CUSTOMER : .

DATE : 2016.01.06 .

REV : REV. 1.0 .

SPECIFICATIONS FOR APPROVAL

10W COB

RoHS Compliant

APPROVAL	REMARK	APPENDIX

DESIGNED	CHECKED	APPROVED

LG Innotek

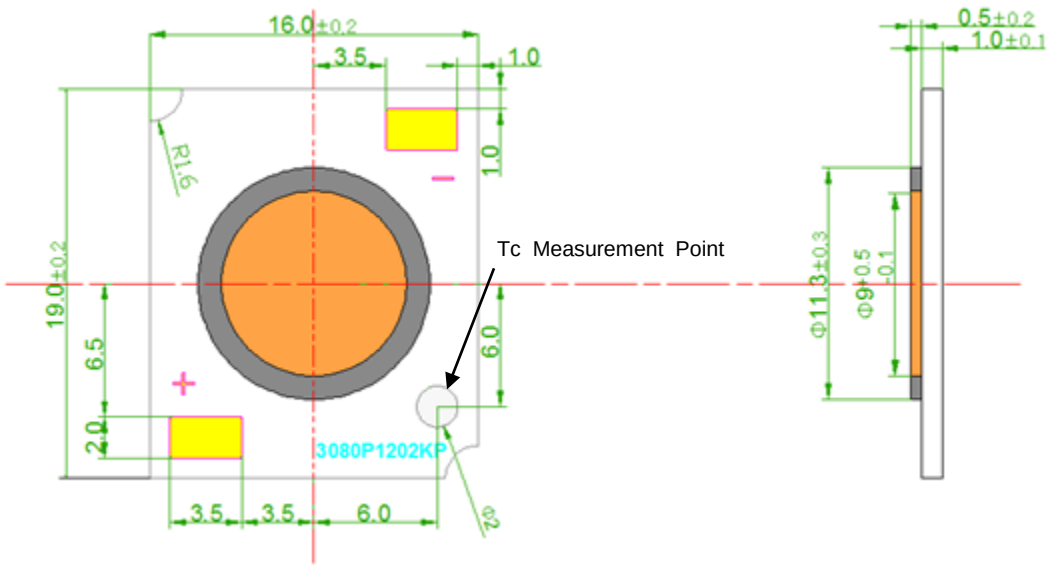
TABLE OF CONTENTS

1. Features

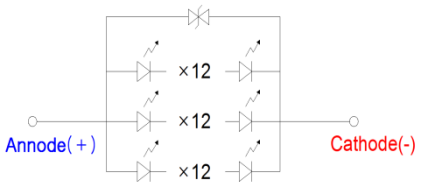
- External Dimensions 16.0×19.0×1.5mm (L × W × H)
- Internal Structure : Aluminum Base Chip on Board
- Compact High Flux Density Light Source
- Uniform High Quality Illumination
- ESD Withstand Voltage: HBM ±8KV
- Energy Star / ANSI Compliant Color Binning Structure with 3SDCM

2. Outline Dimensions

(Unit : mm)



Circuit Diagram



◆Tolerances unless otherwise mentioned are : ±0.20mm

3. Applications

- Bulb, Down Light, Spot Light, High Bay Light, Flood Light, Outdoor Light

4. Maximum Ratings

Items	Symbol	Rating
Forward Current *1)	If	600mA
Storage Temperature	Tstg	-40℃ ~ +120℃
Operating Temperature *2)	Topr	-40℃ ~ +105℃
Case Temperature *2)	Tc	105℃
Junction Temperature *3)	Tj	125℃
ESD Sensitivity		HBM ±8KV
Reverse Voltage		LGIT COB is not designed to be driven in reverse bias

*1) 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.
*2) Operating temperature is evaluated based on the Case Temperature. Refer to 'Outline Dimensions' section on previous page for Tc measurement point.
*3) D. C. Current : Tj = Tc + Rth j-c × Pi

5. Electro-Optical Characteristics

(Tj=85℃)

