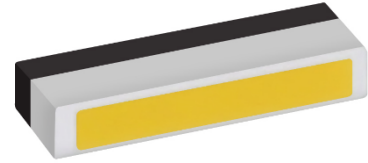




Side View LED

SKHR31AB0



Product Brief

Description

- 1-Chip in one package
- SMT Solderability
- RoHS Compliant
- Low Thermal Resistance
- SKHR31AB0 is very useful side view LED in back light unit application

Features and Benefits

- 1.8 (W) X 0.6 (D) X 0.3 (T) mm
- Side View LED of PCB type

Key Applications

- Flat Backlighting (LCD, Display)
- Mobile Phone, Camera, PDA, Notebook
- Coupling into Light Guide Panel
- AV systems

Table of Contents

Index	
• Product Brief	1
• Table of Contents	2
• Performance Characteristics	3
• Characteristic Diagram	4
• Reliability Test	9
• Color Bin Structure	10
• Mechanical Dimension	13
• Material Structure	14
• Packaging Information	15
• Reflow Soldering Characteristics	18
• Handling of Silicone Resin for LEDs	19
• Precaution For Use	20
• Company Information	24

Performance Characteristics

Table 1. Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Value	Unit
Power Dissipation	P_d^{*1}	100	mW
DC Forward Current	I_F	30	mA
Peak Forward Current	I_{FM}^{*2}	100	mA
Reverse Voltage	V_R	5	V
Operating Temperature	T_{opr}	-30 ~ +85	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 ~ +100	$^\circ\text{C}$
Junction Temperature	$T_j \text{ max}$	105	$^\circ\text{C}$

Notes :

- (1) Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.
- (2) 1/10 Duty Cycle @ 1kHz .

Table 2. Electro Optical Characteristics ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Forward Voltage ¹	Rank Z27	V_F	$I_F = 22\text{mA}$	2.60	-	2.90	V
Reverse Current		I_R	$V_R = 5\text{V}$	-	-	50	μA
Luminous Flux ²	Rank W675	L_m	$I_F = 22\text{mA}$	6.75	-	7.00	lm
	Rank W700			7.00	-	7.25	
	Rank W725			7.25	-	7.50	
	Rank W750			7.50	-	7.75	
	Rank W775			7.75	-	8.00	
Viewing Angle	$2\theta_{1/2}^{*3}$	$I_F = 22\text{mA}$		120		deg.	

Notes :

- (1) Forward voltage measurement allowance is $\pm 0.05\text{V}$
- (2) The luminous flux is measured at the peak of the spatial pattern which may not be aligned with the mechanical axis of the LED package. Luminous flux Measurement allowance is $\pm 5\%$.
- (3) $2\theta_{1/2}$ is the off-axis where the luminous intensity is 1/2 of the peak intensity.
- (4) This product uses a unique phosphor that has a slow response time; when compared with the blue die and green phosphor in the product, the red will fluoresce with a delayed pulse of about 10msec and have an afterglow for about 10msec after the blue die dims. If the LEDs are operated with a pulse current, ensure there are no issues.

Characteristic Diagram

Fig 1. Color Spectrum, $T_a = 25^\circ\text{C}$, $I_F = 22\text{mA}$

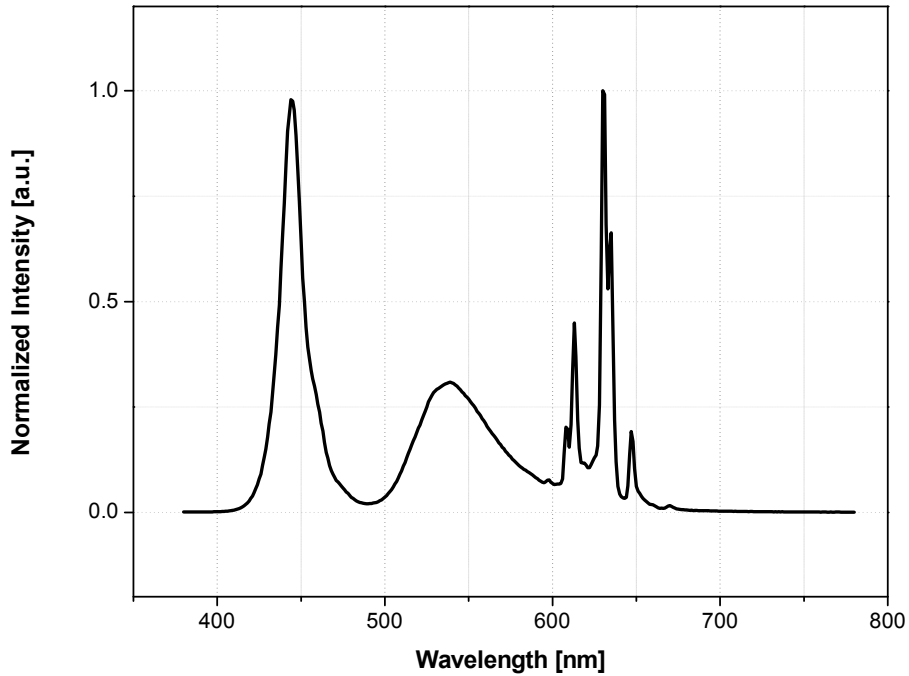
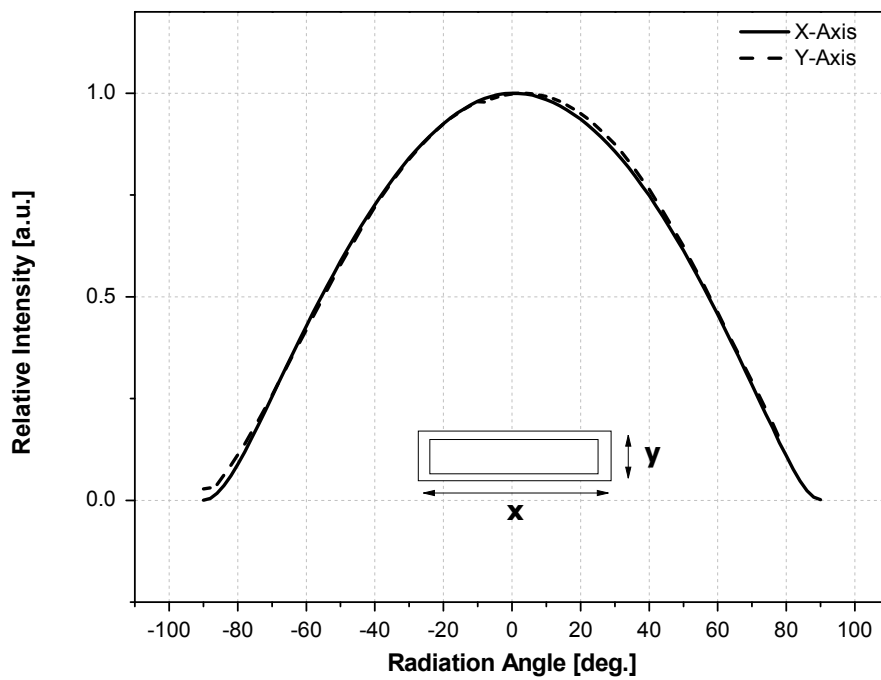
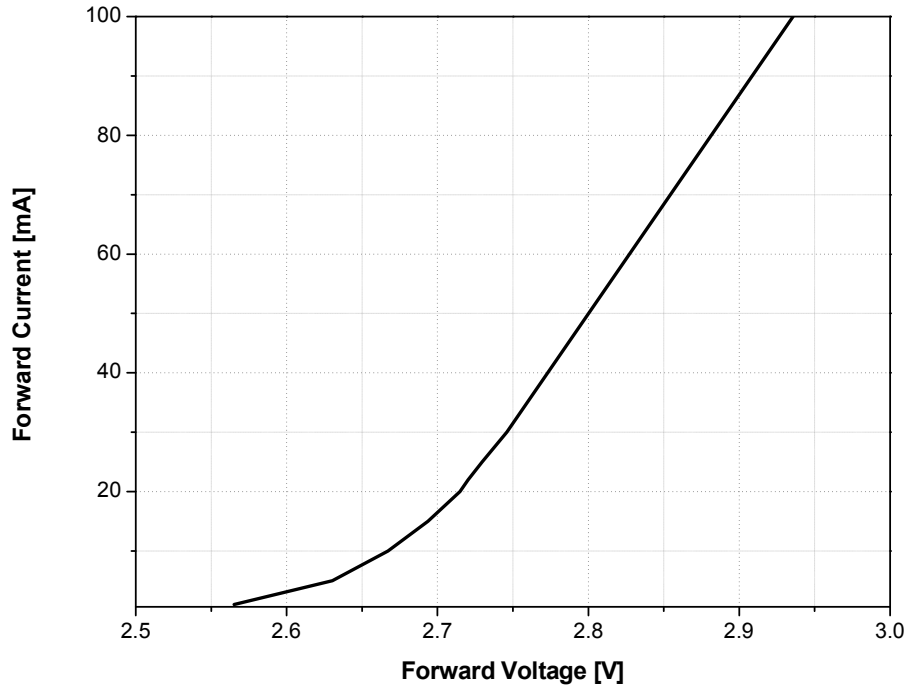
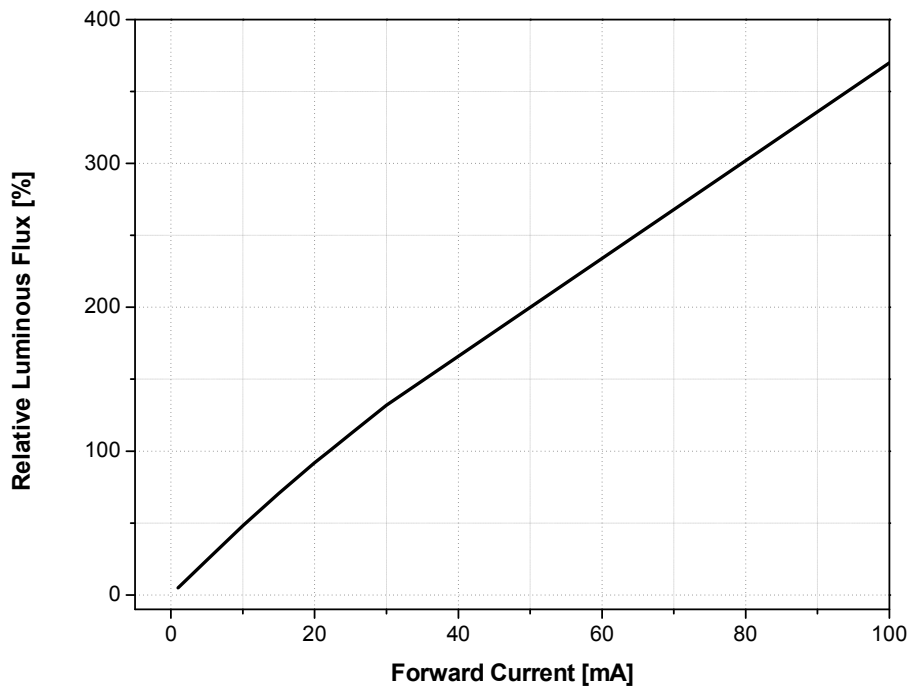


