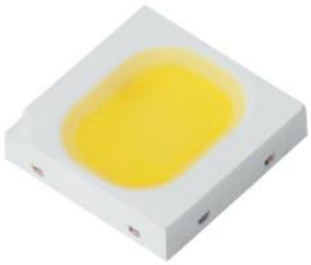
SPECIFICATION
[SBJFQ120E]

Seoul semiconductor			Customer
Drawn by	Checked by	Approved by	Approved by

Edge type Application

SBJFQ120E

Top view LED



Product Brief

Description

- This surface-mount LED comes in standard package dimension.
- It has a substrate made up of a molded white EMC reflector sitting on top of a flat lead frame.
- The die is attached within the reflector cavity and the cavity is encapsulated by silicone.
- The package design coupled with careful selection of component materials allow these products to perform with high reliability.

Features and Benefits

- White colored SMT package
- Low Thermal Resistance
- RoHS Complaint
- Pb-free Reflow Soldering application
- Suitable for all SMT assembly and soldering methods (Must not be hand soldering)

Key Applications

- Flat Backlighting (LCD, Display)
- MNT, TV etc.

Table of Contents

Performance Characteristics

Table 1. Absolute Maximum Ratings (T_a = 25ºC)

Parameter	Symbol	Value	Unit
Power Dissipation	P_d *1	2305.8	mW
DC Forward Current	I_F	650	mA
Operating Temperature	T_{opr}	-30 ~ +85	ºC
Storage Temperature	T_{stg}	-40 ~ +100	ºC
Junction Temperature	Tj max	145	ºC

Notes :

(1) Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.

Table 2. Electro Optical Characteristics (T_a = 25ºC)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage*1	V_F	I_F =400mA	2.9	3.1	3.3	V
Luminous Flux	Flux	I_F =400mA	109	121	136	lm
Viewing Angle*3	H axis-2$\theta_{½}$	I_F =400mA		120		deg.
	V axis-2$\theta_{½}$	I_F =400mA		120		deg.
CIE x	Cx	I_F =400mA	0.269	0.282	0.294	-
CIE y	Cy	I_F =400mA	0.224	0.245	0.266	-
ESD	-	-	5	-	-	kV
Thermal Resistance (Junction to Solder) *4	$R_{th(j-s)}$	I_F =400mA		10		K/W

Notes :

(1) Forward voltage measurement allowance is ±0.1V
(2) The luminous Flux value is based on SSC Calibration. Luminous Flux measurement allowance is ±7%.
(3) $2\theta_{1/2}$ is the off-axis where the luminous intensity is 1/2 of the peak intensity.
(4) R_{th} can be different by T_s at the ambient temperature (PCB : SSC standard)

Characteristic Diagram

Fig 1. Color Spectrum, T_a = 25℃, I_F = 400mA, RH30%

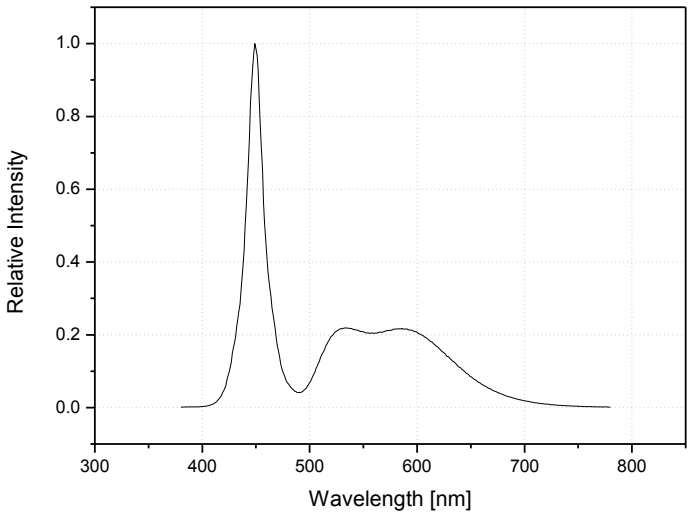
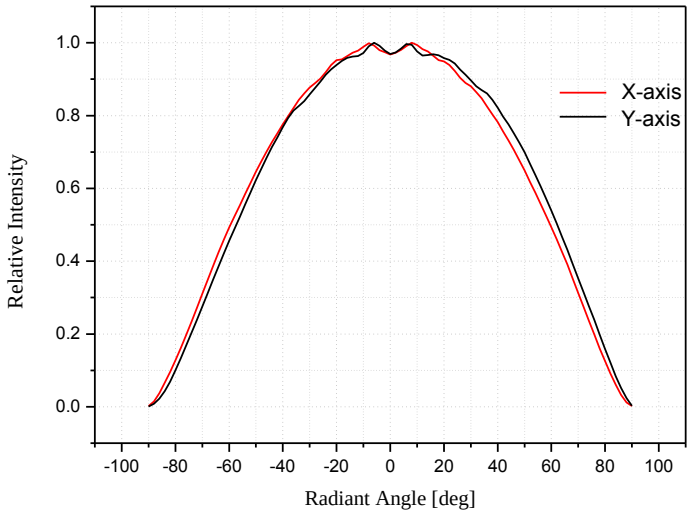


