

CUSTOMER : Standard .

DATE : 2014.07.11 .

REV : 0.0 .

SPECIFICATIONS FOR APPROVAL

Preliminary



Standard Downlight AC Module(850lm)_3000K

CCT(K)	Model Name	Customer P/N
3000K	LLDMLR6-00A201B	-

RoHS
Compliant

APPROVAL	REMARK	APPENDIX

DESIGNED	CHECKED	APPROVED
2014.07.11	2014.07.11	2014.07.11
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1. Features

- This document describes the 9W class AC LED module for downlight application. It covers electrical and mechanical properties as well as general performance parameters of the LED module, including reliability test results based on conditions.
- The AC driver IC which drives the LEDs is mounted on the PCB with LEDs and electrical parts.
- This module should be operated at 220V AC or 230V AC with 50Hz or 60Hz.

2. Applications

- Indoor Light (Downlights)

3. Outline Dimensions and Product composition

3-1. Outline Dimensions

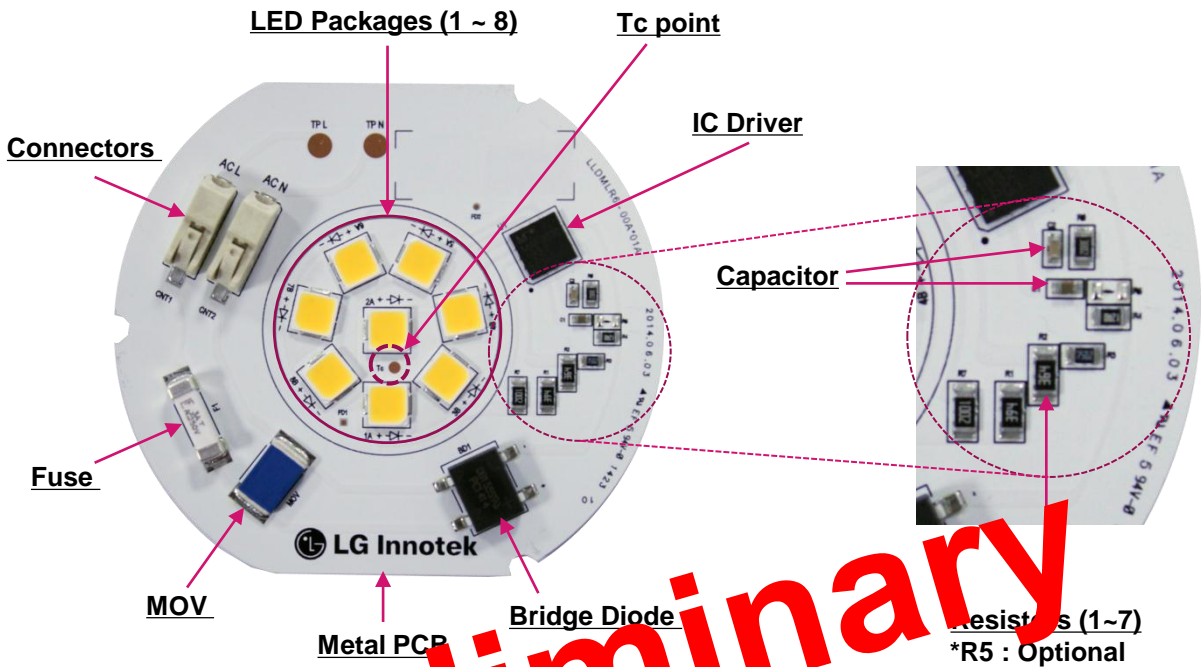
(Unit : mm)



PCB Thickness : 1.2

- ※ Size: 65.0 x 58.0mm
- ※ Height : 1.2mm (PCB Height) / Max. 5.7mm (with connector)
- ※ Tolerance unless otherwise specified : ± 0.2 mm
- ※ The visual inspection of the Product complies the internal standards of LG Innotek Co., LTD

