CUSTOMER : LG Electronics.

DATE : 2011.11.30 .

REV : REV. 5.0 .

SPECIFICATIONS FOR APPROVAL

Bluish White Dip Type Lamp LED

MODEL NAME : LEBWL34A06AA00

RoHS Compliant

APPROVAL	REMARK	APPENDIX

DESIGNED	CHECKED	APPROVED

LG Innotek

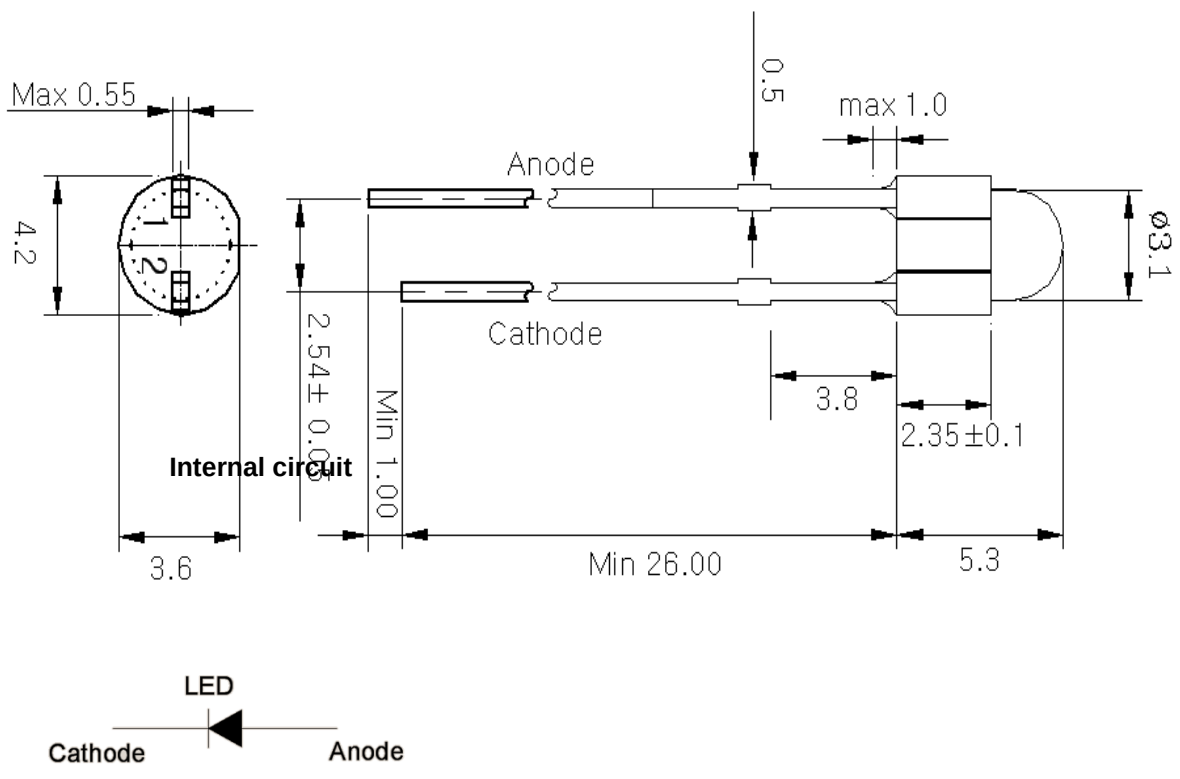
CONTENTS

1. Features

- Lighting Color : Bluish White
- Lamp Type LED Package : Ø3 mm
- Viewing angle : 40˚
- Chip Material : InGaN
- Soldering Methods : Wave Soldering

2. Outline Dimensions

(Unit : mm)



Tolerances Unless Dimension ±0.2mm

3. Applications

- Electronic signs and signals
- Specialty lighting
- Backlighting
- Outdoor displays
- Indicator

4. Maximum Ratings

(Ta=25℃)

Item	Symbol	Rating	Unit
Forward Current	If	30	mA
Peak Pulse Forward Current*1)	Ifp	100	mA
Power Dissipation	Pd	108	mW
Operating Temperature	Topr	-30 ~ +85	℃
Storage Temperature	Tstg	-40 ~ +100	℃

*1) Pulse width = 10 ms, duty ≤ 10%

※ 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.

5. Electro - Optical Characteristics

(Ta=25℃)

Items	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	Vf	If = 20[mA]	2.8	-	3.6	V
Reverse Voltage	Ir	Vr = 5[V]	-	-	5	uA
Luminous Flux	Φ_V	If = 20[mA]	2	-	5	lm
Luminous Intensity	I_V	If = 20[mA]	4	-	11	cd
CIE Value	Cx / Cy	If = 20[mA]	Refer to '6. Bin structure'			-
Viewing Angle	$2\Theta_{1/2}$	If = 20[mA]	-	20	-	deg
ESD		HBM	-1.0	-	+1.0	kV

※ These values are measured by the LG Innotek optical spectrum analyzer within the following tolerances.
Luminous Flux (Φv) : ±7%, Forward Voltage (Vf) : ±0.1V, Color Value : ±0.005, CRI Value : ±2,

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

※ Luminous Intensity : Only reference data.

