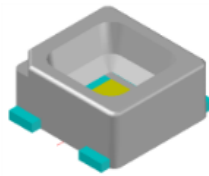


CUSTOMER : \_\_\_\_\_

DATE : 2016. 03. 29. \_\_\_\_\_

Rev : REV. 0.0 \_\_\_\_\_

# SPECIFICATIONS FOR APPROVAL



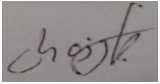


Top View Type White SMD LED  
(LGE 向 CF用 3532 1.5t 1in1 Module)

MODEL NAME : LEYRC35A11GU00

**RoHS**  
Compliant

**Halogen**  
Compliant

APPROVAL

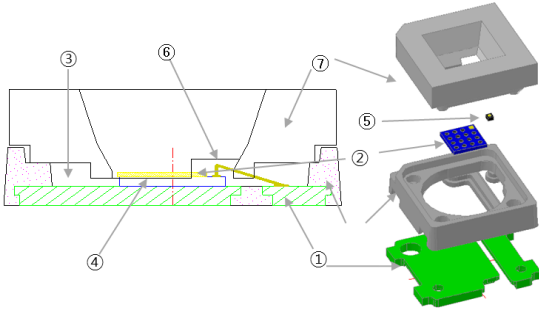
DESIGNED	CHECKED	APPROVED
2016.03.29	2016.03.29	2016.03.29
J.B.Choi	T.S.Lee	H.H.Jung
		

## TABLE OF CONTENTS

1. Features	-----	4
2. Outline Dimensions	-----	4
3. Applications	-----	5
4. Absolute Maximum Ratings	-----	5
5. Electro-Optical Characteristics	-----	5
6. Bin Structure	-----	6
7. Typical Characteristic Curves	-----	7
8. Reliability Test Items and Conditions	-----	8
9. Packing and Labeling of Products	-----	9~12
10. Soldering Conditions	-----	13
11. Cautions on Use	-----	14~16
12. Disclaimers	-----	16
13. Change History of Revision	-----	17
14. 고객사 요청 사항	-----	18~39

## 1. Features

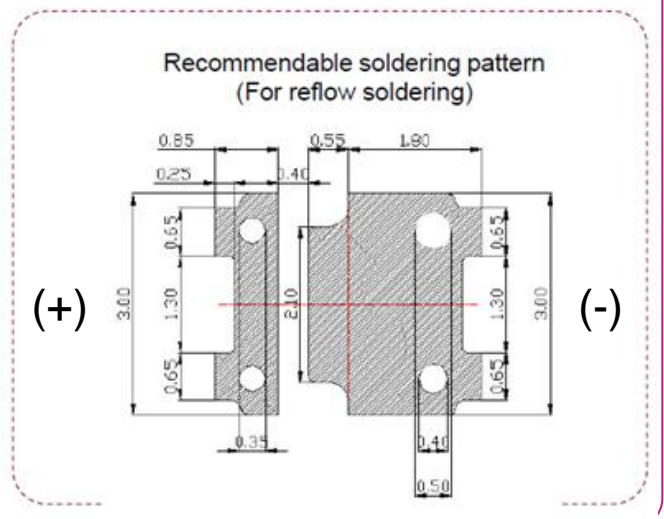
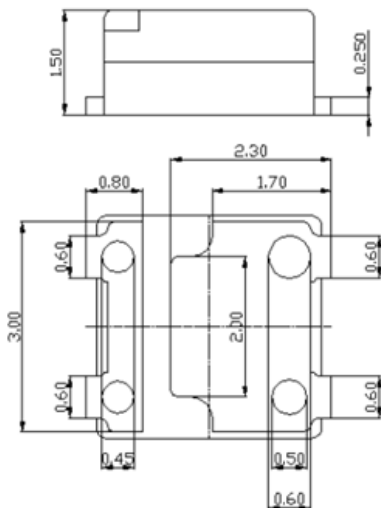
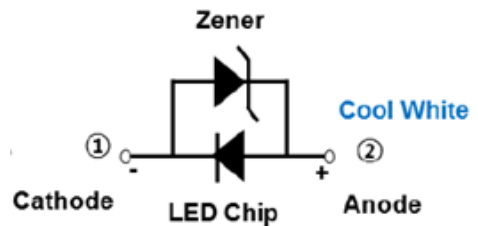
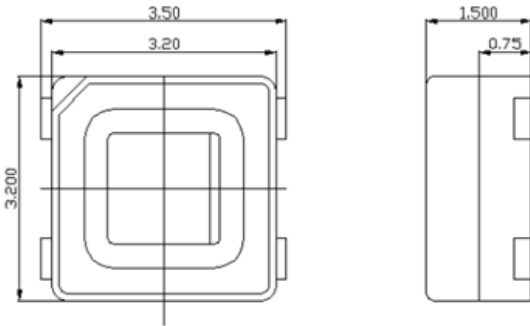
- Small size surface mount type : 3.5×3.2×1.5 [L×W×H, Unit : mm]
- Based Material : InGaN Chip, Silicate/Nitride Phosphor, Copper plate Lead frame
- Soldering methods : Reflow soldering
- Taping : 16 mm Conductive Black Carrier Tape & Antistatic Clear Cover Tape.  
2,000pcs/reel, Φ178 mm reel