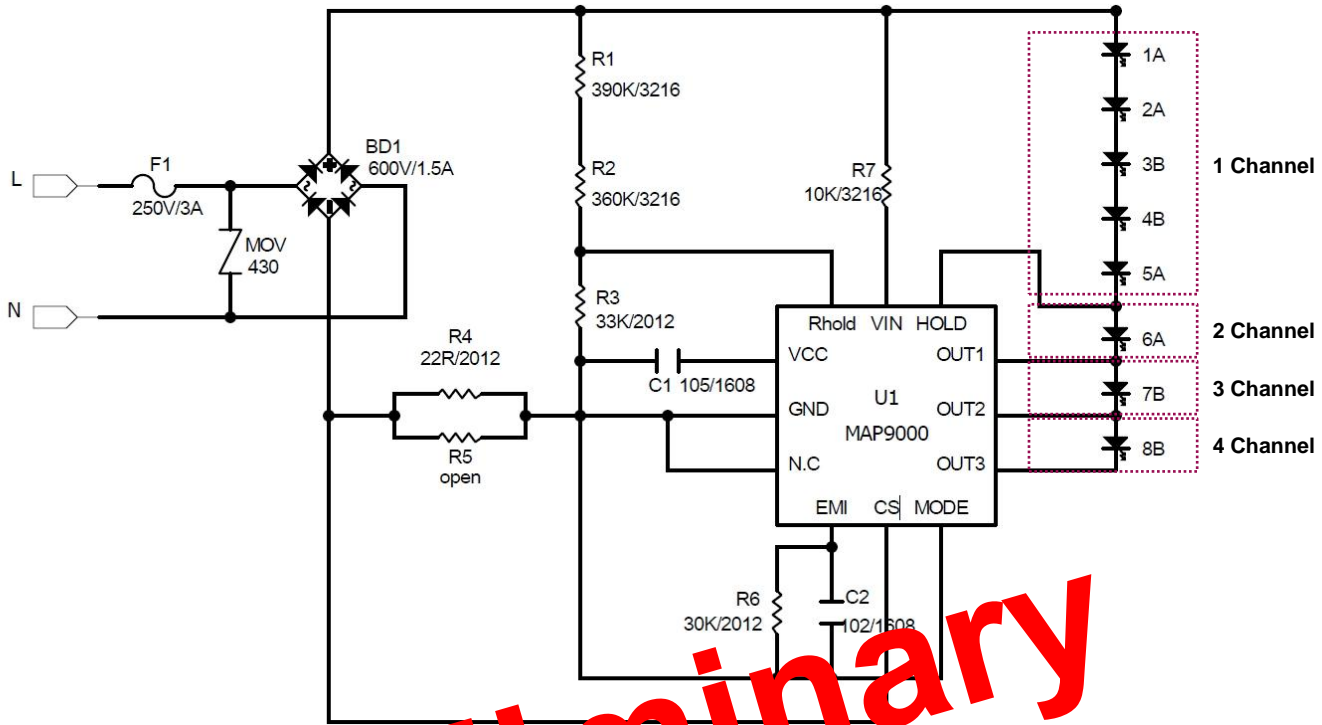
3-2. Product Composition



Part Name	Quantity	Part Specification
LED Package	8	5250 32V LED PKG
Connector	2	Board to Wire / 1 Pin
F1 (Fuse)	1	250V, 3A (443Series)
MOV (Varistor)	1	430V, (V430CH8)
BD1 (Bridge Diode)	1	600V 1.5A (DB155S)
R1 (Resistor)	1	390K Ω , ± 5 (J)%, 1/4W, 3216mm
R2 (Resistor)	1	360K Ω , ± 5 (J)%, 1/4W, 3216mm
R3 (Resistor)	1	33K Ω , ± 1 (F)%, 1/8W, 2012mm
R4 (Resistor)	1	22 Ω , ± 1 (F)%, 1/8W, 2012mm
R5 (Resistor)	-	Sub RASET (If necessary)
R6 (Resistor)	1	30K Ω , ± 1 (F)%, 1/8W, 2012mm
R7 (Resistor)	1	10K Ω , ± 1 (F)%, 1/4W, 3216mm
C1 (Capacitor)	1	1uF, K(± 10 %), 25V 1608mm
C2 (Capacitor)	1	1nF, K(± 10 %), 50V 1608mm
PCB	1	1.2t Metal PCB
Driver IC	1	MAP9000, 6x6 QFN 12 Leads

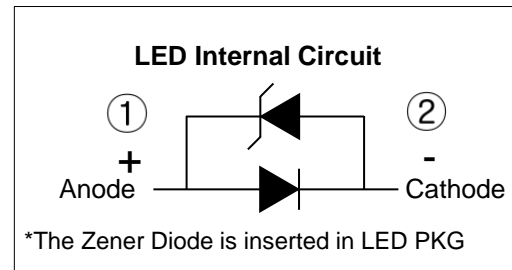
4. Schematic Diagram

4-1. Schematic Diagram



4-2. IC Driver Pin Configuration

Pin No.	Name	Description
1	VCC	Supplying to input voltage for IC driver
2	GND	Ground
3	N.C	No Connection
4	EMI	EMI Improvement
5	CS	Current Sensing
6	MODE	Flicker Free Mode (If necessary)
7	OUT3	Output – 3 (4 Channel)
8	OUT2	Output – 2 (3 Channel)
9	OUT1	Output – 1 (2 Channel)
10	HOLD	Holding-up Current (1 Channel)
11	VIN	VCC Charging
12	RHOLD	HOLD turn-on Voltage