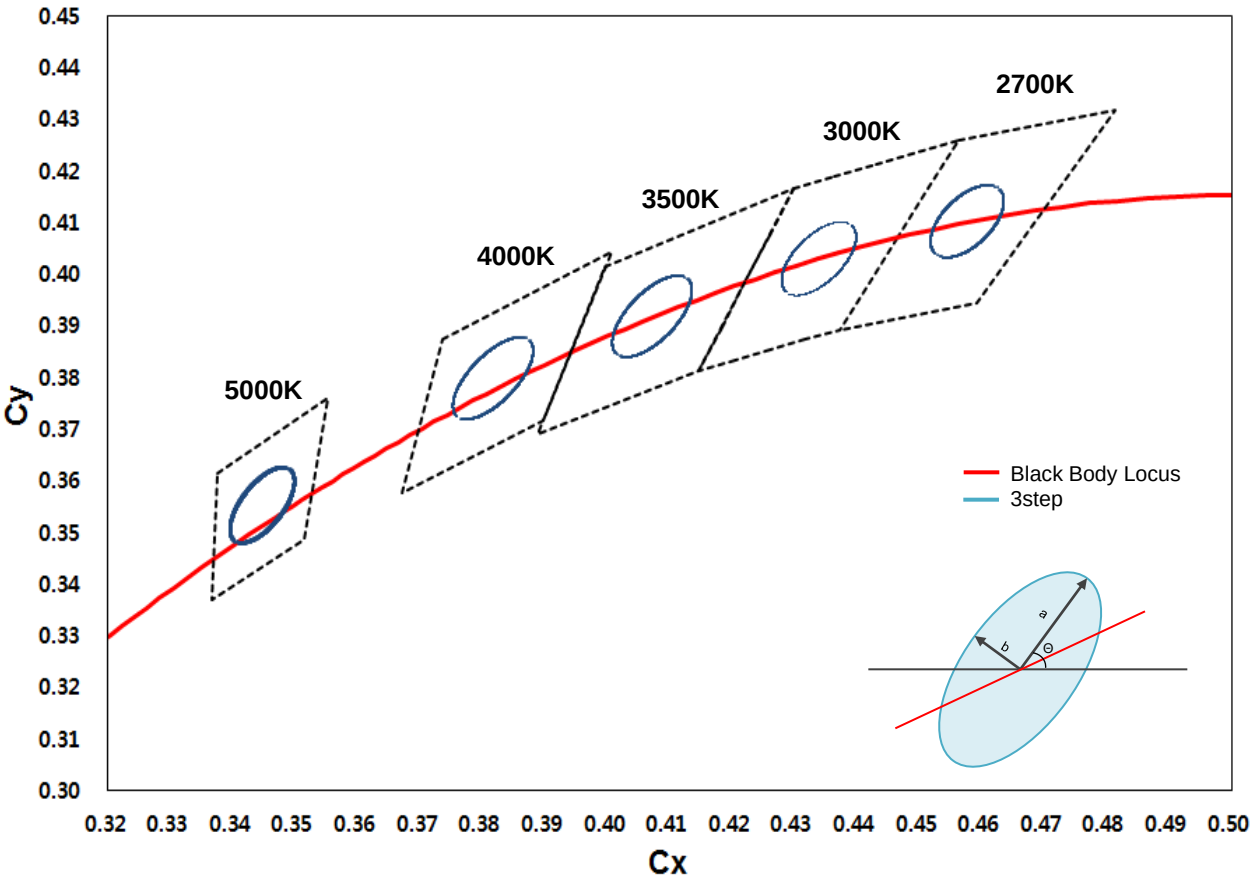
CCT	CRI (Min)	Forward Voltage (Vf)			Luminous Flux (lm)			R9	Typical Luminous Efficacy (lm/W)	Test Current (mA)	LES (mm)	Thermal Resistance (℃/W)	Part Number
		Min	Typ	Max	Min	Typ	Max	Min					
2700K	80	32.5	35.0	37.5	1155	1283	1411	0	122	300	9.0	0.70	LEMWM19680MZ1000
3000K	80	32.5	35.0	37.5	1215	1350	1485	0	129	300	9.0	0.70	LEMWM19680LZ1000
3500K	80	32.5	35.0	37.5	1264	1404	1544	0	134	300	9.0	0.70	LEMWM19680KZ1000
4000K	80	32.5	35.0	37.5	1306	1451	1596	0	138	300	9.0	0.70	LEMWM19680JZ1000
5000K	80	32.5	35.0	37.5	1312	1458	1604	0	139	300	9.0	0.70	LEMWM19680HZ1000
2700K	90	32.5	35.0	37.5	1009	1121	1233	50	107	300	9.0	0.70	LEMWM19690MZ1000
3000K	90	32.5	35.0	37.5	1045	1161	1277	50	111	300	9.0	0.70	LEMWM19690LZ1000
4000K	90	32.5	35.0	37.5	1130	1256	1382	50	120	300	9.0	0.70	LEMWM19690JZ1000

*1) Rthj-c = Thermal Resistance (Junction – Case)

※ These values are measured by the LG Innotek optical spectrum analyzer within the following tolerances.
Luminous Flux (Φv) : ±6.5%, Forward Voltage (Vf) : ±2%, Color Value : ±0.005, CRI Value : ±2