No	Item	Material
①	Frame	Cu + Ag plate
②	LED Chip	InGaN Based Vertical Chip(1000*1000)
③	Silicone	Silicone
④	Paste	Ag Epoxy
⑤	Zener	Silicone
⑥	Wire	Au
⑦	Reflector	Zinc + AgPlating

## 2. Outline Dimensions

◆ Tolerance unless otherwise specified : ± 0.10mm



## 3. Applications

- Camera Flash for Mobile Phone

## 4. Absolute Maximum Ratings

( Ta = 25°C )

Item	Symbol	Rating	Unit
Forward Current	If	300	mA
Peak Pulse Forward Current <sup>1)</sup>	I <sub>fp</sub>	1,500	mA
Power Dissipation <sup>2)</sup>	Pd	1,200	mW
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +85	°C
Junction Temperature	Tj (DC)	135	°C
	Tj (Pulse) <sup>3)</sup>	150	°C
Soldering Temperature	JEDEC-J-STD-020D		
ESD Classification	HBM : Class 3B (8kV , JESD22-A114)		
	MM : 400V(JESD22-A115C)		
	CDM : Class III(500~1,000V/JESD22-C101)		

※ The stresses beyond those listed under maximum ratings may cause permanent damages to the device.  
 These or any other conditions beyond those indicated under recommended operating conditions are not implied.  
 The exposure to the absolute maximum rated conditions may affect device reliability.

※ LEDs are not designed to be driven in reverse voltage.

1) Peak pulse current applies to pulse time of 500ms and a maximum duty factor of 10%.

2) DC Mode Power Dissipation

3) Pulse conditions assume a 10% duty factor

## 5. Electro - Optical Characteristics

( Ta=25°C )

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V <sub>f</sub>	I <sub>f</sub> =1000mA	2.80	3.50	4.00	V
Reverse Voltage (Zener)	V <sub>R</sub>	I <sub>R</sub> =1μA	0.40	0.60	1.20	V
Illuminance (1.0M)	E <sub>v</sub>	I <sub>f</sub> =1000mA	175	190	-	lx
Uniformity (FOV 75°)	0.7F	I <sub>f</sub> =1000mA	70%	-	-	°
	1.0F	I <sub>f</sub> =1000mA	30%	-	-	°
Color Temperature (CCT)	Cool	I <sub>f</sub> =1000mA	5,600	6,000	6,400	K

※ These values are measured by the LG Innotek optical spectrum analyzer within the following tolerances.  
 Illuminance(lx) : ± 10%, Forward Voltage (V<sub>f</sub>) : ± 0.06V, Color Temperature : ± 5%

※ Although all LEDs are tested by LG Innotek equipments, some values may vary slightly depending on the conditions of the test equipments.

## 6. Bin Structure

### ▪ Illuminance Bin(@1000mA)

Rank	Illuminance (lx, @1000mA)		
	Min.	Typ.	Max
B	175	190.0	-

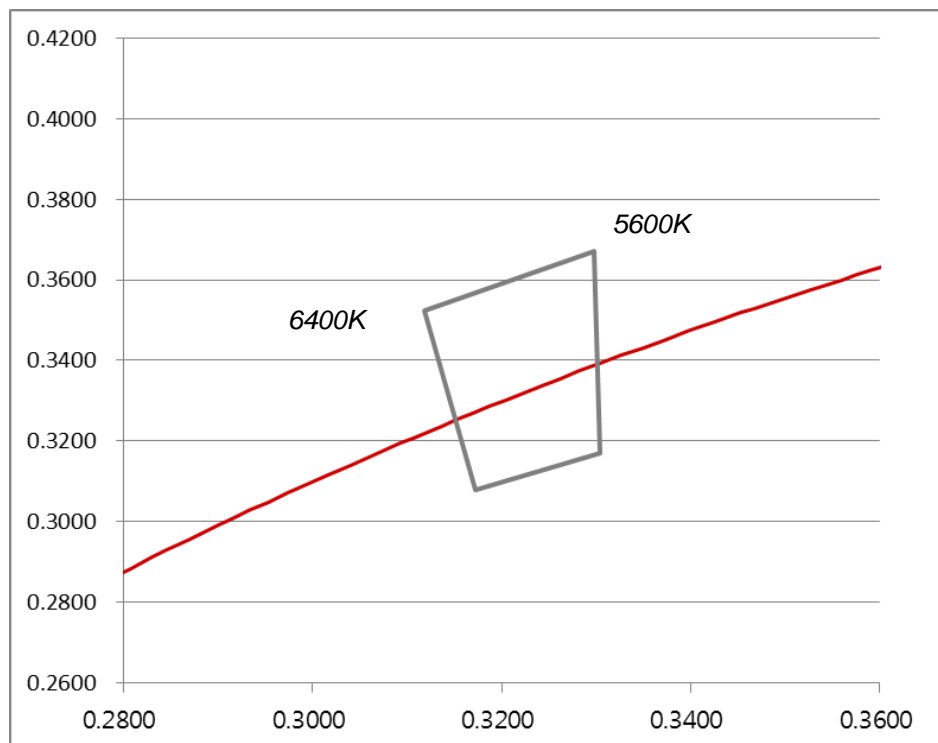
### ▪ Forward Voltage Bins(@1000mA)