Fig 2. Radiant pattern, T_a = 25℃



Characteristic Diagram

Fig 3. Forward Voltage vs. Forward Current , T_a = 25℃

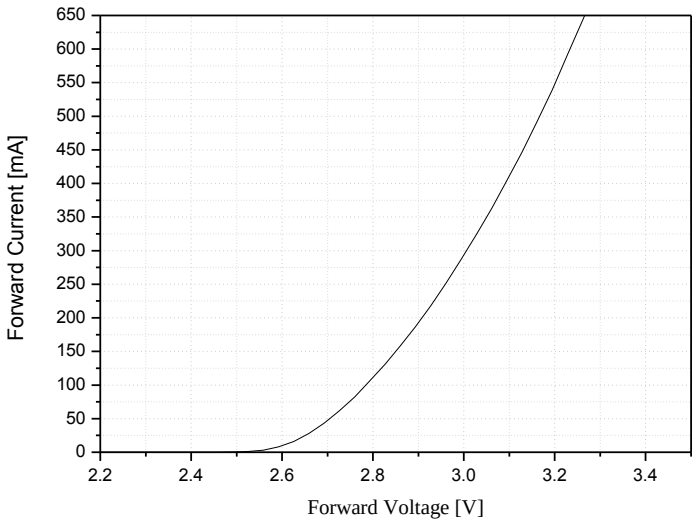
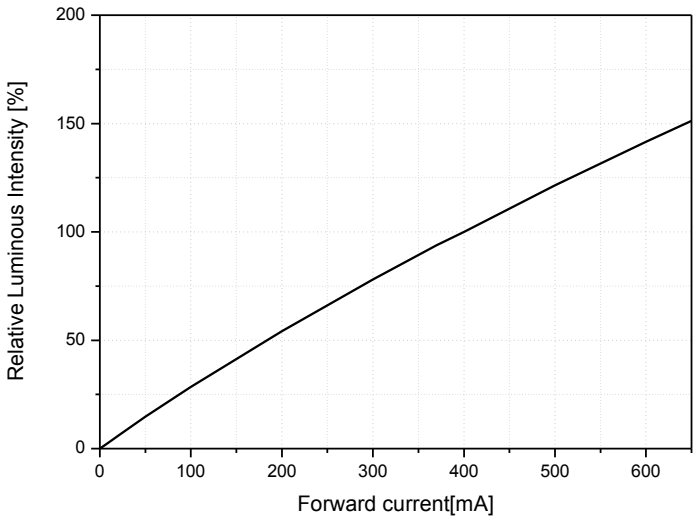