5. Product Characteristics

5-1. Electrical Characteristics

[Ta=25°C]

Items	Spec.			Unit	Note
	Min.	Typ.	Max.		
Input Voltage		220 / 230		Vin	AC
Frequency		50 / 60		Hz	
Power Consumption	8.0	8.9 / 9.8	10.8	W	
Power Factor	0.9	-	1	PF	

- Rated input voltage should be 220V AC or 230V AC.
- Generally available input voltage range would be $\pm 10\%$ but exceeding the 230V AC can overstress the module

5-2. Optical Characteristics

[Ta=25°C]

Items	Condition	Spec.			Unit	Note	
		Min.	Typ.	Max.			
Luminous Flux	Input Voltage (220V AC / 60Hz)	710	850	-	lm		
Luminous Efficiency		74.7	95.5	-	lm/W		
CCT		2870	3045	3220	K		
Color Consistency (Center Point)		Cx = 0.4304 / Cy = 0.3965			4	SDCM	
CRI		80	-	100	Ra		

[Ta=25°C]

Items	Condition	Spec.			Unit	Note	
		Min.	Typ.	Max.			
Luminous Flux	Input Voltage (230V AC / 60Hz)	750	890	-	lm		
Luminous Efficiency		72.1	90.8	-	lm/W		
CCT		2870	3045	3220	K		
Color Consistency (Center Point)		Cx = 0.4302 / Cy = 0.3963			4	SDCM	
CRI		80	-	100	Ra		

1) Measure point : at center point (Refer to page 9)

- No aging (Right after lighting within 2sec) at Ta between 23°C and 27°C
- * These values measured by Optical Spectrum Analyzer of LG Innotek Co., LTD
- Optical Spectrum Analyzer tolerances are followings as below
 - Luminance (lm) : $\pm 5\%$
 - CIE Value : ± 0.003
 - CRI: ± 2 Ra
 - Power measurement : $\pm 3\%$

2) Range of Module CIE : Refer to page 7

5-3. General Characteristics

Items	Condition	Spec.			Unit	Note
		Min.	Typ.	Max.		
Maximum Tc	Input Voltage (220V, 230V AC / 50, 60Hz)			85	°C	
Operating temp.		-10	-	40	°C	
Storage temp.		-10	-	60	°C	
Weight		9.6	11,8	14.0	g	
RoHS		Compliant			-	
IP		00			-	

1) Tc : Case Temperature at the designated point on the PCB, refer to page 3.

5-4. Characteristic Curve

- Relative luminous flux versus input voltage increase

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- Relative wattage versus input voltage increase

※ The curves in the figures above are reference only.

6. Standard Testing Conditions

6-1. Standard Testing Environment.

- Temperature : Room Temp. : $25 \pm 2^\circ\text{C}$,
- Humidity : Under 60%RH
- Darkroom Condition : Below 10lux

6-2. Standard Testing Method.

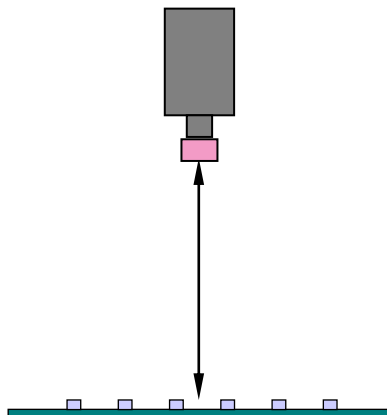
- Operating condition : Typical operating Condition(230V AC, 60Hz)
- Aging : No Aging (Right after lighting within 2 sec.)
- Measuring Point : Center point on the PCB