Fig 2. Radiant Pattern, $T_a = 25^\circ\text{C}$, $I_F = 22\text{mA}$



Characteristic Diagram

Fig 3. Forward Voltage vs. Forward Current, $T_a = 25^\circ\text{C}$

Fig 4. Forward Current vs. Relative Luminous Flux, $T_a = 25^\circ\text{C}$


Characteristic Diagram

Fig 5. Forward Current vs. CIE X, Y Shift, $T_a = 25^\circ\text{C}$

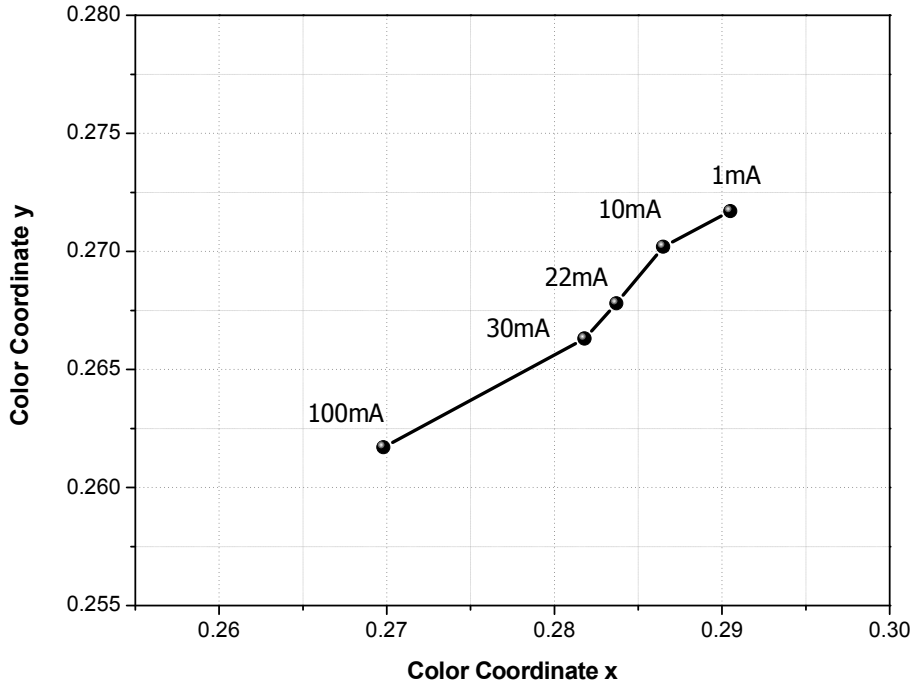
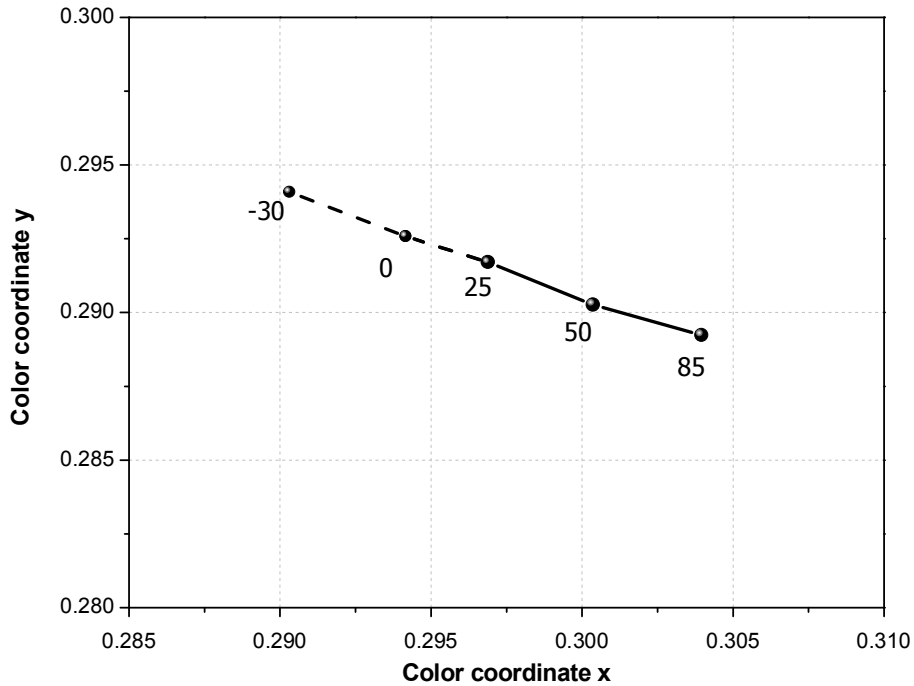