Fig 4. Forward Current vs. Relative Luminous Flux, T_a = 25℃



Characteristic Diagram

Fig 5. Forward Current vs. CIE X, Y Shift, T_a = 25℃

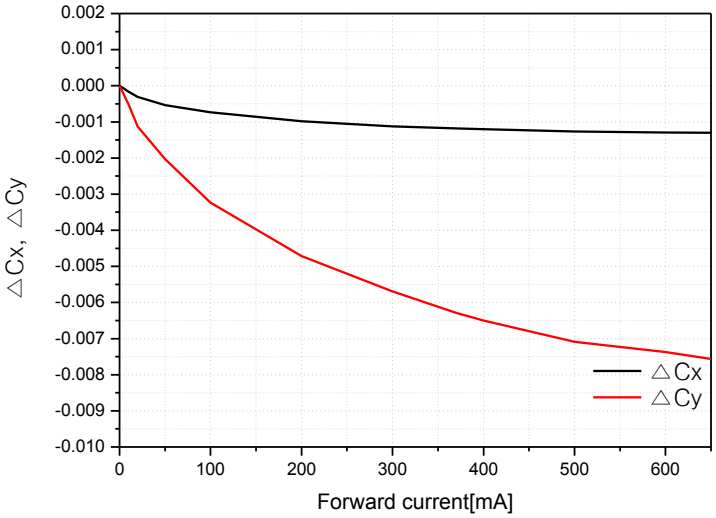
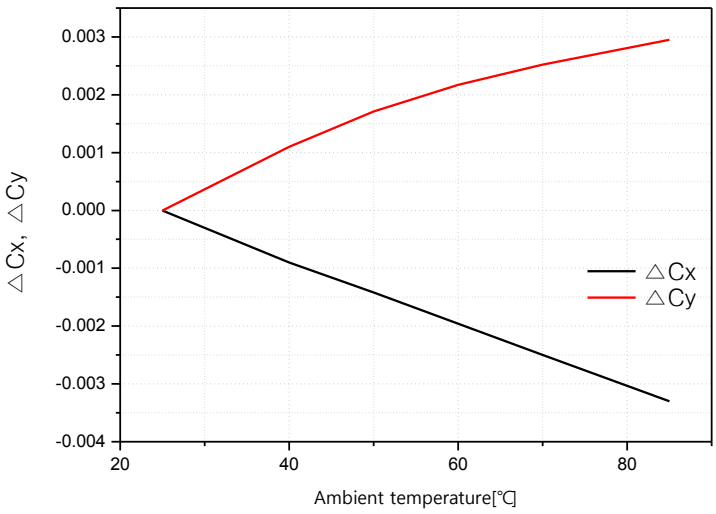


Fig 6. Color Coordinate vs. Ambient Temperature, I_F =400mA



Characteristic Diagram

Fig 7. Forward Voltage vs. Ambient Temperature, I_F =400mA

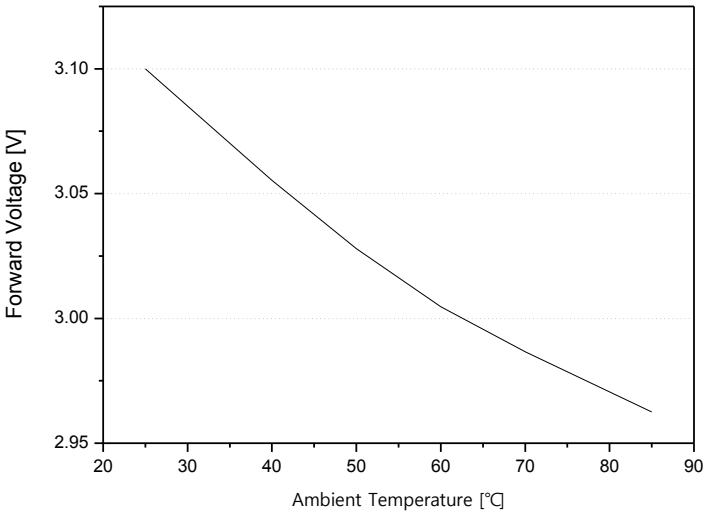
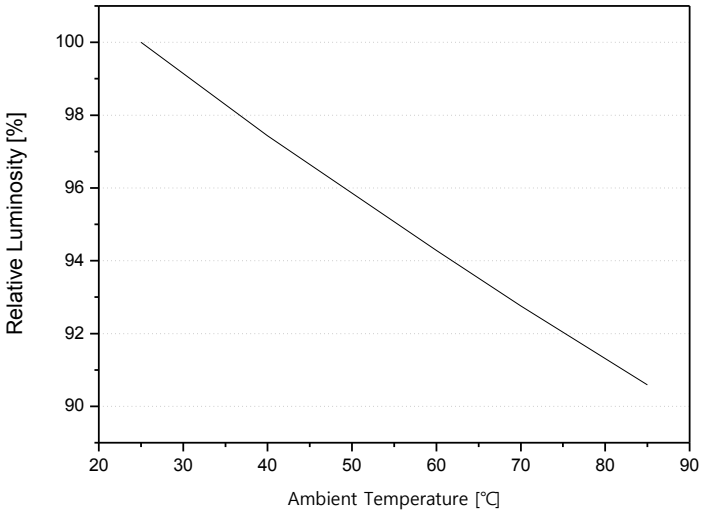