6-3. Schematic of Measurement System



< Top View >

Optical characteristics measurement equipment



7. Reliability Test Items and Conditions

7-1. Criteria for Judging the Damage

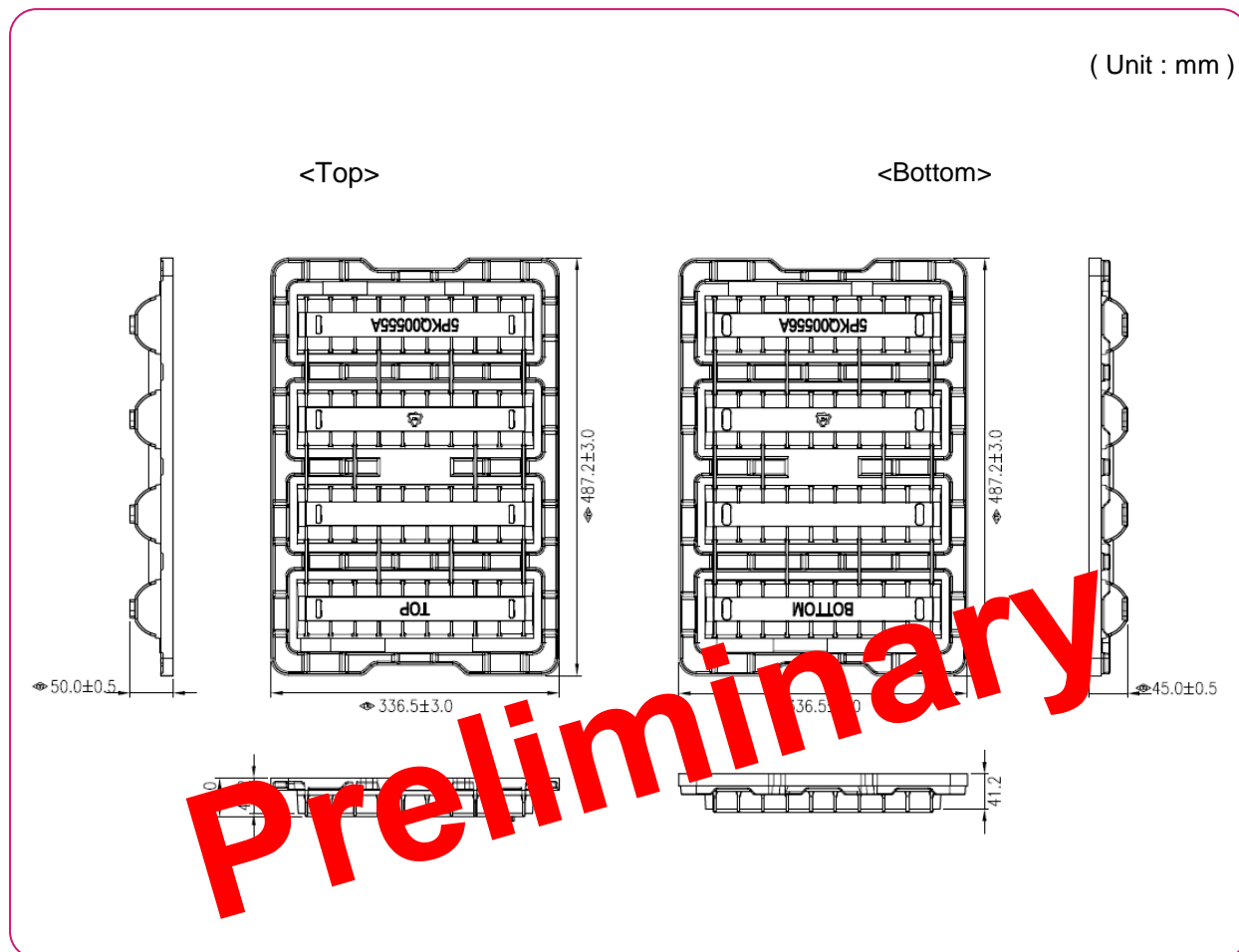
Item	Symbol	Test Condition	Criteria	
			Min.	Max.
Wattage Drop	W	230Vac 60Hz	Initial Value X 0.7	Initial Value X 1.3
Luminous Flux	Φ_v		Initial Value X 0.7	-
Solder Ability	-	Thermal Shock	No Solder Crack	