Rank	Vf (V, @1000mA)		
	Min.	Typ.	Max.
1	2.80	3.5	3.90

### ▪ Color Bins (@1000mA)

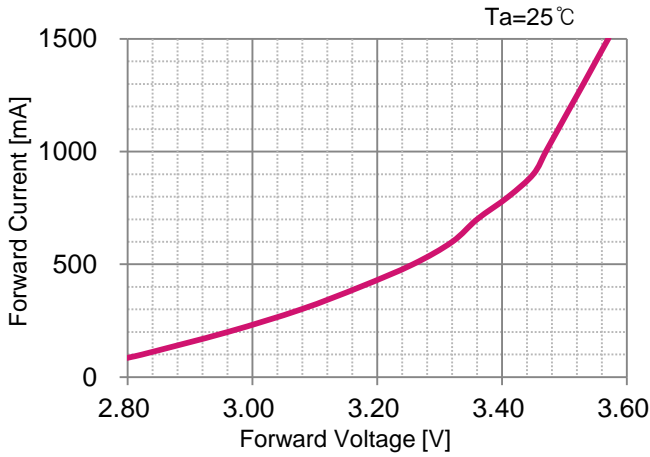
Bin	Cx	Cy
Z	0.3304	0.3170
	0.3298	0.3670
	0.3118	0.3523
	0.3172	0.3078

### Chromaticity Diagram

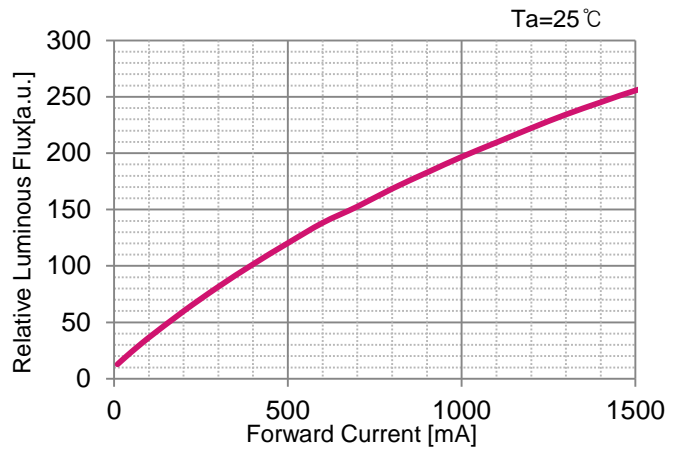


## 7. Typical Characteristic Curves

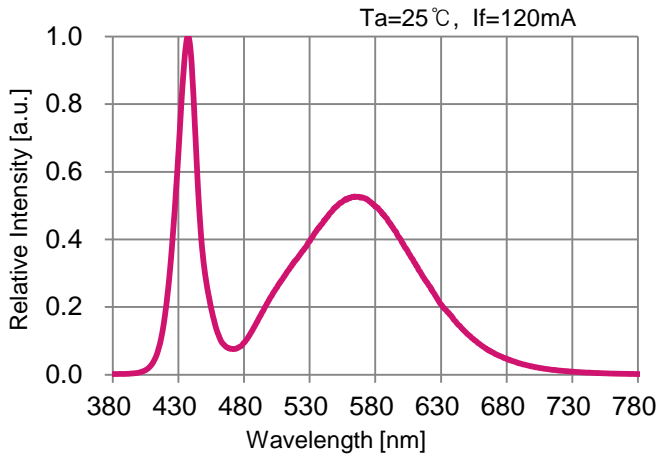
■ Forward Voltage vs. Forward Current



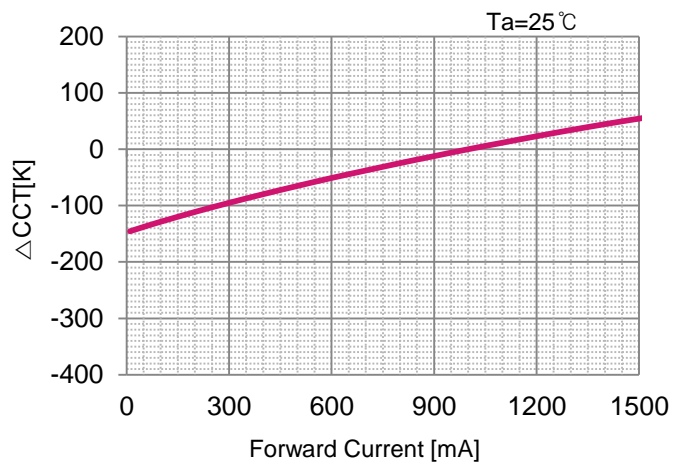
■ Forward Current vs. Relative Illuminance



■ Spectrum



■ Forward Current vs. Chromaticity Coordinate



## 8. Reliability Test Items and Conditions

### 8-1. Criteria for Judging Damages

Items	Symbols	Test Conditions	Limits	
			Min.	Max.
Forward Voltage	Vf	If = 1.0A	-	Initial Value × 1.1
Illuminance	Ev	If = 1.0A	Initial Value × 0.7	-

\* Using Stand PCB Size is 25\*25\*1.7t(mm) and Rth j-s ≒ 7.55°C/W (FR-4 PCB)