Fig 6. Color Coordinate vs. Ambient Temperature, $I_F = 22\text{mA}$



Characteristic Diagram

Fig 7. Forward Voltage vs. Ambient Temperature, $I_F = 22\text{mA}$

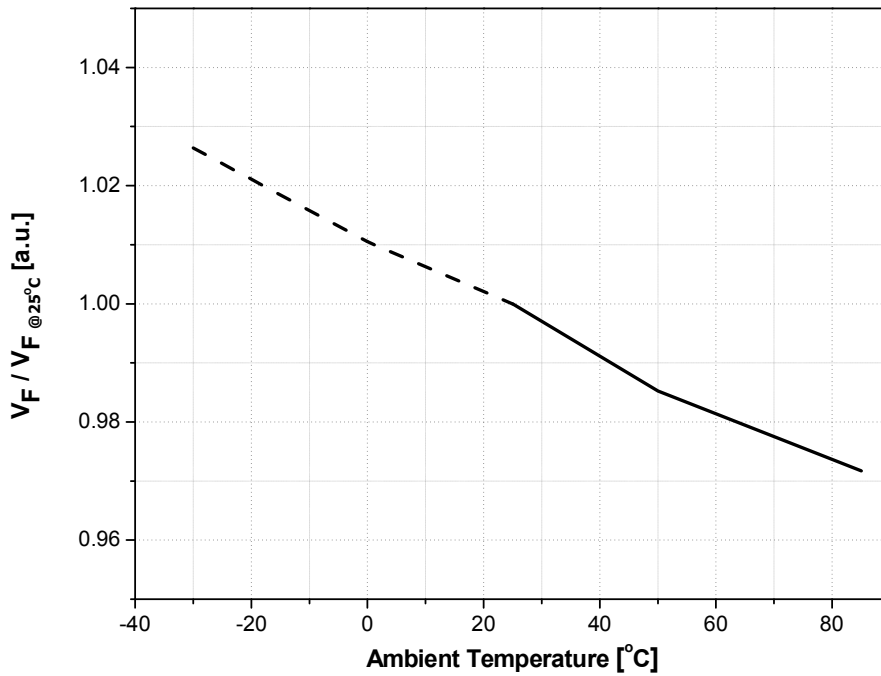
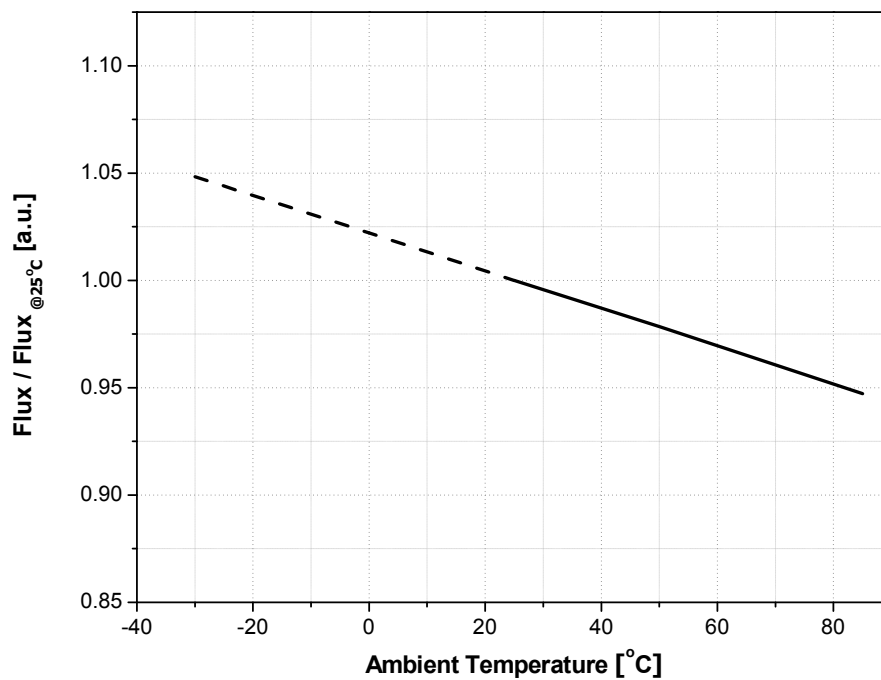