7-2. Reliability Test

No	Test Items	Test Conditions	Test Hours / Cycles	Sample Size	Ac/Re
1	High Temperature Operating Life (HTOL)	Ta = 60°C, 230V AC, 60Hz	1000Hours	5ea	0/1
2	Low Temperature Operating Life (LTOL)	Ta = -30°C, 230V AC, 60Hz	1000Hours	5ea	0/1
3	Room Temperature Operating Life (RTOL)	Ta = 25°C, 230V AC, 60Hz	1000Hours	5ea	0/1
4	Wet High Temperature Operating Life (WHTOL)	Ta = 60°C, RH = 90%, 230V AC, 60Hz	1000Hours	5ea	0/1
5	High Temperature Storage Life (HTSL)	Ta = 100°C	1000Hours	5ea	0/1
6	Low Temperature Storage Life (LTSL)	Ta = -30°C	1000Hours	5ea	0/1
7	Wet High Temperature Storage Life (WHTSL)	Ta = 85°C, RH = 85%	1000Hours	5ea	0/1
8	On / Off test	Ta=25°C On (10sec) / Off (10sec)	30K Cycles	5ea	0/1
9	Temperature Cycle	-40°C (30min) ~ 25°C (5min) ~ 100°C (30min)	200 Cycles	5ea	0/1
10	Thermal Shock	-45°C (15min) ~ 25°C (5min) ~125°C (15min)	300 Cycles	5ea	0/1
11	ESD (HBM/Contact) Min. ±2KV	 <p>R1 : 10MΩ, R2: 1.5KΩ C: 100pF</p>	3 Times	3ea	0/1

8. Packing and Labeling of Products

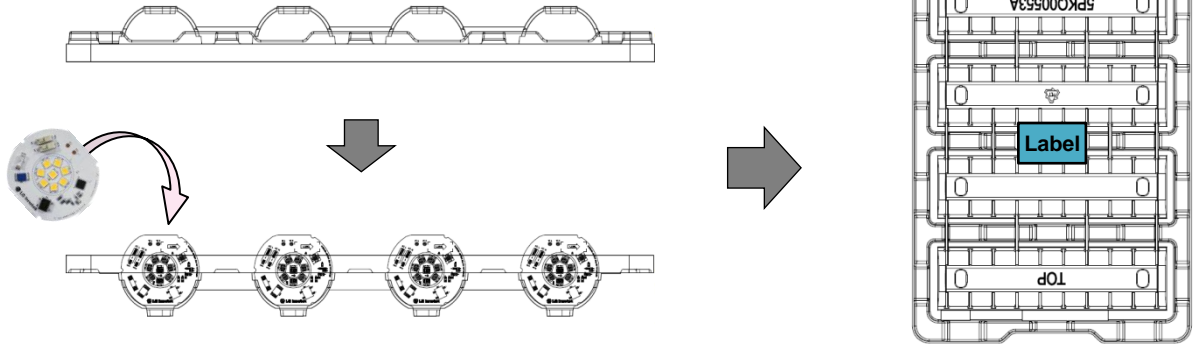
8-1. Tray information



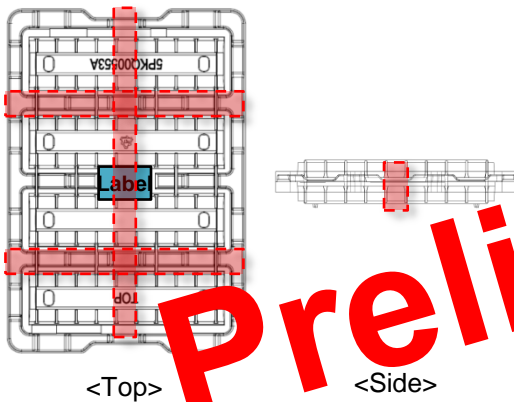
Items	information	Unit	Remark
Dimensions	487.2 x 336.5 x 50.0	mm	Top
	487.2 x 336.5 x 45.0	mm	Bottom
Module Quantity	80	EA	
Material	Antistatic PET	-	
Color	Clear	-	

8-2. Packing Specifications

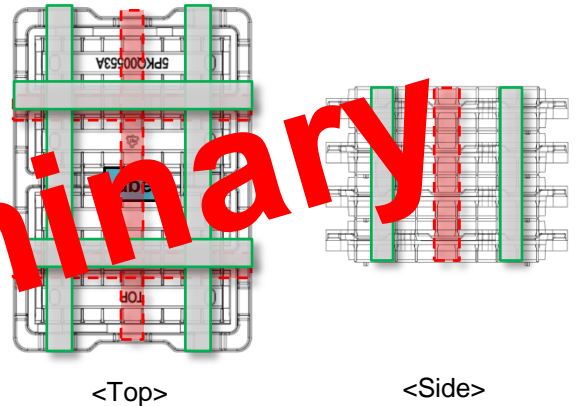
1) Putting modules into a Tray and Labeling (80 Modules / Tray)