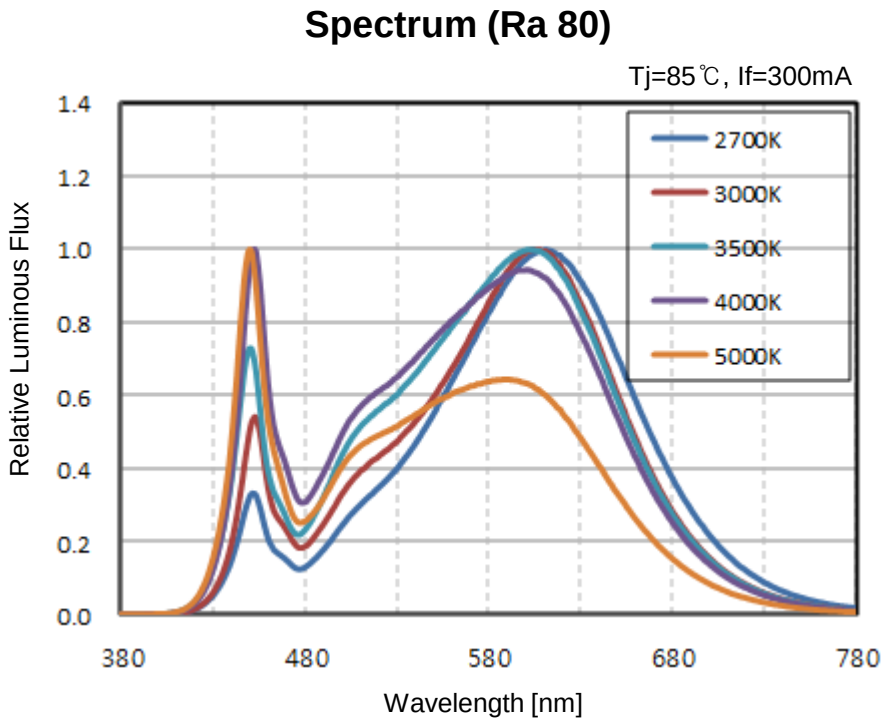
6. Bin Structure

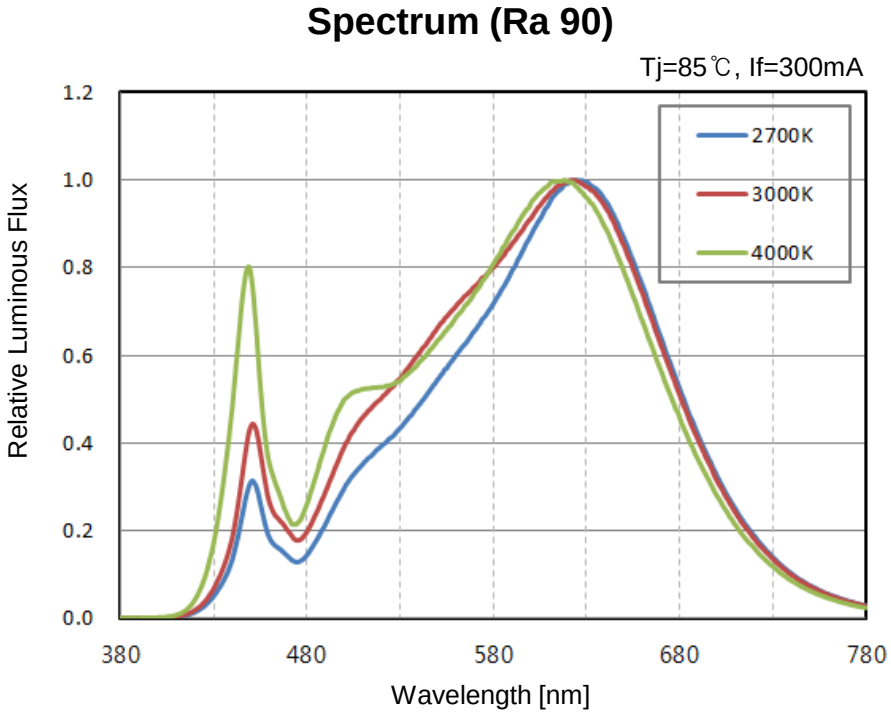
▪ Color Bins. (@300mA, Tj=85℃)



Norminal CCT	Color Space	Center Point (Cx, Cy)	Major Axis, a	Minor Axis, b	Ellipse Rotation Angle, Θ
2700K	Single 3-step MacAdam ellipse	(0.4578,0.4101)	0.00810	0.00420	53.7˚
3000K	Single 3-step MacAdam ellipse	(0.4338, 0.4030)	0.00834	0.00408	53.2˚
3500K	Single 3-step MacAdam ellipse	(0.4073, 0.3917)	0.00927	0.00414	54.0˚
4000K	Single 3-step MacAdam ellipse	(0.3818, 0.3797)	0.00939	0.00402	53.7˚
5000K	Single 3-step MacAdam ellipse	(0.3447, 0.3553)	0.00822	0.00354	59.6˚