Fig 8. Relative Luminous Flux vs. Ambient Temperature, $I_F = 22\text{mA}$



Characteristic Diagram

Fig 9. Allowable Forward Current vs. Ambient Temperature

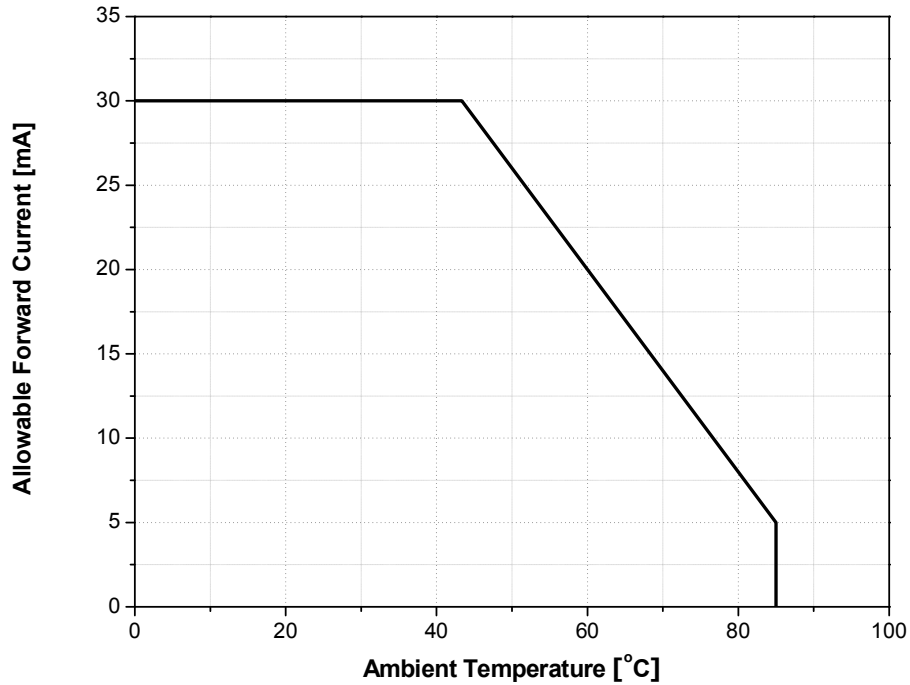
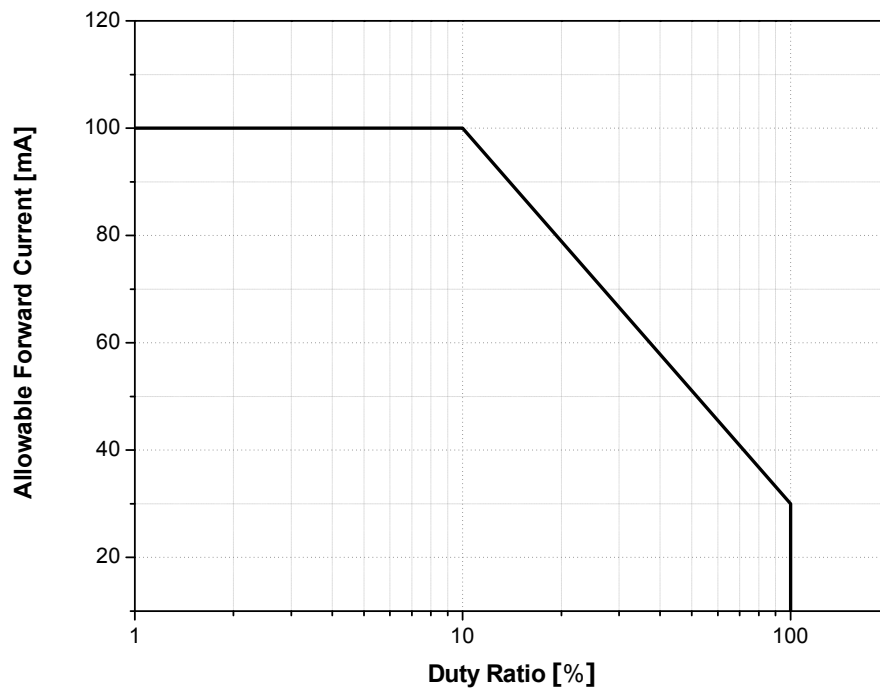


Fig 10. Allowable Forward Current vs. Duty Ratio, $T_a = 25^\circ\text{C}$



Reliability Test

Table 3. Test Items and Results

Item	Reference	Test Condition	Duration / Cycle	Number of Damage
Life Test	-	$T_a = 25^{\circ}\text{C}$, $I_F = 22\text{mA}$	1,000 Hours	0/20
High Temperature Life Test	-	$T_a = 85^{\circ}\text{C}$, $I_F = 5\text{mA}$	1,000 Hours	0/20
Low Temperature Life Test	-	$T_a = -30^{\circ}\text{C}$, $I_F = 22\text{mA}$	1,000 Hours	0/20
High Humidity Heat Life Test	JEITA ED-4701 100 102	$T_a = 60^{\circ}\text{C}$, $\text{RH} = 90\%$, $I_F = 22\text{mA}$	500 Hours	0/20
High Temperature Storage	JEITA ED-4701 200 201	$T_a = 100^{\circ}\text{C}$	1,000 Hours	0/20
Low Temperature Storage	JEITA ED-4701 200 202	$T_a = -40^{\circ}\text{C}$	1,000 Hours	0/20
Temperature Cycle	JEITA ED-4701 100 105	$-40^{\circ}\text{C} \sim 25^{\circ}\text{C} \sim 100^{\circ}\text{C} \sim 25^{\circ}\text{C}$ (30min) (5min) (30min) (5min)	100 cycle	0/20

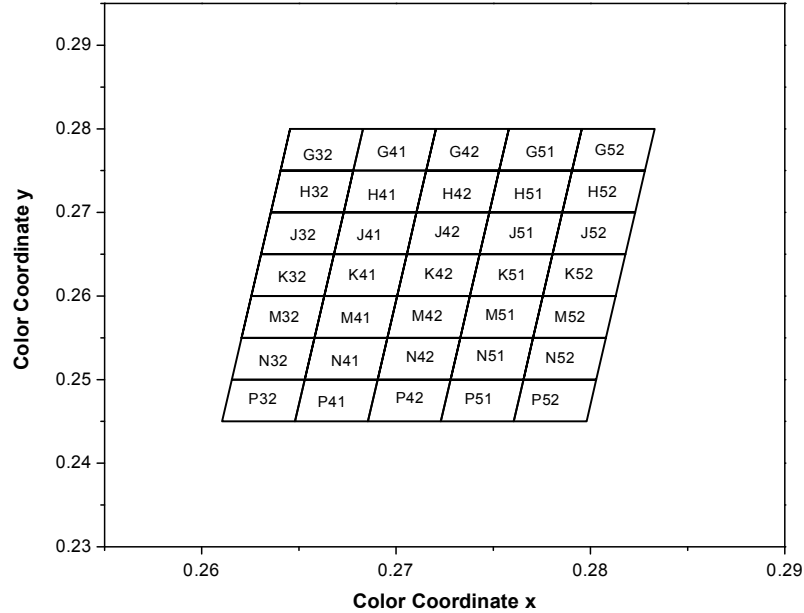
Table 4. Criteria for Judging the Damage

Item	Symbol	Condition	Criteria for Judgment	
			Min	Max
Forward Voltage	V_F	$I_F = 22\text{mA}$	-	$\text{I.V.}^{*1} \times 1.2$
Reverse Current	I_R	$V_R = 5\text{V}$	-	$\text{U.S.L.}^{*2} \times 2.0$
Luminous Flux	I_V	$I_F = 22\text{mA}$	$\text{I.V.} \times 0.7$	-

Notes :