2) Tapping

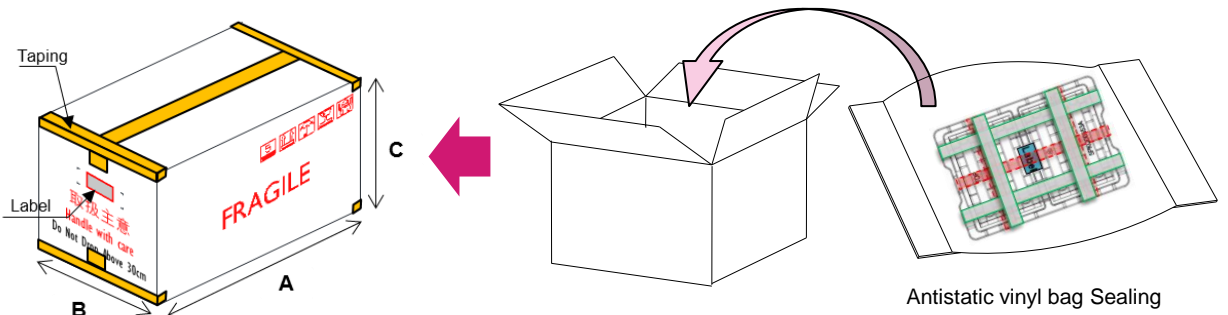


3) Stacking and Tapping(4 Trays)



* Labels should be attached on the trays

4) Inserting trays into a box & attaching the label on the box (4 Trays / Box)



A : 500mm, B : 350mm, C : 275mm

Box Specification	
Size (LxWxH)	500 x 350 x 275 mm
Tray / Box	4 EA

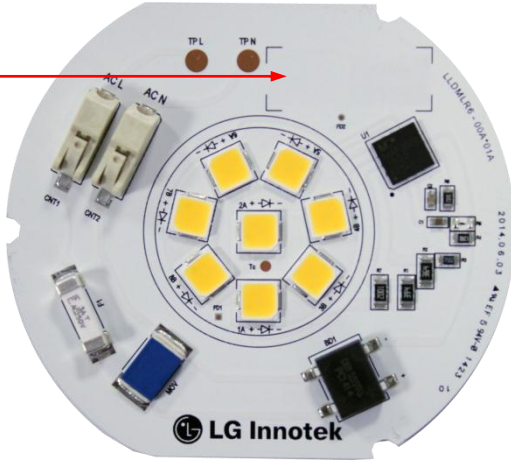


Put 4 Silica gels around center on the top tray before the trays are wrapped by the antistatic bag

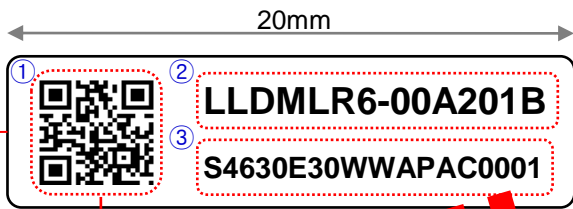
* The box can be stacked up to 5 boxes.

8-3. Labeling (Module / Tray / Outer box)

8-3-1. Module Label



< PCB Label Example >



→ ex) S4630E30WWAPAC0001
(Traceability Code Only)

PCB Label	Description
Size	20mm x 6mm

No.	Description
①	QR CODE
②	Model Name
③	Traceability code

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8-3-1-1. Traceability Code

No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Marking	S	4	6	3	0	E	3	0	W	W	A	P	A	C	0	0	0	1
Meaning	SMT Site	SMT Year/Month/Day				PCB Site	CCT Code	Flux Code	Flux Code	Color MRM Code		Vf MRM Code		SMT Serial No.				
Digits	1	4				1	2	1	1	1	1	1	1	1	4			
How to Use	S : Sunji	1 st : Last no. of Year 2 nd : Month (1~9,X,Y,Z) 3 rd and 4 th : Day				E : Eidea	CCT	PKG ← Flux	PKG ∼ Flux	PKG ← Color	PKG ∼ Color	PKG ← Vf	PKG ∼ Vf	Serial No.				

8-3-1-2. Table for Traceability code

<SMT Site>

Code	S
SMT Site	Sungji

<SMT Year/Month>

Code	Year	Code	1	2	3	4	5	6	7	8	9	X
4	2014	Month	1	2	3	4	5	6	7	8	9	10
5	2015	Code	Y	Z								
6	2016	Month	11	12								

<SMT Day>

Code	1	2	3	4	5	6	7	8	9	10	11	12
Day	1	2	3	4	5	6	7	8	9	10	11	12
Code	13	14	15	16	17	18	19	20	21	22	23	24
Day	13	14	15	16	17	18	19	20	21	22	23	24
Code	25	26	27	28	29	30	31					
Day	25	26	27	28	29	30	31					