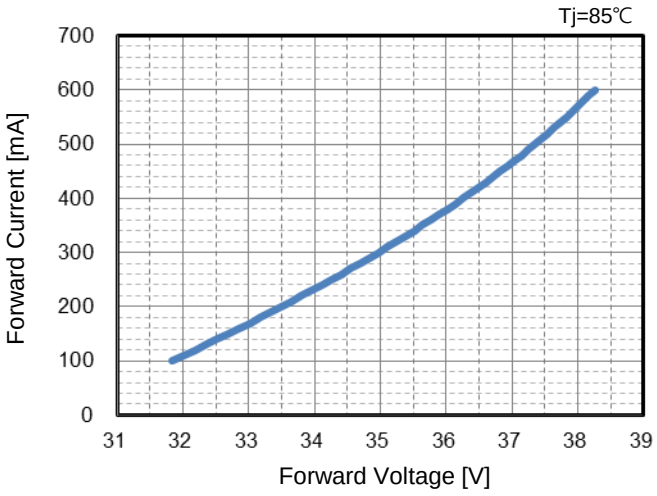
7. Typical Characteristic Curves



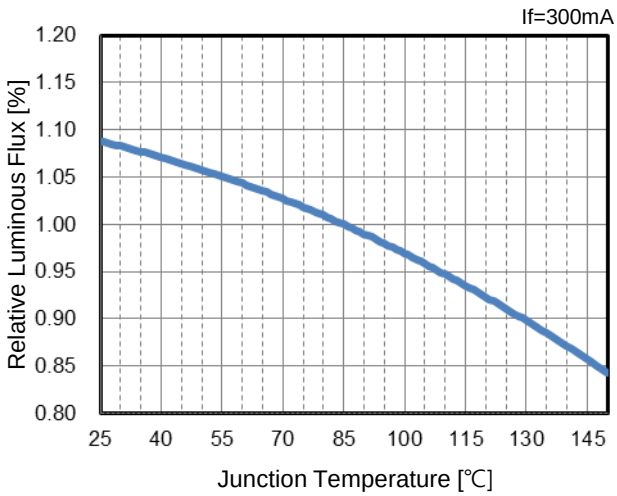


7. Typical Characteristic Curves

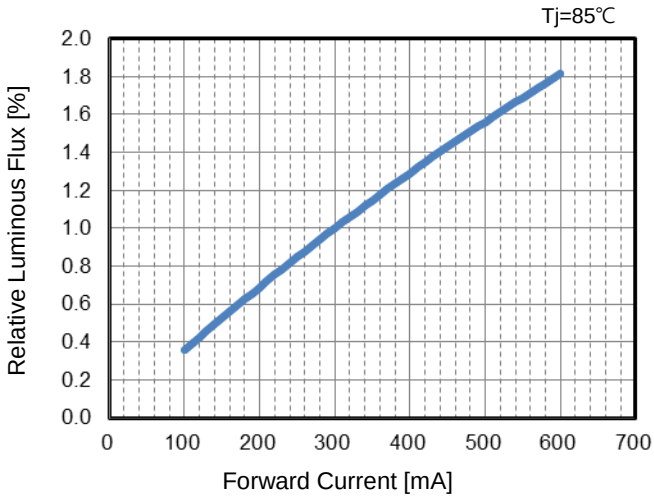
Forward Voltage vs. Forward Current



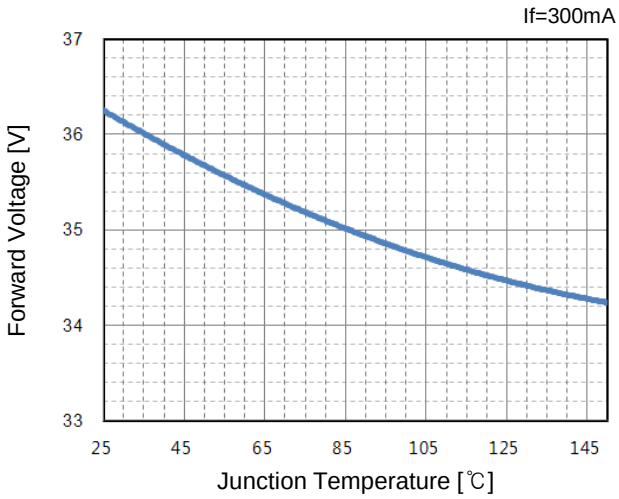
Junction Temp. vs. Relative Luminous Flux