Fig 8. Relative Luminosity vs. Ambient Temperature, I_F =400mA



Reliability Test

Table 1. TEST ITEMS AND RESULTS

Item	Reference	Test Condition	Duration / Cycle	Number of Damage
Room Temperature Operating Test	-	25℃±3℃, DC 240mA	1000hr	0/50
High Temperature Operating Test	-	Tj 145℃, DC 240mA (Normal Current)	1000hr	0/50
High Temperature Operating Test	-	Tj 145℃, DC 650mA	1000hr	0/50
Low Temperature Operating Test	-	-40℃±3℃, DC 240mA	1000hr	0/50
Wet High Temperature Operating Test	-	60℃±3℃, 90%±2%RH, DC 240mA	1000hr	0/50
Temperature Humidity Cycle Operating Test	-	25℃~65℃~-10℃, DC 240mA 24hrs/1cycle, 95%RH	10 Cycles	0/50
Wet High Temperature On/Off	-	85℃±3℃, 85%±2%RH, DC 240mA, On/2sec, Off/5sec	100,000 cycles	0/50
High Temperature Storage	-	Ta=100℃±3℃	1000hr	0/11
Low Temperature Storage	-	Ta=-40℃±3℃	1000hr	0/11
Thermal Shock	-	-45℃/30min~125℃/30min	200 cycles	0/100
Reflow	-	Peak 260℃±5℃ for 10sec, 220℃ over time 60sec max	3 times	0/11
ESD(HBM)	-	R1:10㏁, R2:1.5㏀, C:100㎊	5 times/1 sec (±5kV)	0/5

Table 2. Criteria for Judging the Damage

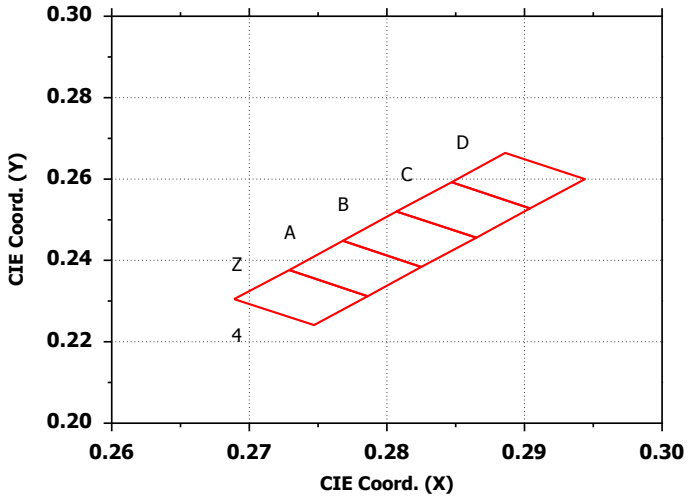
Item	Symbol	Condition	Criteria for Judgment	
			MIN	MAX
Forward Voltage	V_F	I_F =400mA		I.V. *1 × 1.1
Luminous Flux	Φ_V	I_F =400mA	I.V. *1 × 0.7	

Notes :

*(1) I.V. : Initial Value

Color Bin Structure

CIE Chromaticity Diagram



RANK	x1	y1	x2	y2
	x3	y3	x4	y4
Z4	0.2689	0.2305	0.2729	0.2376
	0.2786	0.2312	0.2747	0.2241
A4	0.2729	0.2376	0.2768	0.2448
	0.2825	0.2384	0.2786	0.2312
B4	0.2768	0.2448	0.2807	0.2520
	0.2865	0.2456	0.2825	0.2384
C4	0.2807	0.2520	0.2847	0.2592
	0.2904	0.2528	0.2865	0.2456
D4	0.2847	0.2592	0.2886	0.2664
	0.2944	0.2600	0.2904	0.2528