### 8-2. Reliability Test

고객사 요청항목

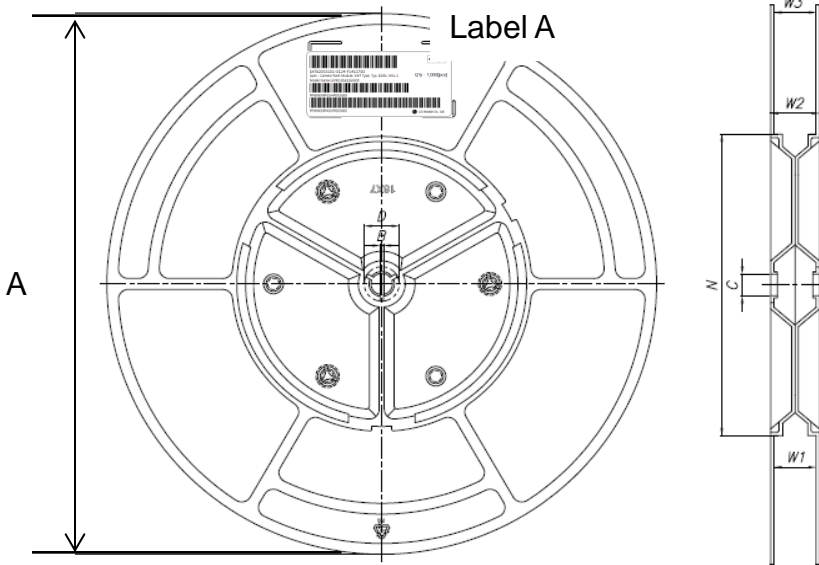
No	Items	Test Conditions	Test Hours /Cycles	Sample Size	Ac/Re
1	Room Temperature Operating Life after Reflow (RTOL)	If : 300mA (Pre treatment T <sub>sld</sub> =260°C)	96 Hours	20PCS	0/1
2	High Temperature Operating Life after Reflow (HTOL)	Ta=60°C, RH=90%, If=300mA (Pre treatment T <sub>sld</sub> =260°C)	96 Hours	20PCS	0/1
3	High Temperature Operating Life (HTOL_1)	Ta=60°C, If=300mA	96 Hours	20PCS	0/1
4	High Temperature Operating Life (HTOL_2)	Ta=85°C, If =300mA	96 Hours	20PCS	0/1
5	Low Temperature Operating Life (LTOL)	Ta=-40°C, If=300mA	96 Hours	20PCS	0/1
6	High Temperature Storage Life (HTSL)	Ta=100°C	96 Hours	20PCS	0/1
7	Low Temperature Storage Life (LTSL)	Ta=-40°C	96 Hours	20PCS	0/1
8	Wet High Temperature Storage Life (WHTSL)	Ta=85°C, RH=85%	96 Hours	20PCS	0/1
9	Temperature Cycle	H : +100°C 30min ~ 5min L : -40°C 30min	50 Cycles	20PCS	0/1
10	Moisture Sensitivity Level (MSL)	T <sub>sld</sub> =260°C (Pre treatment 85°C, 85%, 168 Hours)	3 Times	20PCS	0/1
11	Vibration	10~2000~10Hz Sweep 4min. 200m/s <sup>2</sup> , 3direction	4 Cycles	20PCS	0/1
12	Pulse Operating Test	Ta 60°C, IF=1,500mA t ≤500 ms, D = 0.1	30,000 Cycles	20PCS	0/1
13	ESD Test_HBM	8KV		20PCS	0/1
14	ESD Test_MM	400V		20PCS	0/1

※ All samples must pass each test item and all test items must be satisfied.

## 9. Packing and Labeling of Products

### 9-1. Taping Outline Dimension

( Unit : mm )

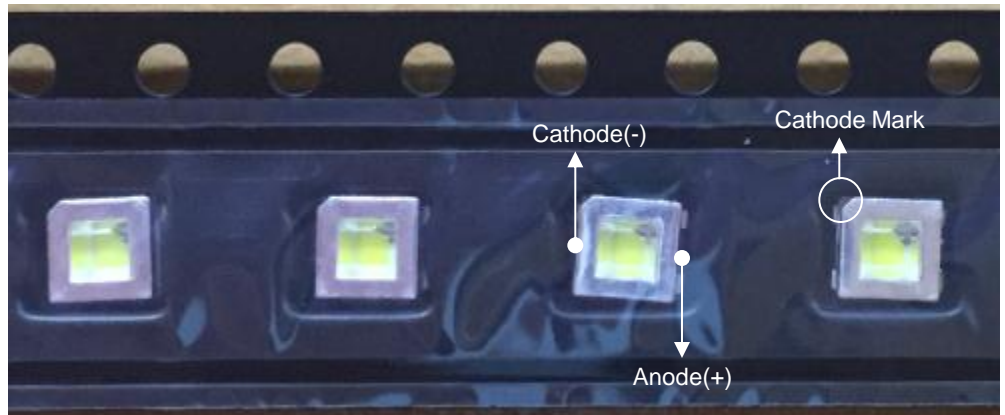
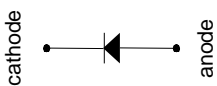