- (1) I.V. : Initial Value
- (2) U.S.L. : Upper Standard Level

Color Bin Structure

Fig 11. CIE Chromaticity Diagram

Table 5. Color Rank

Rank	x1	y1	x2	y2	Rank	x1	y1	x2	y2
	x3	y3	x4	y4		x3	y3	x4	y4
G32	0.2646	0.2800	0.2683	0.2800	M41	0.2663	0.2600	0.2701	0.2600
	0.2678	0.2750	0.2641	0.2750		0.2696	0.2550	0.2658	0.2550
H32	0.2641	0.2750	0.2678	0.2750	N41	0.2658	0.2550	0.2696	0.2550
	0.2673	0.2700	0.2636	0.2700		0.2691	0.2500	0.2653	0.2500
J32	0.2636	0.2700	0.2673	0.2700	P41	0.2653	0.2500	0.2691	0.2500
	0.2668	0.2650	0.2631	0.2650		0.2686	0.2450	0.2648	0.2450
K32	0.2631	0.2650	0.2668	0.2650	G42	0.2721	0.2800	0.2758	0.2800
	0.2663	0.2600	0.2626	0.2600		0.2753	0.2750	0.2716	0.2750
M32	0.2626	0.2600	0.2663	0.2600	H42	0.2716	0.2750	0.2753	0.2750
	0.2658	0.2550	0.2621	0.2550		0.2748	0.2700	0.2711	0.2700
N32	0.2621	0.2550	0.2658	0.2550	J42	0.2711	0.2700	0.2748	0.2700
	0.2653	0.2500	0.2616	0.2500		0.2743	0.2650	0.2706	0.2650
P32	0.2616	0.2500	0.2653	0.2500	K42	0.2706	0.2650	0.2743	0.2650
	0.2648	0.2450	0.2611	0.2450		0.2738	0.2600	0.2701	0.2600
G41	0.2683	0.2800	0.2721	0.2800	M42	0.2701	0.2600	0.2738	0.2600
	0.2716	0.2750	0.2678	0.2750		0.2733	0.2550	0.2696	0.2550
H41	0.2678	0.2750	0.2716	0.2750	N42	0.2696	0.2550	0.2733	0.2550
	0.2711	0.2700	0.2673	0.2700		0.2728	0.2500	0.2691	0.2500
J41	0.2673	0.2700	0.2711	0.2700	P42	0.2691	0.2500	0.2728	0.2500
	0.2706	0.2650	0.2668	0.2650		0.2723	0.2450	0.2686	0.2450
K41	0.2668	0.2650	0.2706	0.2650					
	0.2701	0.2600	0.2663	0.2600					

* Measurement Uncertainty of the Color Coordinates is ± 0.005

Color Bin Structure

Table 5. Color Rank

Rank	x1	y1	x2	y2	Rank	x1	y1	x2	y2
	x3	y3	x4	y4		x3	y3	x4	y4
G51	0.2758	0.2800	0.2796	0.2800	G52	0.2796	0.2800	0.2833	0.2800
	0.2791	0.2750	0.2753	0.2750		0.2828	0.2750	0.2791	0.2750
H51	0.2753	0.2750	0.2791	0.2750	H52	0.2791	0.2750	0.2828	0.2750
	0.2786	0.2700	0.2748	0.2700		0.2823	0.2700	0.2786	0.2700
J51	0.2748	0.2700	0.2786	0.2700	J52	0.2786	0.2700	0.2823	0.2700
	0.2781	0.2650	0.2743	0.2650		0.2818	0.2650	0.2781	0.2650
K51	0.2743	0.2650	0.2781	0.2650	K52	0.2781	0.2650	0.2818	0.2650
	0.2776	0.2600	0.2738	0.2600		0.2813	0.2600	0.2776	0.2600
M51	0.2738	0.2600	0.2776	0.2600	M52	0.2776	0.2600	0.2813	0.2600
	0.2771	0.2550	0.2733	0.2550		0.2808	0.2550	0.2771	0.2550
N51	0.2733	0.2550	0.2771	0.2550	N52	0.2771	0.2550	0.2808	0.2550
	0.2766	0.2500	0.2728	0.2500		0.2803	0.2500	0.2766	0.2500
P51	0.2728	0.2500	0.2766	0.2500	P52	0.2766	0.2500	0.2803	0.2500
	0.2761	0.2450	0.2723	0.2450		0.2798	0.2450	0.2761	0.2450

* Measurement Uncertainty of the Color Coordinates is ± 0.005

Color Bin Structure

Table 6. Bin Code Description
Part Number : SKHR31AB0

Bin Code			
Luminous Flux	Color Rank	Wp	Forward Voltage
W725	M42	X	Z26



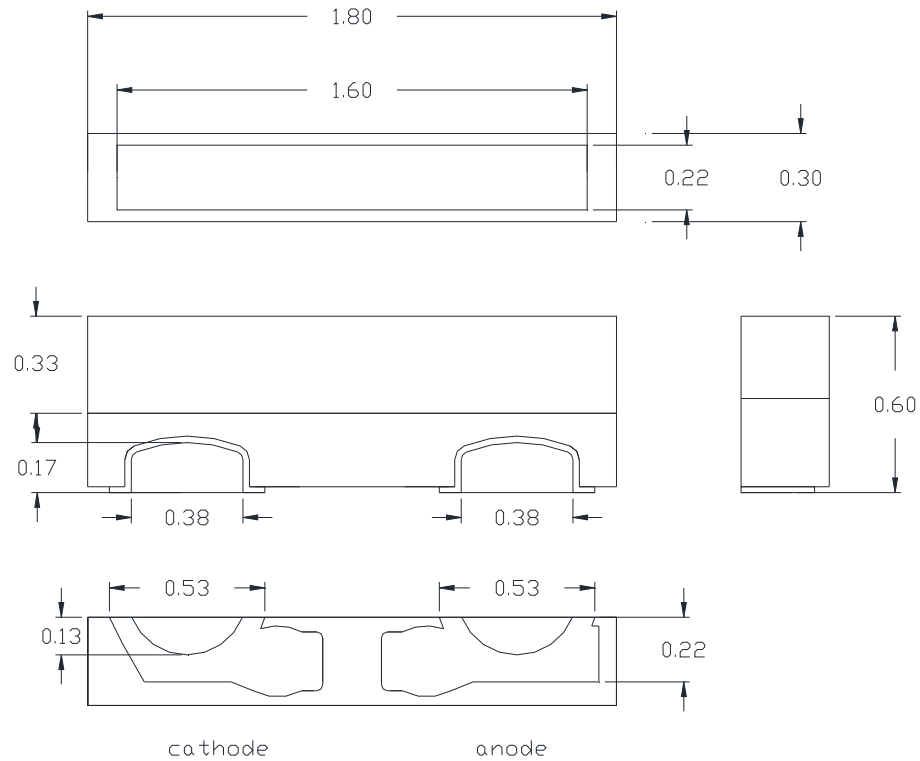
Luminous Flux(lm) @ I _F = 22mA			Color Rank @ I _F = 22mA	Wp(nm) @ I _F = 22mA			Forward Voltage(V) @ I _F = 20mA		
Bin Code	Min.	Max.	Bin Code	Bin Code	Min.	Max.	Bin Code	Min.	Max.
W675	6.75	7.00	G32	W	443	446	Z26	2.60	2.90
W700	7.00	7.25	G41	X	446	449			
W725	7.25	7.50	:	Y	449	452			
W750	7.50	7.75	:						
W775	7.75	8.00	P51						
			P52						

 Available Ranks

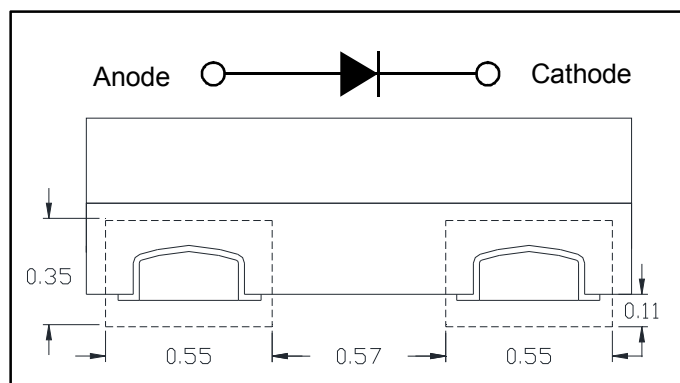
* Wavelength measurement allowance is ±2nm

Mechanical dimensions

PKG Outline Dimension

 (Tolerance: ± 0.1 , Unit: mm)