Color Bin Structure

Table 5. Bin Code description

Part Number : SBJFQ120E

Bin Code			
Luminous Flux	CIE	Wp	Forward Voltage
A118	B4	G	Z29

Luminous Flux [lm] @ I_F = 400mA		
Bin Code	Min.	Max.
A109	109	112
A112	112	115
A115	115	118
A118	118	121
A121	121	124
A124	124	127
A127	127	130
A130	130	133
A133	133	136

Color Rank @ I_F = 400mA
Z4
A4
B4
C4
D4

Peak Wavelength [nm] @ I_F = 400mA		
Bin Code	Min.	Max.
F	439.5	444.0
G	444.0	448.0
H	448.0	452.5

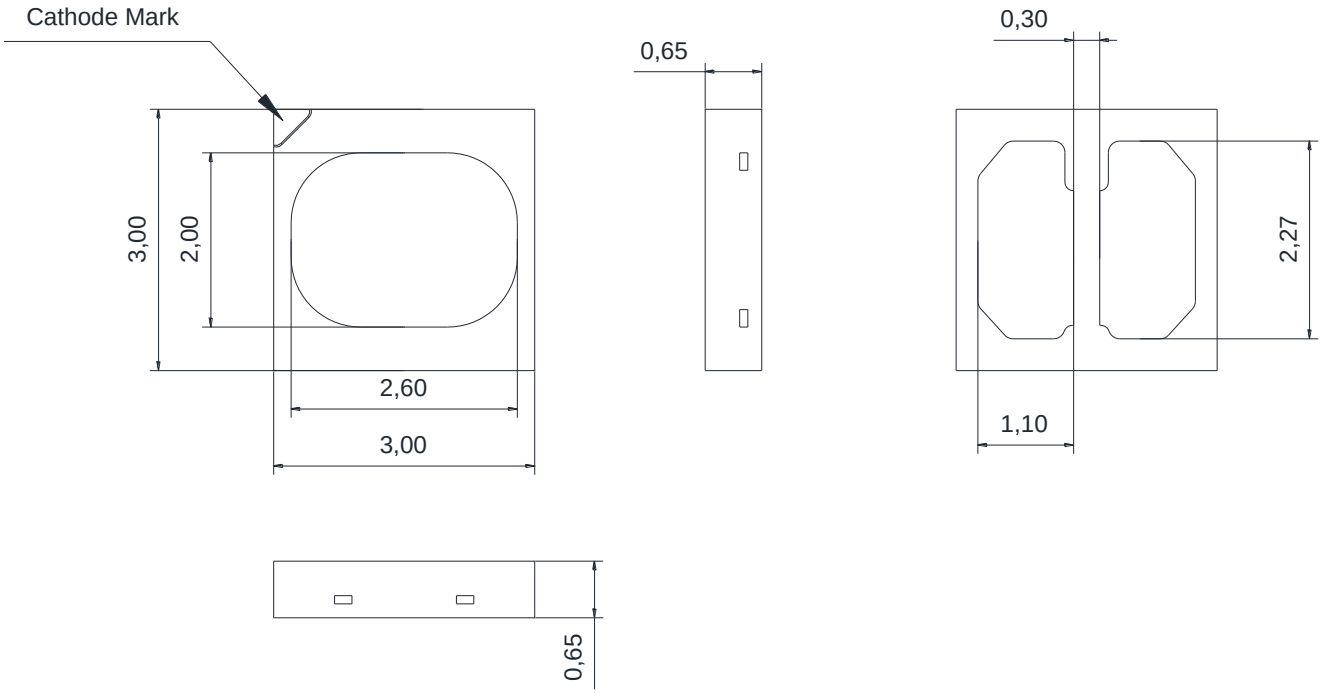
Forward Voltage [V] @ I_F = 400mA		
Bin Code	Min.	Max.
Z29	2.9	3.1
Z31	3.1	3.3