Size	12mm	16mm	24mm	32mm	44mm
A	-	330 +2.0 -2.0	-	-	-
B	-	1.5min.	-	-	-
C	-	13.0 +0.5 -0.2	-	-	-
D	-	20.2min.	-	-	-
N	-	178 +3.0 -0.0	-	-	-
W1	-	16.4 +3.0 -0.0	-	-	-
W2	-	20.4 +2.0 -2.0	-	-	-
W3	-	17.65 +1.75 -1.75	-	-	-

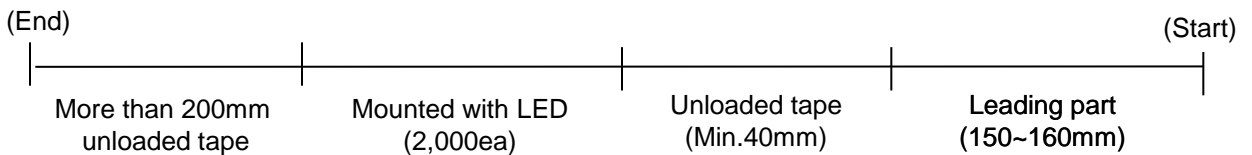
- ◆ Packing Materials :
  - Reel : Conductive PS (Black)
  - Emboss Tape : Conductive PS (Black)
  - Cover Tape : Conductive PET Base

#### • Tape

**Polarity direction**



#### • Taping Arrangement

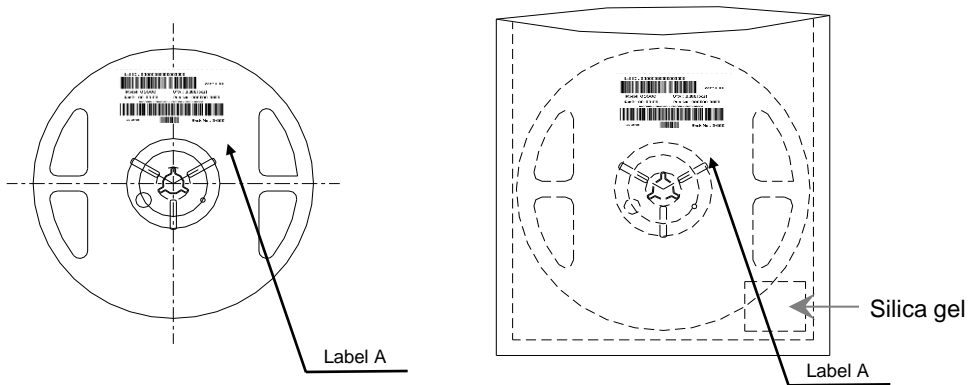




## 9. Packing and Labeling of Products

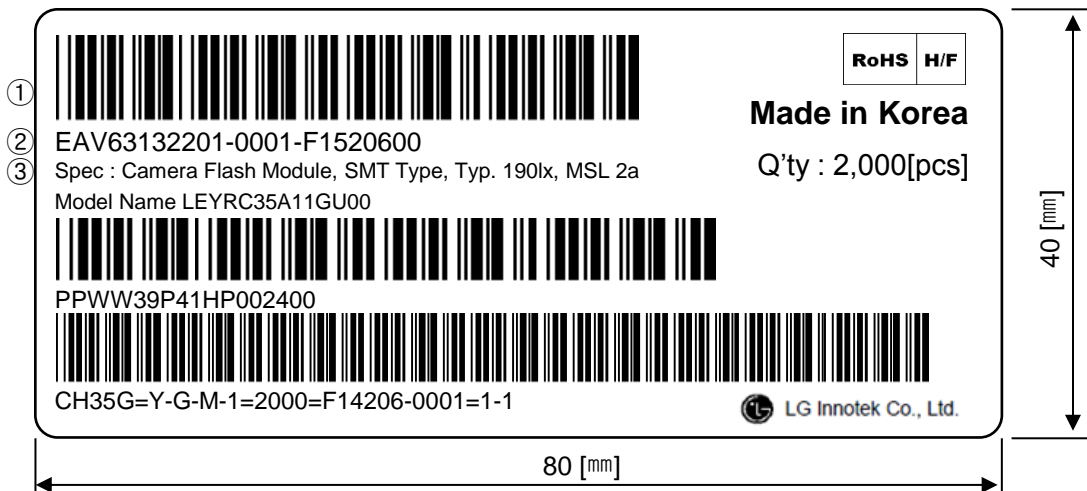
### 9-2. Package

Products are packed in one bag of 2,000 pcs in one taping reel and a label is affixed on each bag specifying Model, Rank, Quantity and Run number.