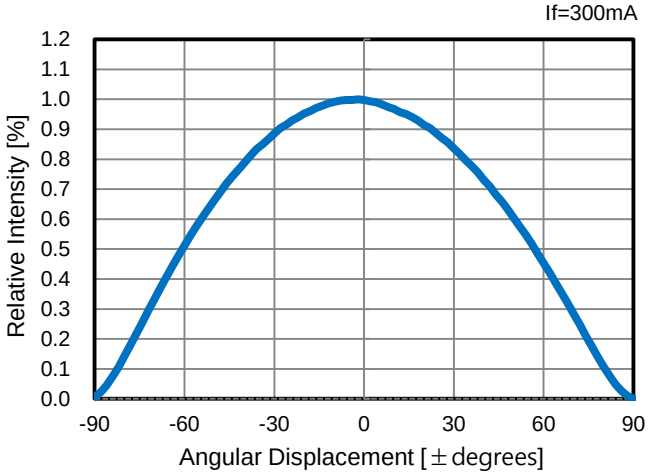
Forward Current vs. Relative Luminous Flux



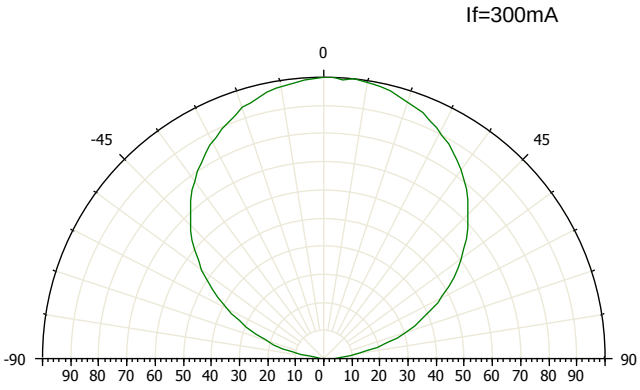
Junction Temp. vs. Forward Voltage



Viewing Angle



Radiation Pattern



8. Reliability Test Items and Conditions

8-1. Failure Criteria

Item	Symbol	Test Condition	Criteria	
			Min	Max
Forward Voltage	Vf	If = 300mA	-	Initial Value × 1.1
Luminous Flux	Φv	If = 300mA	Initial Value × 0.8	-

8-2. Reliability Test

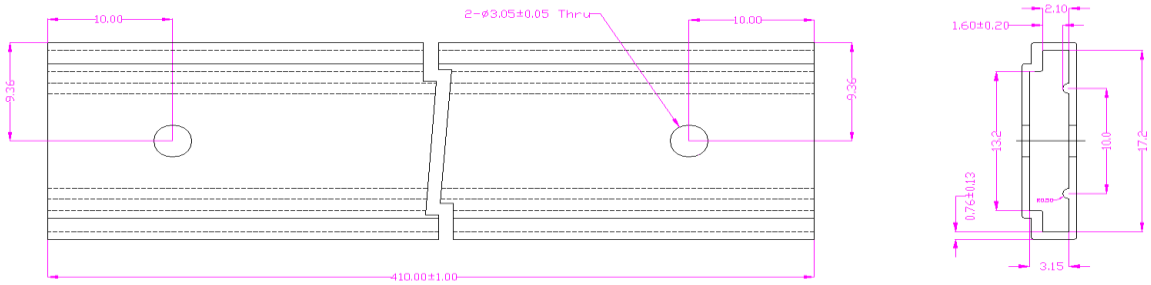
No	Items	Test Conditions	Test Hours/ Cycles	Sample Size
1	Wet High Temperature Operating (WHTOL)	85°C/85%RH, DC 30 min ON/OFF, Tj=max	1,000 cycles	12 pcs
2	Power Temperature Cycle (PTMCL)	-40° C to 90° C dwell 15min /transfer 15min(1hour/cycle), ON 5 minutes / OFF 5 min If=max	1,000 cycles	12 pcs
3	Low Temperature Operating Life (LTOL)	Tc=-40°C, 30 min ON/OFF If=max	1,000 hours	12 pcs
4	Low Temperature Storage Life (LTSL)	Ta=-55°C	1,000 hours	12 pcs
5	Corrosion test (H2S vapor)	15ppm H2S	96 hours	10 pcs
6	Mechanical Shock	1500G, 0.5ms pulse, 5 shocks each 6 axis	30 Times (5 shocks each 6 axis)	12 pcs
7	Non Operating Thermal Shock (TMSK)	-40°C to 125°C,dwell 15min, < transfer 10sec,	1000cycles	10 pcs
8	High Temperature Storage Life (HTSL)	Ta=120°C	1000cycles	12 pcs
9	Fast Switch Cycling Test	Ta =25℃±5℃,40,000cycles, 2 mins On/Off, If=max	4000cycles	10 pcs
10	ESD	<8000V Human Body Model(HBM) Class 3A JESD22-A114-E <400V Machine Model(MM) Class B JESD22-A115-B	3 times	12 pcs
11	Vibration	100~2000~100Hz Sweep 4min. 200m/s2 ,3direction	48min	5 pcs
12	Autoclave	121°C, 100%RH,15psig (Check Performance after 200 hrs)	20hrs	15 pcs

※ All Samples are tested using LG Innotek Standard Metal PCB (40x60x1.7 mm^3(L × W × H)) except vibration test .
※ All samples must pass each test item and all test items must be satisfied.