<PCB Site>

Code	E
Site	ifidea

<Flux Bin Code>

Code	Flux Bin	Min.	Max.	Remark
W	W	150	183	3000K

<CCT Code>

Code	30	40	50
CCT(K)	3000	4000	5000

※ Flux sorting current : 42mA

<Color Bin Code>

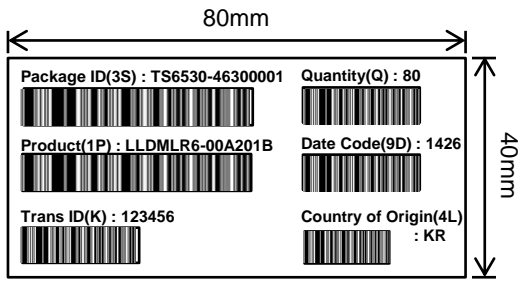
LG Innotek PKG Code				(L Rank)
Code	A	B	C	D
Bin	11	12	13	14
Code	E	F	G	H
Bin	21	22	23	24
Code	I	J	K	L
Bin	31	32	33	34
Code	M	N	O	P
Bin	41	42	43	44

<Vf Bin Code>

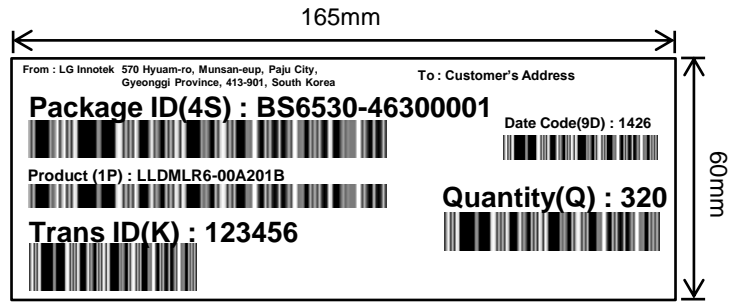
Code	Vf Bin	Min.	Max.
A	3A	29.5	31.5
B	3B	31.5	33.5
C	3C	33.5	35.5

※ Vf sorting current : 42mA

8-3-2. Tray and Outer Box Label



< Tray Label Example >



< Box Label Example >

8-3-2-1. Package ID(3S or 4S)



8-3-2-2. Table for Packing ID(3S or 4S) Code

<TYPE>	Code	T	B	<SMT Site>	Code	S							
	Item	TRAY	BOX		SMT Site	Singji							
<PCB Size>	Code	88	72	65	<CCT Code>	Code	30	40	50				
	Size	Φ88	Φ72	Φ65		CCT(K)	3000	4000	5000				
<Packing Year/Month>	Code	Year	Code	1	2	3	4	5	6				
		2014	Month	1	2	3	4	5	6				
		2015	Code	7	8	9	X	Y	Z				
	6	2016	Month	7	8	9	10	11	12				
<Packing Day>	Code	01	02	03	04	05	06	07	08	09	10	11	12
	Day	1	2	3	4	5	6	7	8	9	10	11	12
	Code	13	14	15	16	17	18	19	20	21	22	23	24
	Day	13	14	15	16	17	18	19	20	21	22	23	24
	Code	25	26	27	28	29	30	31					
	Day	25	26	27	28	29	30	31					

8-3-2-3. Code

- . Product (1P) : Model Name (LLDMLR6-00A201B)
- . Trans ID(K) : P.O Number (Refer to Customer's Purchase Order)
- . Date Code(9D) : First two digits → last two digits of year / Last two digits → week number of year
*1426 : 14 → 2014 / 26 → 26th Week of the year (Based on the packing date)
- . Quantity(Q) : Number of products in a tray or box
- . Country of Origin (4L) : KR(Korea)
- . From / To : Address of Shipping Site / Address of Arrival Site

* Identification Marks(3S, 4S, 1P, K, Q, 9D, 4L) should be positioned at the first place in the bar code. (Code 128)

9. Cautions on Use

9-1. 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.

9-2. Storage

- Store them in a dark place. Do not expose these product to sunlight
- Keep the temperature 5 °C ~ 35 °C at RH 60%.
- Do not open ESD Trays before this products are ready to assemble into Light
- During transportation and storage for a short time
- Keep the temperature under 80 °C at normal humidity
- Do not exposed to sulfur gas or sulfur-containing materials.

9-2. 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, 25 °C max. × 60sec max.
- Ultrasonic cleaning is not recommended.
- Pretests must be followed by the actual cleaning processes to avoid any possible damages to the LEDs.

9-3. 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.

9-4. Static Electricity

- Wristbands 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.

9-5. 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.