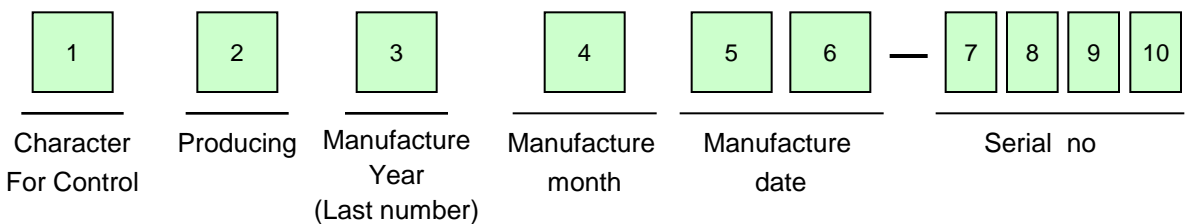


#### ※. Label A

Specifying Model, Rank, Quantity and Run number



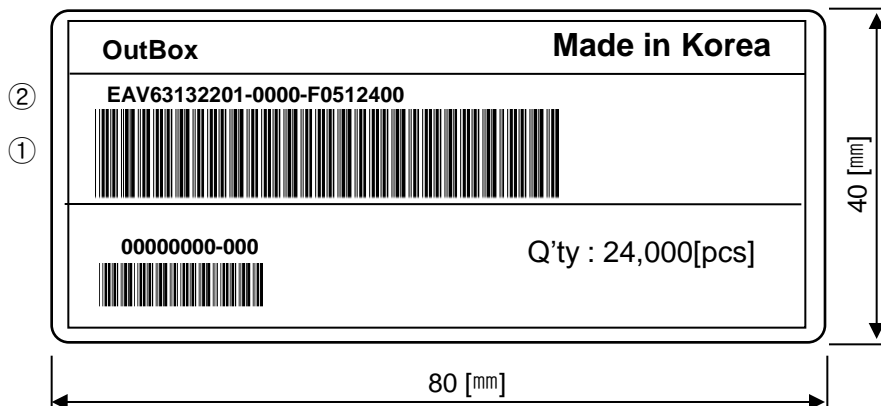
#### ◆ Run No. indication



## 9. Packing and Labeling of Products

### 9-2. Package

- ※ Label C  
Specifying Customer P/N , Serial No and Maker Code

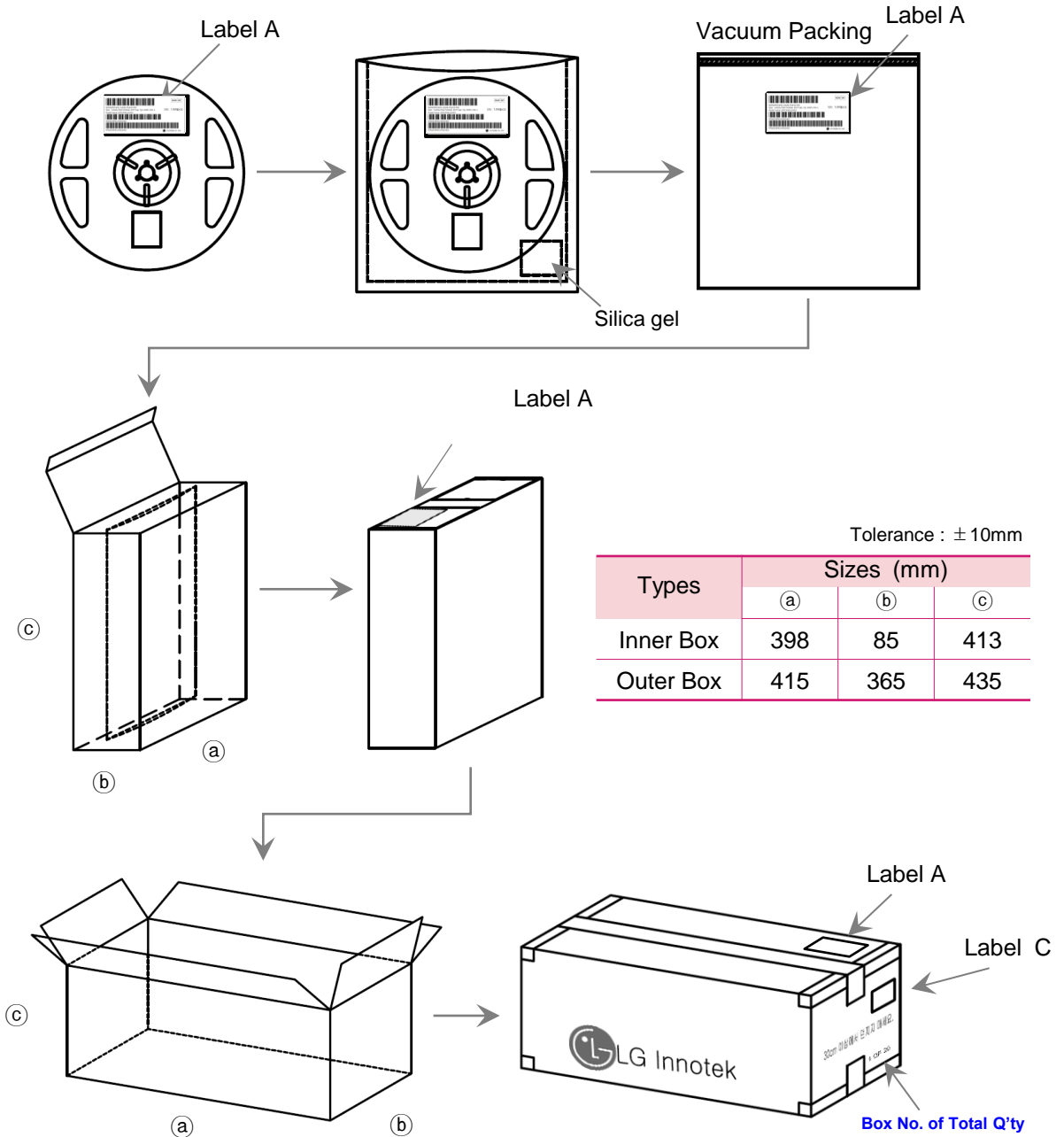


## 9. Packing and Labeling of Products

### 9-3. Packing Structures

Reeled products (numbers of products are 2,000 pcs) packed in a seal off aluminum bag or moisture-proof bag along with desiccants (Silicagel).