9. Packing and Labeling of Products

9-1. Tube Outline Dimension

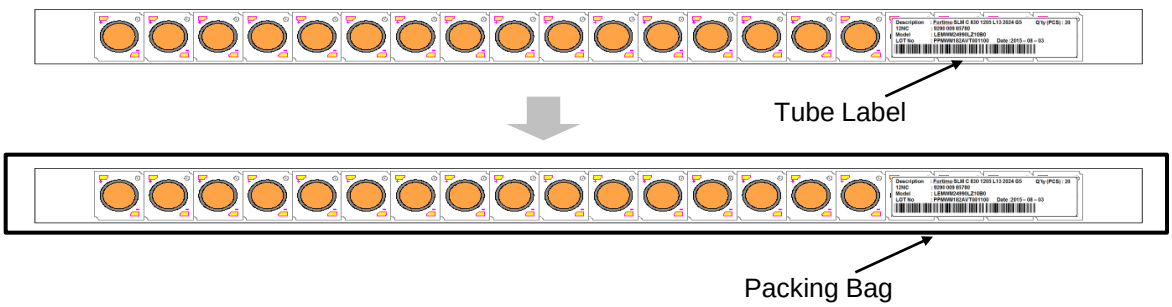
(unit : mm)

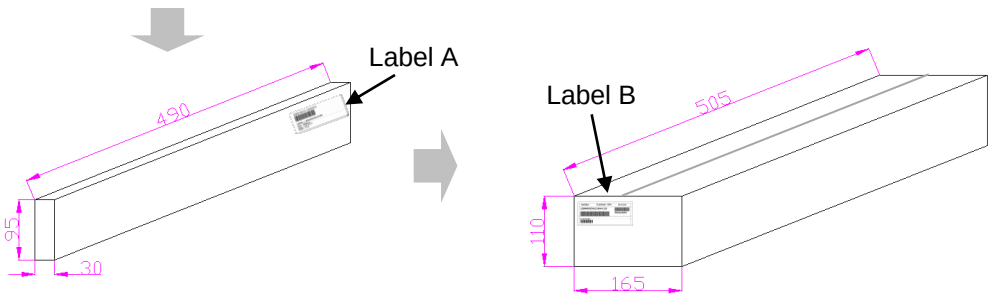


- Tube Packing Material: PET (Polyethylene Terephthalate)
- Tube Dimension : 410 ×18.72 ×4.67mm
- Units per Tube : 20 units

9-2. Packing Specifications

One tube is packed in a vacuum sealed packing bag along with desiccants (Silica Gel). Five packing bags are packed in an inner box (for a maximum grand total of 100 units) where 5 inner boxes are placed into an outer box (for a maximum grand total of 500 units).





Inner Box

Outer Box

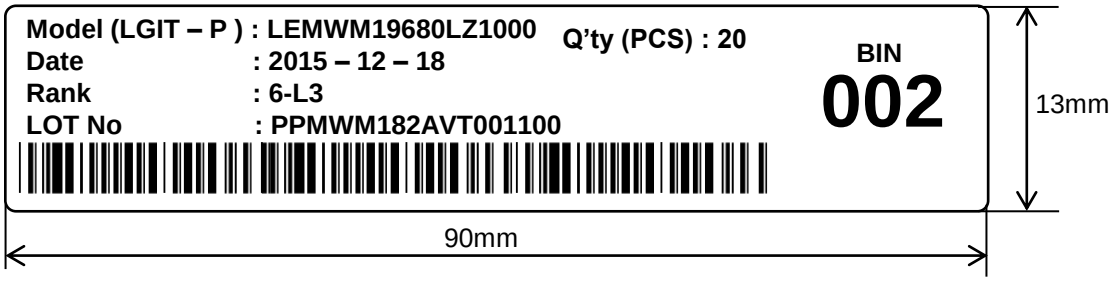
Types	Sizes (mm)		
	W	L	H
Inner Box	490	30	95
Outer Box	505	165	110