Available Ranks

Mechanical Dimensions

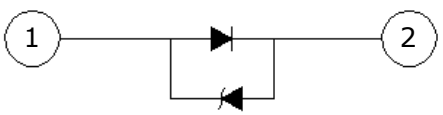
(Tolerance: ±0.1, Unit: mm)

PKG Outline dimension

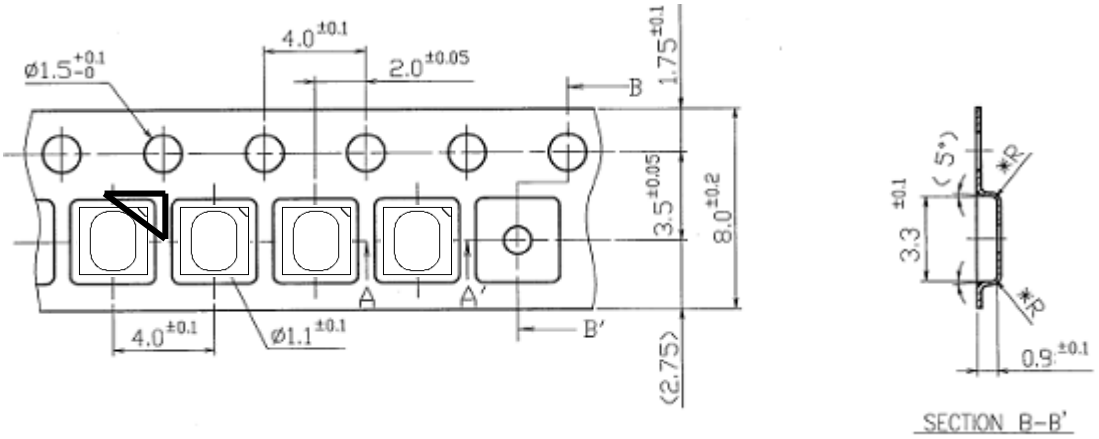


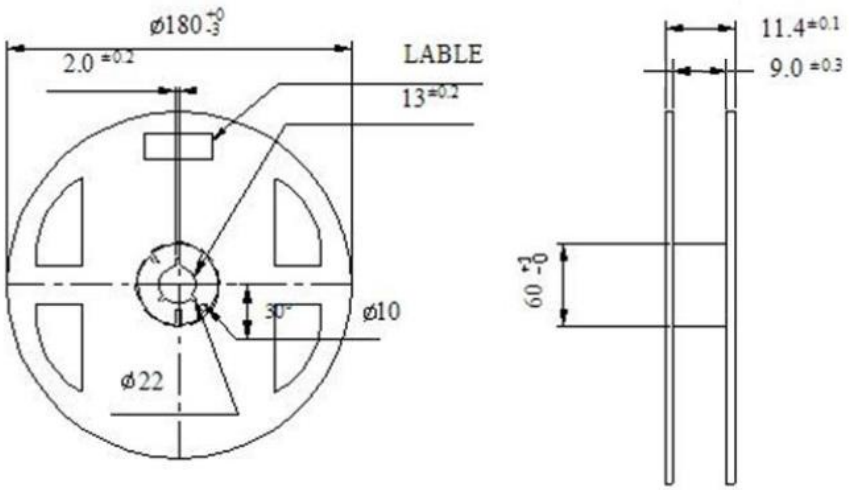
<Circuit>

Anode Cathode