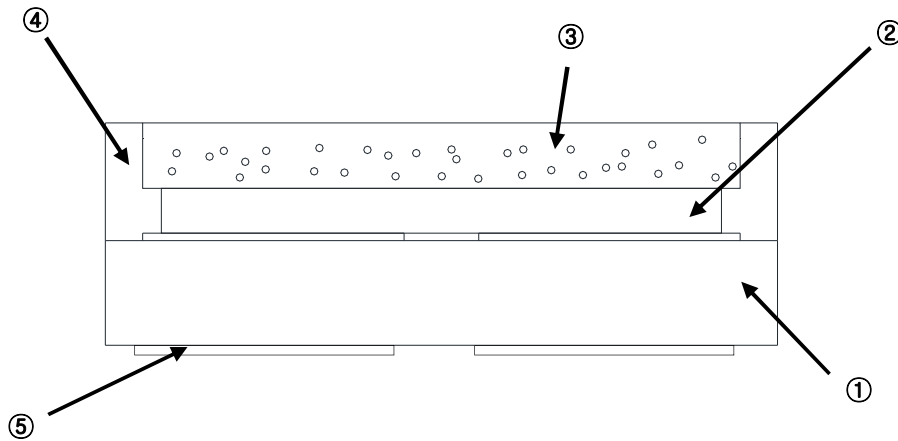
<Recommended Solder Pattern>



Notes :

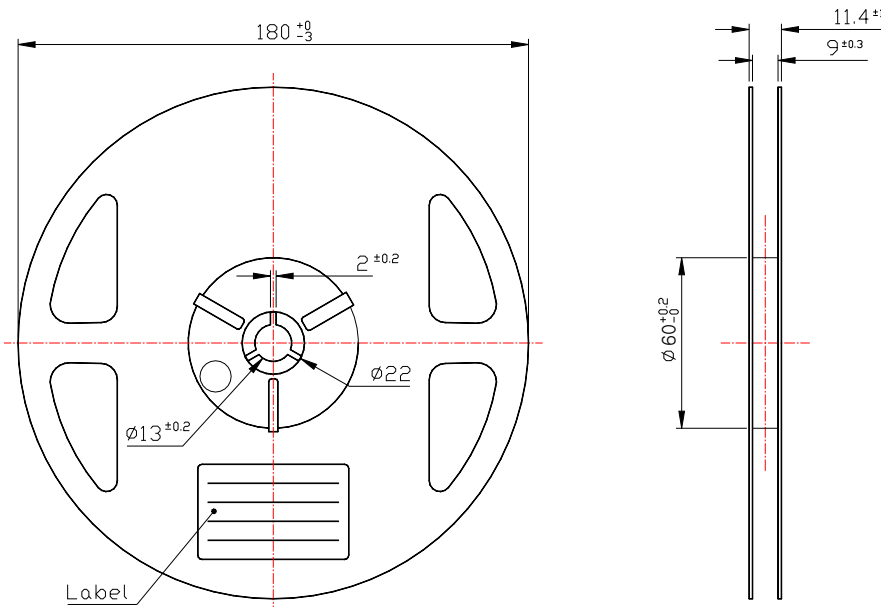
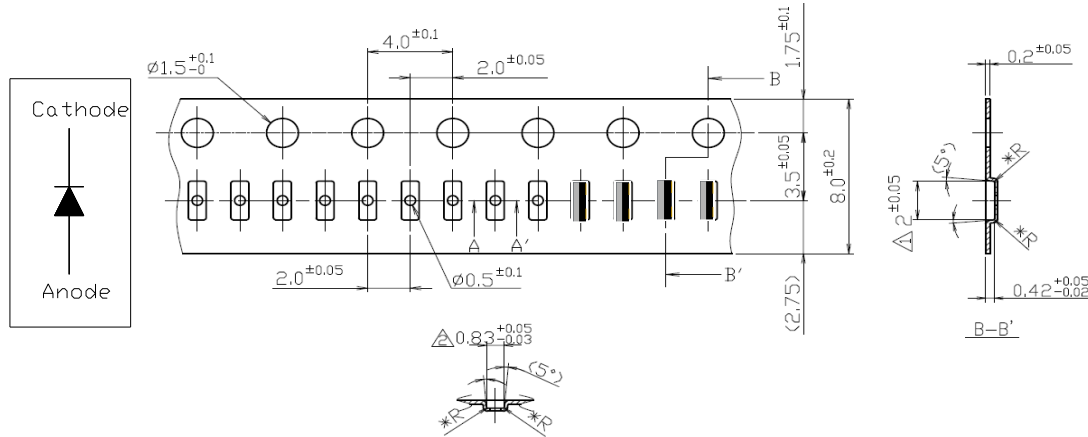
(1) Dimension is not including mold flash or metal burr.

Material Structure



No.	LIST	MATERIAL
①	Frame	Glass Fabric Based- Epoxy Resin
②	LED Chip	GaN on Sapphire
③	Phosphor	Nitride + KSF+Silicone
④	Housing	Silicone Resin
⑤	Metal	Cu Base / Au- Plated

Emitter Tape & Reel Packaging



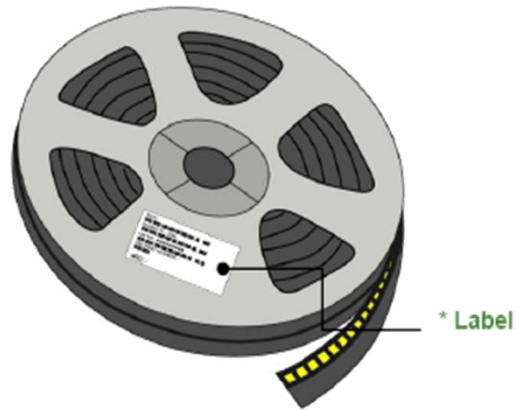
(Tolerance: ± 0.2 , Unit: mm)

Notes :

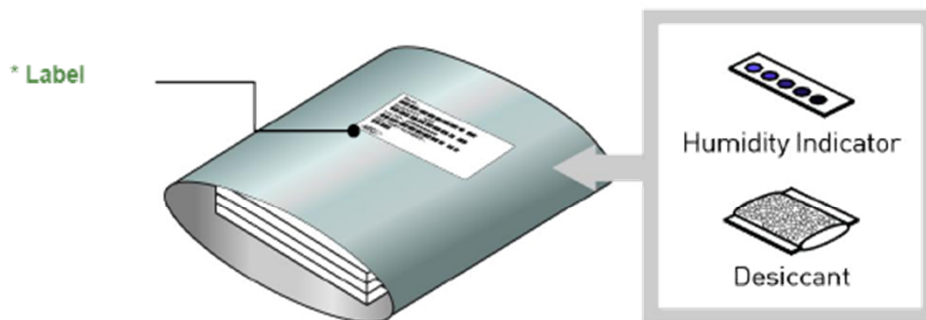
- (1) Quantity : min 2,000 pcs/Reel
- (2) Cumulative Tolerance : Cumulative Tolerance/10 pitches to be ± 0.2 mm
- (3) Adhesion Strength of Cover Tape : Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at the angle of 10° to the carrier tape
- (4) Package : P/N, Manufacturing data Code No. and quantity to be indicated on a damp proof Package