Tolerance : ±10mm

9. Packing and Labeling of Products

※ Tube Label

Model(Company's Name - Location of manufacture) , Date, Rank, LOT No, Quantity



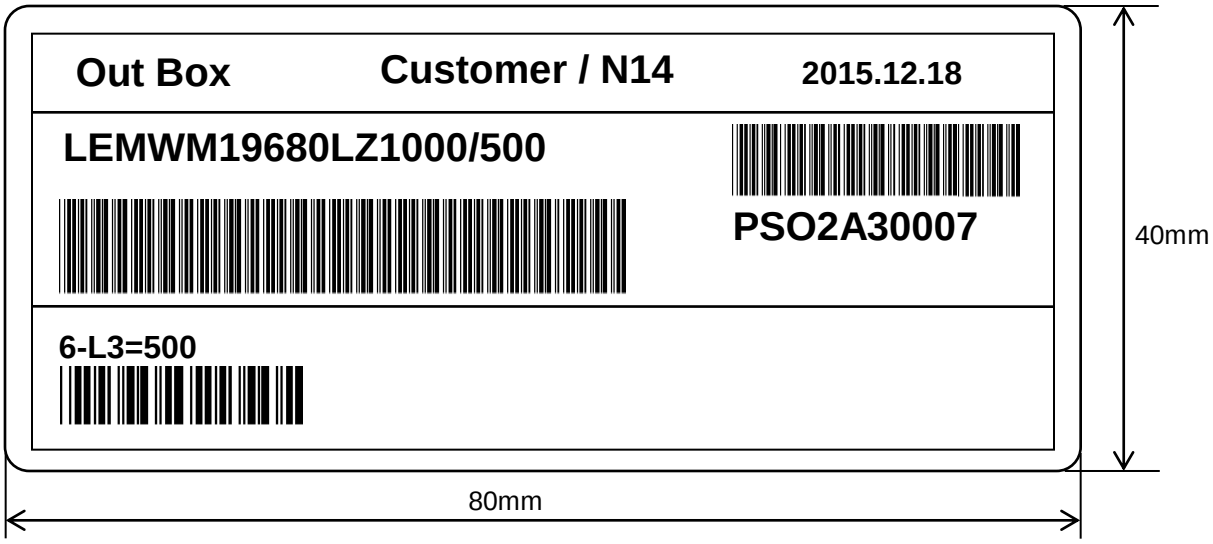
※ Label A

INNER BOX ID, MODEL, Quantity, Date, Rank

9. Packing and Labeling of Products

※ Label B

Specifying Customer, Date, Model Name, Quantity, Customer Part no, Outbox ID



▪ Outbox ID. indication

1	2	3	4	5	6	7	8	9	10
Site	PKG Site	Outbox	Year	Month	Date		Serial No		
			14 : 4 15 : 5	1~9 : 1~9 10 : A 11 : B 12 : C	(01 ~ 31)		(001 ~ 999)		

▪ **Lot No. indication**

1	2	3	4	5	—	6	7
Code	**QA Inspection Year (Last number)**	**QA Inspection Month**	**QA Inspection Date**			**Serial No**	
	(1, 2, 3, 4, 5, 6, 7, 8, 9, 0)	**(1, 2, 3, 4, 5, 6, 7, 8, 9, X, Y, Z)**	**(01 ~ 31)**			**(01 ~ 99)**	

10. Caution on Use

10-1. Overcurrent Protection

- Customer must apply current limiting devices for protection such as resistors or constant current LED drivers. Otherwise, a slight variation in voltage will cause a significant current shift where a catastrophic failure may occur.
- LG Innotek is not responsible for any damages caused by any accidents or any other reasons during the operation under the conditions exceeding the absolute maximum ratings or the special attentions which are ignored when required by the exceptional operation conditions.

10-2. During Storage

Conditions		Temperature	Humidity	Time
Storage	Before Opening PE Bag	5℃ ~ 30℃	< 50%RH	Within 1 Year from the Delivery Date
	After Opening PE Bag	5℃ ~ 30℃	< 60%RH	≤ 672 hours
Baking		65 ± 5℃	< 10%RH	10 ~ 24 hours

- The LEDs should be stored in a clean environment. If the LEDs are stored for 3 months of more after being shipped from LGIT, a sealed container with a nitrogen gas should be used for storage.
- When storing the LEDs after opening PE bag, reseal with a moisture absorbent material inside.

10-3. During Usage

- The LED should be avoided direct contact with hazardous materials such as sulfur, chlorine, phthalate, acid, solvent, etc. These materials (S, Cl, VOCs, etc) may cause sulfurization of silver lead-frame or encapsulant silicone discoloration in LED.
  VOCs (Volatile Organic Compounds) can be generated from adhesives glue, cleaning flux, molding hardener or organic additive which used in luminaries fixtures and they (VOCs) may cause a significant lumen degradation of LED in luminaires when they exposed to heat or light.
  To prevent this phenomenon, materials used in luminaires must be carefully selected by user.
- The metal parts on the LED can rust when exposed to corrosive gases. Therefore, exposure to corrosive gases must be avoided during operation and storage.
- The 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.
- Extreme environments such as sudden ambient temperature changes or high humidity that can cause condensation must be avoided.