9-6. Cautions

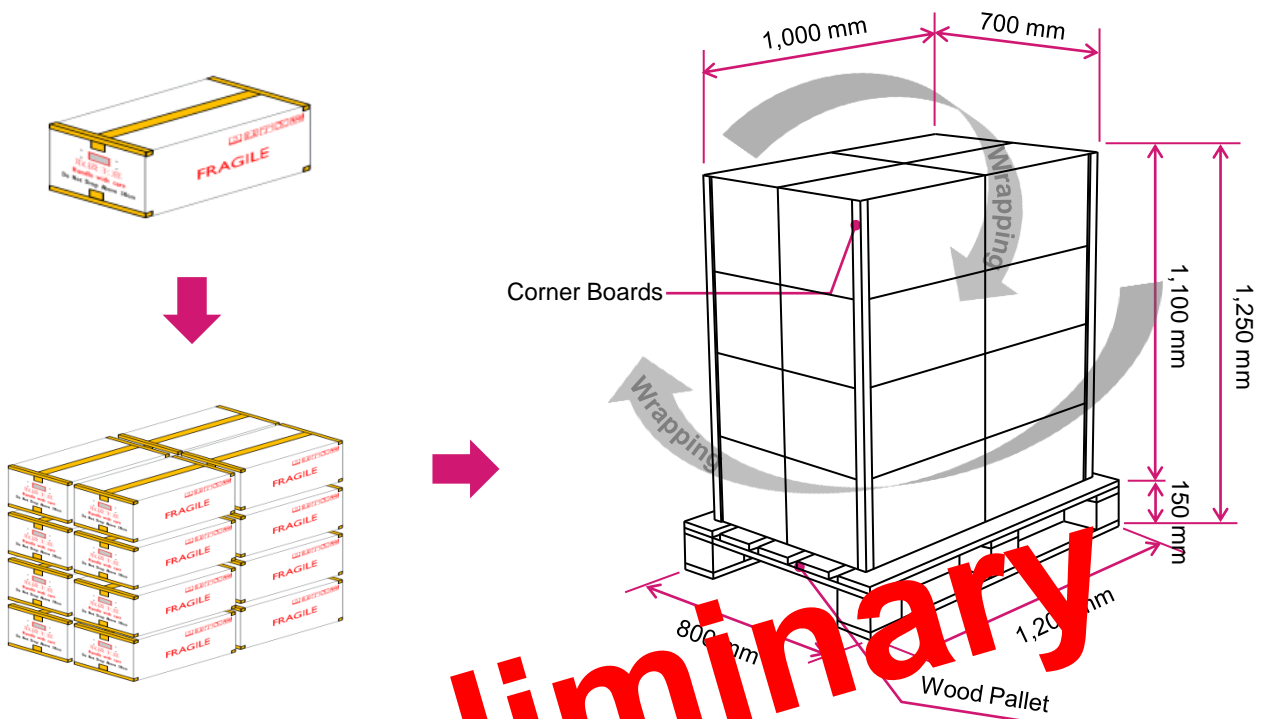
- Do not touch any electrical traces or connection points with bare hands during operation.
- Exceeding the maximum operating conditions can overstress the module. This may result in significant acceleration of lumen depreciation or even permanent damage of the module.
- A thermal management solution such as a heat sink, which will dissipate the heat generated by the LED module, should be tightly attached to the module to maintain the case temperature (T_c) below 85°C.
- Do not use near fire or inflammables.
- Use only as a Indoor Lighting.
- If the module is operated with a dimmer system or sensor, the product could be not working properly.
- Do not disassemble or renovate at one's option.
- The product should not experience any physical impacts such as being dropped onto the ground.
- Output light fluctuation could occur under particular conditions such as power supply fluctuation.
- LG Innotek is not responsible for any damages caused if the operating or storage conditions exceed the maximum ratings recommended in this document.

10. Disclaimer

- 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 product information can be modified and upgraded without prior notice.

Appendix A. Pallet Packing

10-1. Pallet Packing



Preliminary

10-2. Caution (Corner boards)

GOOD or BAD	Pictures	Description
GOOD		Corner Boards Height /Length Requirements <ul style="list-style-type: none"> ➤ <u>Corner boards Length</u> - need to extend from top surface of deck board to top surface of highest level carton (flush) or maximum 1/2" below the top of the carton surface
BAD		<ul style="list-style-type: none"> ➤ <u>Minimum Height for Corner Boards</u> Not to be below of top of load by more that 1/2"
		<ul style="list-style-type: none"> ➤ <u>Maximum Height for Corner Boards</u> Not to exceed top of load.