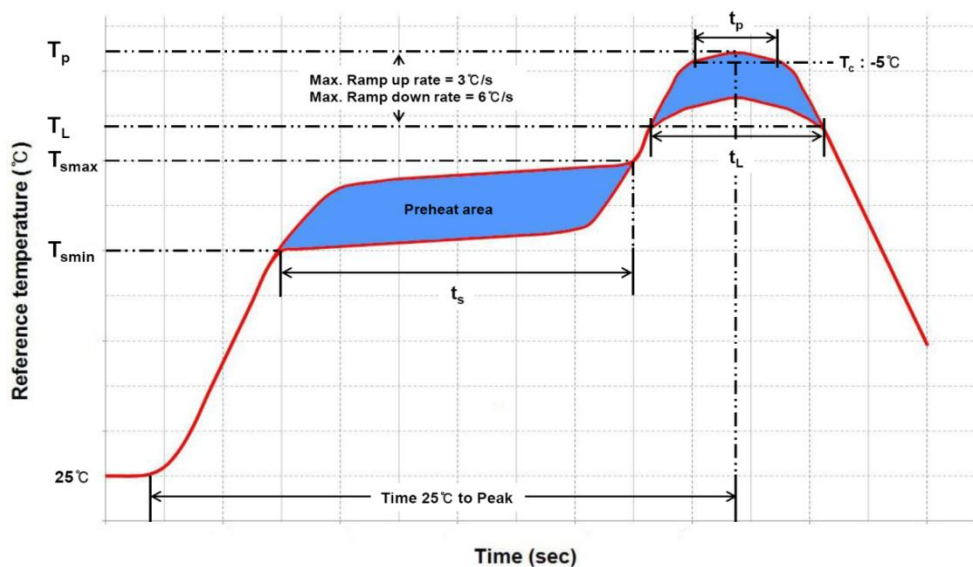
Six aluminum bags (total maximum number of products are 24,000 pcs) packed in an inner box and six inner boxes are put into an outer box.



## 10. Soldering Conditions

### 10-1. Soldering Conditions

- Reflow soldering method is recommended for LEDs assembly.
- LG Innotek does not guarantee the performance of the LEDs assembled by dip soldering method.
- Recommended Soldering Profile (according to JEDEC J-STD-020D)



Profile Feature	Pb-Free Assembly	Pb-Based Assembly
Preheat/Soak		
Temperature Min( $T_{smin}$ )	150°C	100°C
Temperature Max( $T_{smax}$ )	200°C	150°C
Maximum time( $t_s$ ) from $T_{smin}$ to $T_{smax}$	60~120 seconds	60~120 seconds
Ramp-up rate ( $T_L$ to $T_p$ )	3°C/ second max.	3°C/ second max.
Liquidus temperature ( $T_L$ )	217°C	183°C
Time ( $t_l$ ) maintained above $T_L$	60~150 seconds	60~150 seconds
Maximum peak package body temperature ( $T_p$ )	260°C	235°C
Time( $t_p$ ) within 5°C of the specified temperature ( $T_p$ )	30 seconds	20 seconds
Ramp-down rate ( $T_p$ to $T_L$ )	6°C/second max.	6°C/second max.
Maximum Time 25°C to peak temperature	8minutes max.	6minutes max.

- Reflow or hand soldering at the lowest possible temperature is desirable for the LEDs although the recommended soldering conditions are specified in the above diagrams.
- A rapid cooling process is not recommended for the LEDs from the peak temperature.
- The LEDs encapsulate silicone and have soft surfaces on the tops, which can easily be damaged by pressure. Precautions should be taken to avoid strong pressure on the encapsulated part when leveraging the pick and place machines. The pick up nozzles should not directly contact the silicone resin of the LEDs.
- Reflow soldering should not be done more than two times.

## 11. Cautions on Use

### 11-1. Moisture-Proof Package

- The moisture can damage the optical characteristics of the LEDs.

### 11-2. Storage

- Proper temperature and RH conditions for storage are : 5 °C ~ 35 °C under 60% RH.
- Do not open moisture-proof bag before the products are ready to use.
- Store products in a moisture-proof bag with a desiccant(Silica gel) after open.
- Considering the tape life, we suggest our customers to use our products within a year(from production date)

### 11-3. During Usage

- LED should avoid the direct contact with exposure to hazardous materials such as sulfur, chlorine, phthalate, etc..
- The silver-plated metal parts on LEDs can be rusted when exposed to corrosive gases\*.
- The silver-plated metal parts also can be affected not only by the corrosive gases\* emitted inside of the end-products but by the gases penetrated from outside environment.
- The corrosive atmosphere must be avoided during the use and storage.
- Extreme environments such as sudden ambient temperature changes or high humidity that can cause condensation must be avoided.