10. Caution on Use

10-4. 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.

-. Isopropyl Alcohol(IPA) is the recommended solvent for cleaning the LEDs under the following conditions.

Cleaning Condition : IPA, 25℃ max. × 60sec max.

-. Ultrasonic cleaning is not recommended.

-. Pretests should be conducted with the actual cleaning process to validate that the process will not damage the LEDs.

10-5. Thermal Management

-. The thermal design of the end product must be seriously considered, particularly at the beginning of the system design process.

-. The generation of heat is greatly impacted by the input power, the thermal resistance of the circuit boards and the density of the LED array combined with other components.

10-6. Static Electricity

-. Wristbands and anti-electrostatic gloves are strongly recommended and all devices, equipment and machinery 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.

-. Unusual characteristics such as significant increase of current leakage, decrease of turn-on voltage, or non-operation at a low current can occur when the LED is damaged.

10. Caution on Use

10-7. Recommended Circuits

- The current through each LED must not exceed the absolute maximum rating when designing 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.

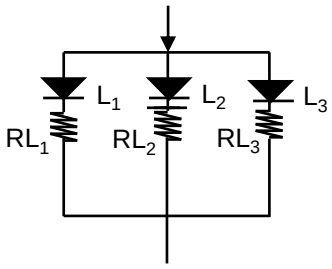


Fig.1 Recommended Circuits in Parallel Mode
: Separate resistors must be used for each LED.

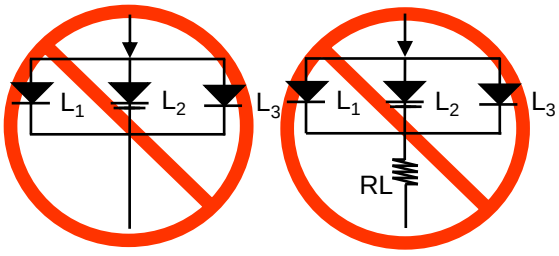


Fig.2 Abnormal Circuit
Circuits to Avoid : The current through the LEDs may vary due to the variation in LED forward voltage.

-. The driving circuits must be designed to operate the LEDs by forward bias only.
-. Reverse voltages can damage the zener diode, which can cause the LED to fail.
-. A constant current LED driver is recommended to power the LEDs.

10. Caution on Use

10-8 Recommended Soldering Conditions

- Manual Soldering is allowed when reflow process is not available.
- Lead-free soldering shall be implemented using maximum 40W soldering bit under the conditions, 350℃ or less within 3.5 seconds.

10-9. Safety Guideline for Human Eyes

- 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.

10-10. Manual Handling

- It is recommended to wear anti-static plastic gloves to prevent static electricity and dirt or other contaminants.
- When using tweezers, please handle aluminum substrate part and avoid touching resin part.
- For mounting, please handle the side of the aluminum part.

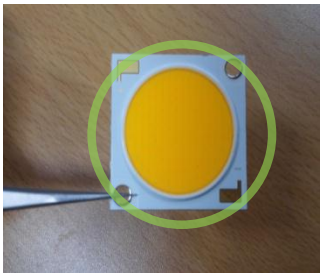


Fig.3 Proper Handling of the COB Using Tweezers

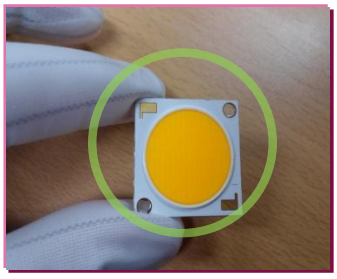


Fig.4 Proper Handling of the COB Using Anti-Static Gloves

Fig.5 Improper Handling of the COB Using Tweezers

Fig.6 Improper Handling of the COB Using Anti-Static Gloves

11. Disclaimers

-. LG Innotek is not responsible for any damages or accidents caused if the operating or storage conditions exceed the absolute maximum ratings recommended in this document.
-. The LEDs described in this document are intended to be operated by ordinary electronic equipment.
-. The LEDs should not be used at any lighting products together with the other LEDs, which has a different part number. If required, please contact any sales person.
-. It is recommended to consult with LG Innotek when the environment or the LED operation is non-standard in order to avoid any possible malfunctions or damage to product or risk of life or health.
-. Disassembly of the LED products for the purpose of reverse engineering is prohibited without prior written consent from LG Innotek. All defected LEDs must be reported to LG Innotek and are not to be disassembled or analyzed.
-. The product information can be modified and upgraded without prior notice.