Emitter Tape & Reel Packaging



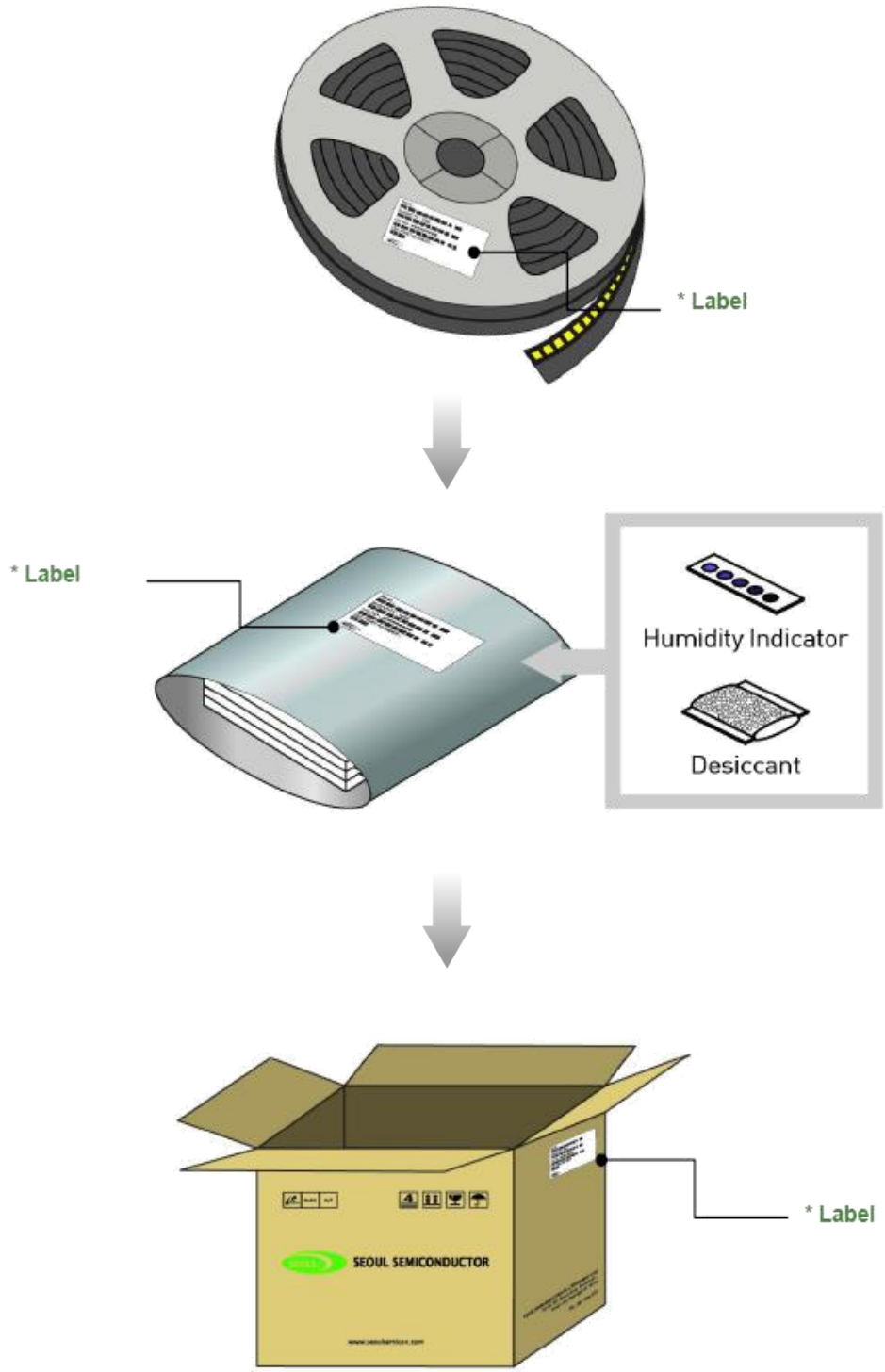


(Tolerance: ±0.2, Unit: mm)

Notes :

(1) Quantity : Max 4,500pcs/Reel
(2) Cumulative Tolerance : Cumulative Tolerance/10 pitches to be ±0.2mm
(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