※ corrosive gases\* ; sulfur, chlorine, Phthalate, etc..

Conditions		Temperature	Humidity	Time
Usage	After Opening Aluminum Bag(Reflow X)	5°C ~ 30°C	< 60%RH	< 3 weeks
	After Reflow	5°C ~ 30°C	< 60%RH	< 2 weeks

### 11-4. Cleaning

- Do not use brushes for cleaning or organic solvents (i.e. Acetone, TCE, etc..) for washing as they may damage the resin of the LEDs.
- IPA is the recommendable solvent for cleaning the LEDs under the following conditions.  
Clearing Condition : IPA(Isopropyl Alcohol), 25°C max. x 60sec max.
- Ultrasonic cleaning is not recommended.
- Pretests must be followed by the actual cleaning processes to avoid any possible damages to the LEDs.

## 11. Cautions on Use

### 11-5. Thermal Design

- The thermal design of the end product must be seriously considered even from the beginning stage.
- The co-efficiency between the heat generation and the thermal dissipation is affected by the thermal resistance of the circuit boards and the density of the LED placements together with other components.

### 11-6. Static Electricity

- Wrist bands and anti-electrostatic gloves are strongly recommended and all devices, equipment and machineries must be properly grounded when handling the LEDs which are sensitive against static electricity and surge.
- Precautions are to be taken against surge voltage to the equipment that mounts the LEDs.
- Some unusual characteristics such as significant increase of current leakage, decrease of turn-on voltage, or no operation at a low current can be occurred by damaged LEDs.

### 11-7. Recommended Circuit

- The current through each LED must not exceed the absolute maximum rating when design the circuits.
- In general, there can be various forward voltages for LEDs. Different forward voltages in parallel via a single resistor can result different forward currents to each LED, which also can output different luminous flux values. In the worst case, the currents can exceed the absolute maximum ratings which can stress the LEDs. Matrix circuit with a single resistor for each LED is recommended to avoid the luminous flux fluctuations.

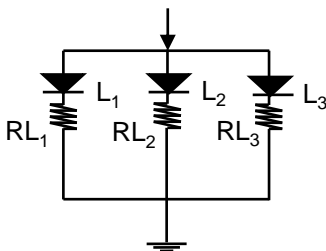


Fig.1 Recommended Circuit in Parallel Mode  
: Separate resistors must be used for each LED.

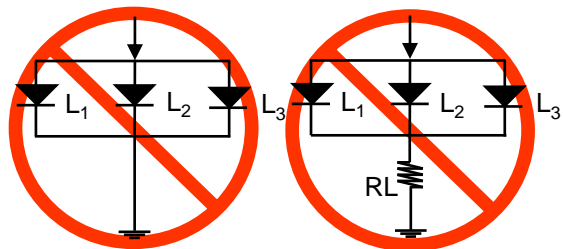


Fig.2. Abnormal Circuit  
Circuits to Avoid: The current through the LEDs may vary due to the variation in LED forward voltage.

- The driving circuits must be designed and operated by forward bias only so that the LEDs are not to be operated by the reverse voltages while turned off, which can damage the LEDs.
- Reverse voltage can damage the zener diode and cause destructions.
- Constant-current operation by driver IC controller is recommended.

## 11. Cautions on Use

### 11-8. Soldering Iron

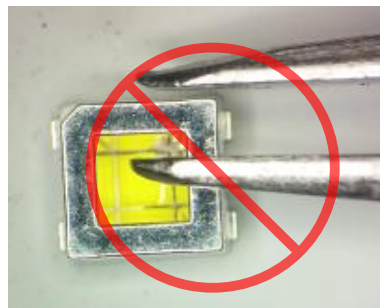
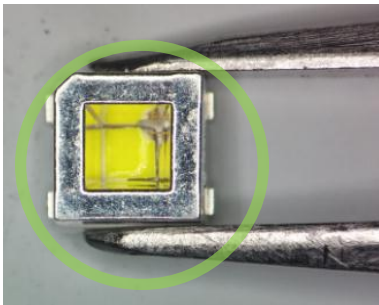
- The recommended condition is less than 5 seconds at 260 °C.
- The time must be shorter for the higher temperature. (+10°C → -1sec).
- The power dissipation of the soldering iron should be lower than 15W when the surface temperature of the device should be controlled at or under 230 °C.

### 11-9. Eye Safety Guidelines

- Do not directly look at the light when the LEDs are on.
- Proceed with caution to avoid the risk of damage to the eyes when examining the LEDs with optical instruments.

### 11-10. Manual Handling

- Use anti- electrostatic tweezers to grab base of LED and do not touch the emitting surfaces.



## 12. Disclaimers

- LG Innotek is not responsible for any damages caused by any accidents or operational environments exceeding the absolute maximum ratings.
- Generally accepted electronic equipment must be used to operate the LEDs in this document.
- Consultation with LG Innotek is recommended for unassured environments or operations to avoid any possible malfunctions or damages of the products or risk of life or health.
- Any unauthorized, without prior written consents from LG Innotek, disassembly is prohibited If purposed for reverse-engineering. All defected LEDs must be reported to LG Innotek and not to be disassembled or analyzed.
- The information can be modified and upgraded without prior notice.





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