Emitter Tape & Reel Packaging

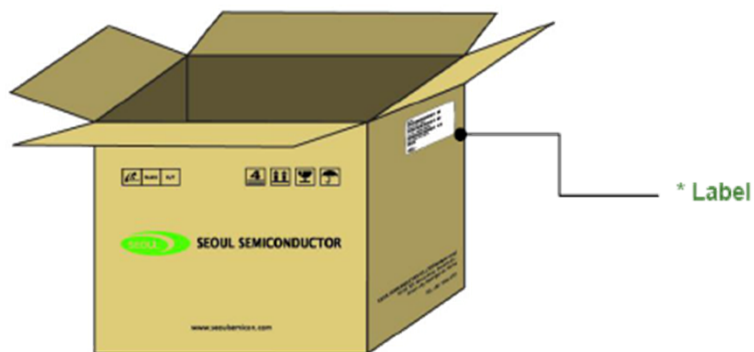
Reel



Aluminum Bag



Outer Box



Product Nomenclature

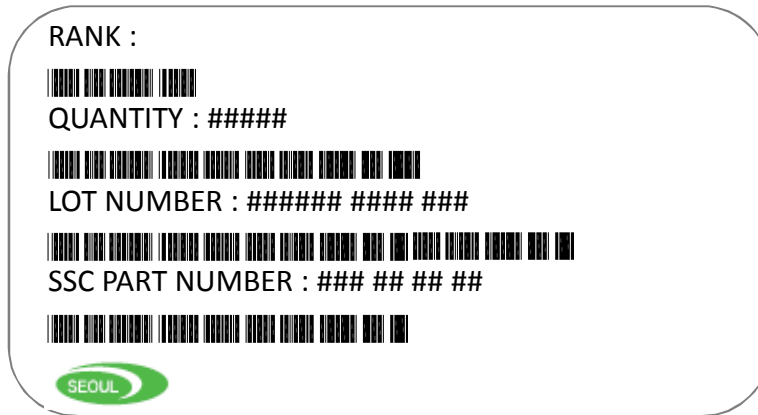


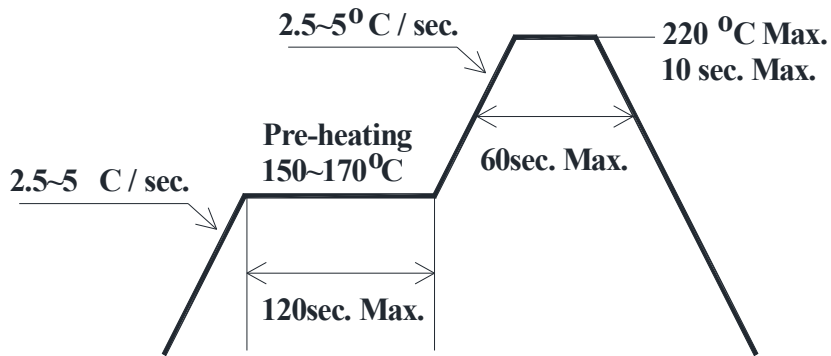
Table 7. Part Numbering System : X₁X₂X₃ - X₄X₅ - X₆X₇ - X₈X₉

The lot number is composed of the following characters aaaaabbbbb-ccc-ccc-ddddddd

Symbol	Meaning	Example
aaaaa	The Date	09A23 (Year : 09, A : Month, 23 : Day)
bbbbbb	SSC's Number	Ex) S0017 0001~9999 Allowance
ccc-ccc	Order of Taping	014-001
ddddddd	SSC's Number	7300024(Automatic)

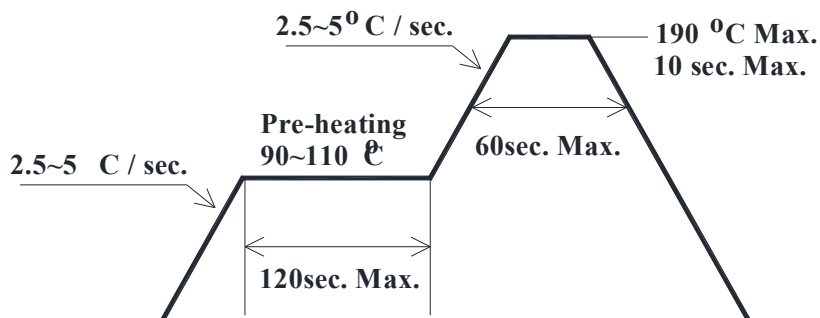
Reflow Soldering Characteristics

(1) Middle temperature Solder



Lead Solder	
Pre-heat	150~170°C
Pre-heat time	120 sec. Max.
Peak-Temperature	220°C Max.
Soldering time Condition	10 sec. Max.

(2) Low temperature Solder



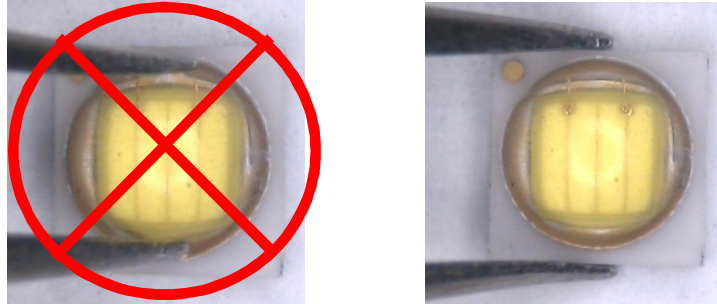
Lead Free Solder	
Pre-heat	90~110°C
Pre-heat time	120 sec. Max.
Peak-Temperature	190°C Max.
Soldering time Condition	10 sec. Max.

Notes :

(1) In case that the soldered products are reused in soldering process, we don't guarantee the products.

Handling of Silicone Resin for LEDs

- (1) During processing, mechanical stress on the surface should be minimized as much as possible. Sharp objects of all types should not be used to pierce the sealing compound.



- (2) In general, LEDs should only be handled from the side. By the way, this also applies to LEDs without a silicone sealant, since the surface can also become scratched.
- (3) When populating boards in SMT production, there are basically no restrictions regarding the form of the pick and place nozzle, except that mechanical pressure on the surface of the resin must be prevented. This is assured by choosing a pick and place nozzle which is larger than the LED's reflector area.
- (4) Silicone differs from materials conventionally used for the manufacturing of LEDs. These conditions must be considered during the handling of such devices. Compared to standard encapsulants, silicone is generally softer, and the surface is more likely to attract dust. As mentioned previously, the increased sensitivity to dust requires 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.
- (5) Seoul Semiconductor 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.
- (6) Please do not mold this product into another resin (epoxy, urethane, etc) and do not handle this product with acid or sulfur material in sealed space.
- (7) Avoid leaving fingerprints on silicone resin parts.



Precaution for Use

(1) Storage conditions

Keep the product in a dry box or a desiccator with a desiccant in order to prevent moisture absorption.

- a. Keep it at a temperature in the range from 5°C to 30°C and at a humidity of less than 50% RH. The product should be kept within a year.

(2) After opening the package .

When soldering, this could result in a decrease of the photoelectric effect or light intensity.

- a. Soldering should be done right after mounting the product.
- b. Keep the temperature in the range from 5°C to 30°C and the humidity at less than 60%.

Soldering should be done within 7 days after opening the desiccant package.

An unused and unsealed product should be repacked in a desiccant package and kept sealed in a dry atmosphere.