Product Nomenclature

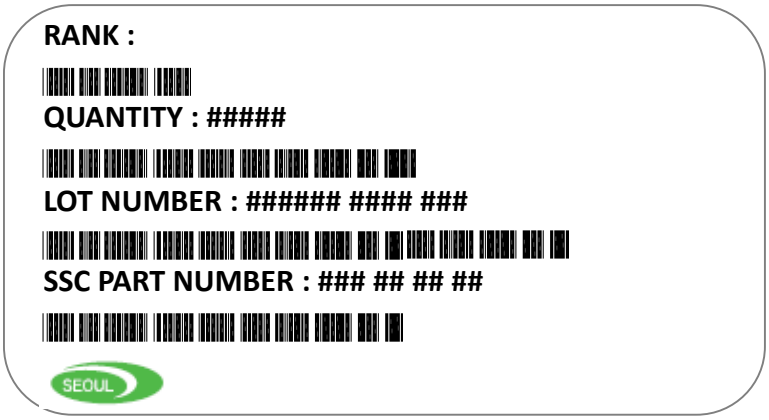
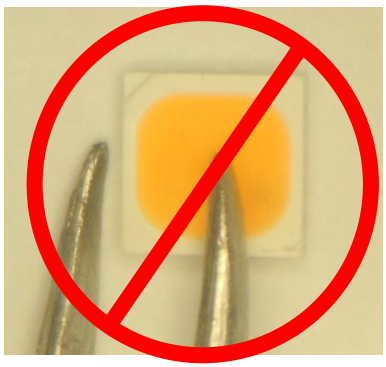


Table 6. Lot Numbering System : $Y_1Y_2Y_3Y_4Y_5Y_6\ Y_7Y_8Y_9Y_{10}–Y_{11}Y_{12}Y_{13}–Y_{14}Y_{15}Y_{16}–Y_{17}Y_{18}Y_{19}\ Y_{20}Y_{21}Y_{22}Y_{23}$

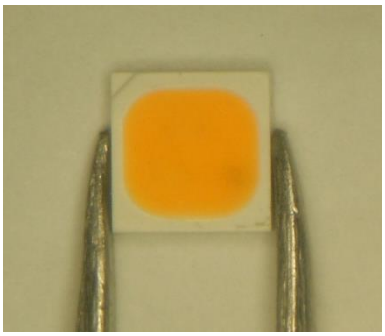
Symbol	Meaning	Example
$Y_1Y_2Y_3Y_4Y_5$	THE DATE	09A23 (Year : 09, A : Month, 23 : day)
$Y_6Y_7Y_8Y_9Y_{10}$	SSC's Number	Ex) S0017 0001~9999 allowance
$Y_{11}Y_{12}Y_{13}–Y_{14}Y_{15}Y_{16}$	Order of Taping	014-001
$Y_{17}Y_{18}Y_{19}\ Y_{20}Y_{21}Y_{22}Y_{23}$	SSC's Number	7250553(Automatic)

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) SSC 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.

Precaution for Use

(1) Storage
To avoid the moisture penetration, we recommend store in a dry box with a desiccant.
The recommended storage temperature range is 5℃ to 30℃ and a maximum humidity of RH50%.

(2) Use Precaution after Opening the Packaging
Use proper SMT techniques when the LED is to be soldered dipped as separation of the lens may affect the light output efficiency.
Pay attention to the following:
a. Recommend conditions after opening the package
- Sealing
- Temperature : 5 ~ 30℃ Humidity : less than RH60%

b. If the package has been opened more than 168hrs(MSL_3) or the color of the desiccant changes, components should be dried for 10-24hr at 65±5℃

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

(4) Do not rapidly cool device after soldering.

(5) Components should not be mounted on warped (non coplanar) portion of PCB.

(6) Radioactive exposure is not considered for the products listed here in.

(7) Gallium arsenide is used in some of the products listed in this publication.
These products are dangerous if they are burned or shredded in the process of disposal. It is also dangerous to drink the liquid or inhale the gas generated by such products when chemically disposed of.

(8) This device should not be used in any type of fluid such as water, oil, organic solvent and etc.
When washing is required, IPA (Isopropyl Alcohol) should be used.

(9) When the LEDs are in operation the maximum current should be decided after measuring the package temperature.

(10) LEDs must be stored properly to maintain the device. If the LEDs are stored for 3 months or more after being shipped from SSC, a sealed container with a nitrogen atmosphere should be used for storage.

(11) The appearance and specifications of the product may be modified for improvement without notice.

(12) Long time exposure of sunlight or occasional UV exposure will cause lens discoloration.

(13) 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.

Precaution for Use

(14) Attaching LEDs, do not use adhesives that outgas organic vapor.

(15) 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.

(16) Similar to most Solid state devices;
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 the 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 an 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

Company Information

Published by

Company Information

Seoul Semiconductor (www.SeoulSemicon.com) manufacturers 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.

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Revision History

Revision	Date	Page	Remarks