Stored at a humidity of less than 10% RH.

(3) Precautions for use

Any external mechanical force or excessive vibration should not be applied to the product during cooling after soldering, and it is preferable to avoid rapid cooling.

The product should not be mounted on a distorted part of PCB.

Gloves or wrist bands for ESD(Electric Static Discharge) should be wore in order to prevent ESD and surge damage, and all devices and equipments must be grounded to the earth.

(4) Miscellaneous

Radiation resistance is not considered.

When cleaning the product, any kind of fluid such as water, oil and organic solvent must not be used and IPA(Isopropyl Alcohol) must be used.

When using the product, operating current should be settled in consideration of the maximum ambient temperature.

Its appearance or specification for improvement is subject to change without notice.



Precaution for Use

(5) LEDs are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS).

Below is a list of suggestions that Seoul Semiconductor purposes to minimize these effects.

a. ESD (Electro Static Discharge)

Electrostatic discharge (ESD) is defined as the release of static electricity when two objects come into contact. While most ESD events are considered harmless, it can be an expensive problem in many industrial environments during production and storage. The damage from ESD to LEDs may cause the product to demonstrate unusual characteristics such as:

- Increase in reverse leakage current lowered turn-on voltage
- Abnormal emissions from the LED at low current

The following recommendations are suggested to help minimize the potential for an ESD event. One or more recommended work area suggestions:

- Ionizing fan setup
- ESD table/shelf mat made of conductive materials
- ESD safe storage containers

One or more personnel suggestion options:

- Antistatic wrist-strap
- Antistatic material shoes
- Antistatic clothes

Environmental controls:

- Humidity control (ESD gets worse in a dry environment)



Precaution for Use

b. EOS (Electrical Over Stress)

Electrical Over-Stress (EOS) is defined as damage that may occur when an electronic device is subjected to a current or voltage that is beyond the maximum specification limits of the device. The effects from an EOS event can be noticed through product performance like:

- Changes to the performance of the LED package
(If the damage is around the bond pad area and since the package is completely encapsulated the package may turn on but flicker show severe performance degradation.)
- Changes to the light output of the luminaire from component failure
- Components on the board not operating at determined drive power

Failure of performance from entire fixture due to changes in circuit voltage and current across total circuit causing trickle down failures. It is impossible to predict the failure mode of every LED exposed to electrical overstress as the failure modes have been investigated to vary, but there are some common signs that will indicate an EOS event has occurred:

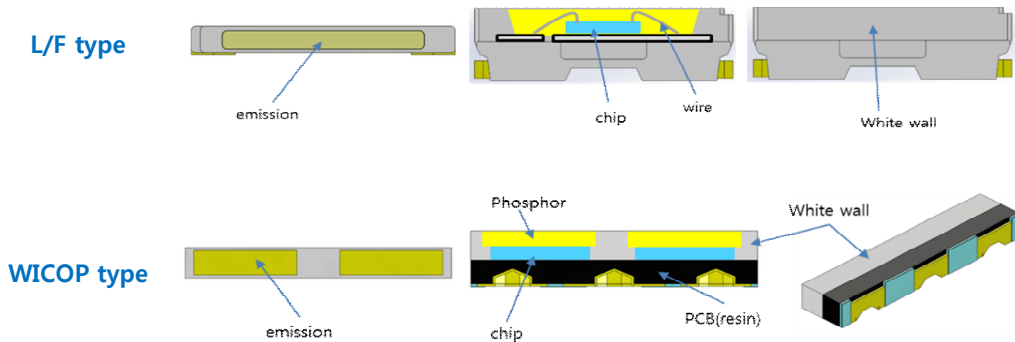
- Damaged may be noticed to the bond wires (appearing similar to a blown fuse)
- Damage to the bond pads located on the emission surface of the LED package
(shadowing can be noticed around the bond pads while viewing through a microscope)
- Anomalies noticed in the encapsulation and phosphor around the bond wires.
- This damage usually appears due to the thermal stress produced during the EOS event.

c. To help minimize the damage from an EOS event Seoul Semiconductor recommends utilizing:

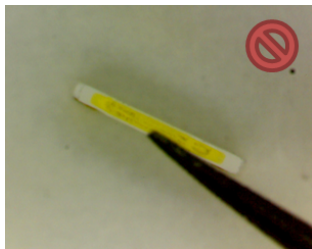
- A surge protection circuit
- An appropriately rated over voltage protection device
- A current limiting device

Precaution for Use

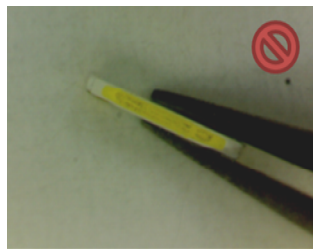
(6) Side View LED structure and precautions



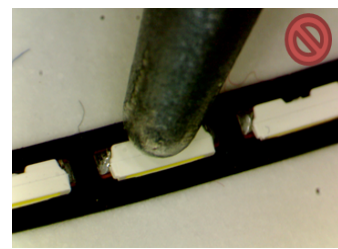
- The light emitting part of the side view LED consists of silicones and shall not interfere with the light emitting part. Interference with a sharp tool can tear up the silicon, damaging the wire and the chip, it can cause a fatal defect.
- Do not to apply pressure to the white wall area from the outside.
If the force is applied, the appearance of the PKG can be distorted (damaged), and the chip can be broken (damaged), resulting in poor lighting.
- Chip crack can occur without any external pressure trace due to PCB bending.
- Be careful when using parts smaller than the illuminating part, as it may interfere with the light emitting part.



Be careful not to interfere with the light emitting part with sharp tools.

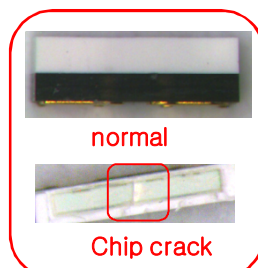
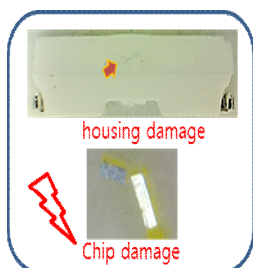


Do not to apply excessive force to the central part of the PKG. (chip crack)



Do not to externally push the center of the PKG. (housing, chip crack)

Defect phenomenon





Company Information

Published by

Seoul Semiconductor © 2013 All Rights Reserved.

Company Information

Seoul Semiconductor (www.SeoulSemicon.com) manufactures and packages a wide selection of light emitting diodes (LEDs) for the automotive, general illumination/lighting, Home appliance, signage and back lighting markets. The company is the world's fifth largest LED supplier, holding more than 10,000 patents globally, while offering a wide range of LED technology and production capacity in areas such as "nPola", "Acrich", the world's first commercially produced AC LED, and "Acrich MJT - Multi-Junction Technology" a proprietary family of high-voltage LEDs.

The company's broad product portfolio includes a wide array of package and device choices such as Acrich and Acirch2, high-brightness LEDs, mid-power LEDs, side-view LEDs, and through-hole type LEDs as well as custom modules, displays, and sensors.

Legal Disclaimer

Information in this document is provided in connection with Seoul Semiconductor products. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Seoul Semiconductor hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party. The appearance and specifications of the product can be changed to improve the quality and/or performance without notice.