5. Electro - Optical Characteristics

If (mA)	Vf (V)	Power (mW)	Φv (lm)	lm/W
8	3.01	24.1	1.64	68.11
10	3.05	30.5	2.01	66.02
20(Typ)	3.19	63.9	3.73	58.45
25	3.25	81.3	4.52	55.60
30	3.31	99.3	5.27	53.13

※ Φv values are for representative references only.

6. Bin Structure

▪ Luminous Flux Bin

Bin	Φ_V (lm, @20mA)		
	Min	Typ	Max
L1	2	-	3
L2	3	-	4
L3	4	-	5

▪ Forward Voltage Bins

Bin	Vf(V, @ 20mA)		
	Min	Typ	Max
1	2.8	-	3.1
2	3.1	-	3.3
3	3.3	-	3.6

▪ Color Bins (@ 20mA)

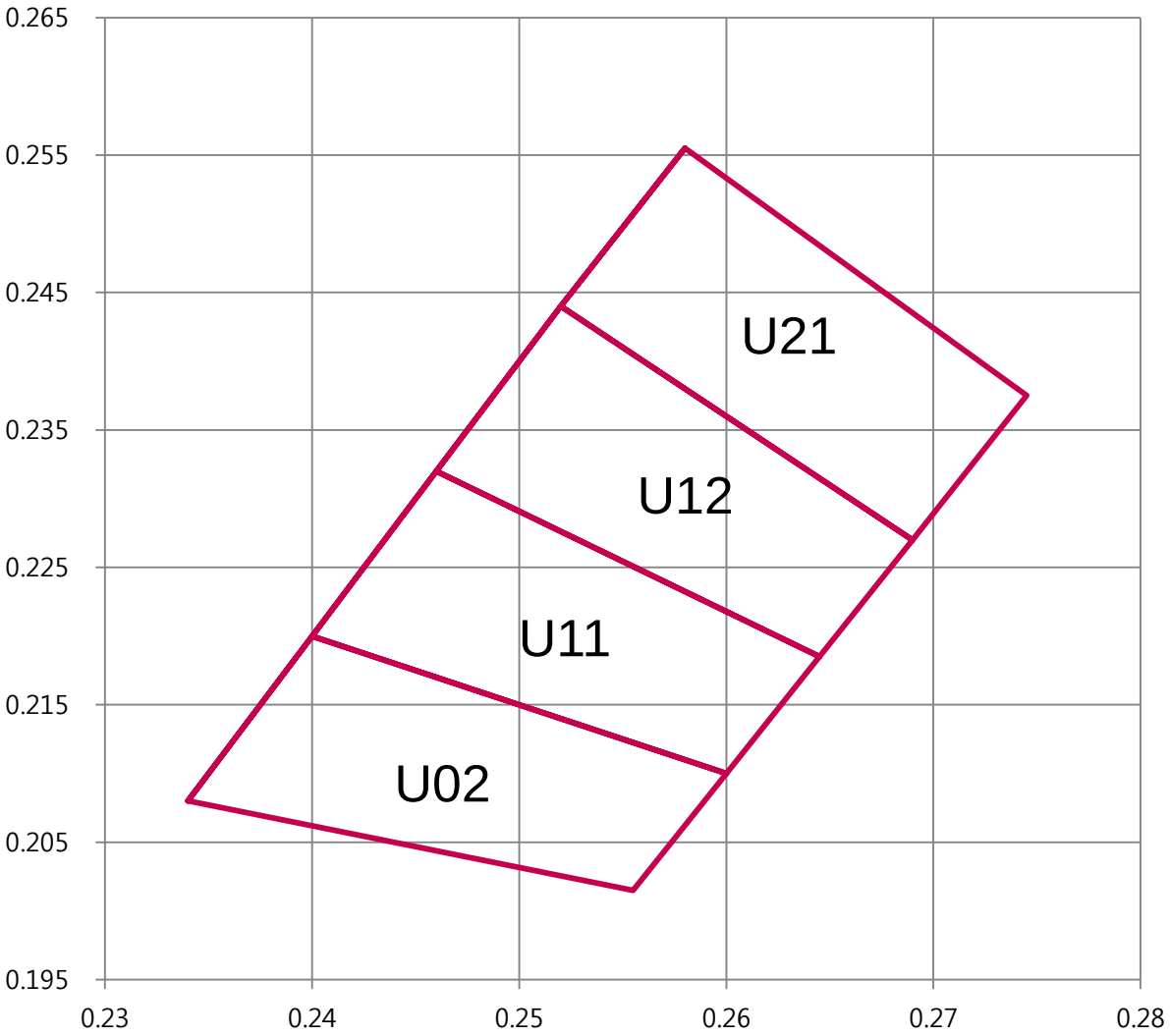
Bin	Cx	Cy
U02	0.234	0.208
	0.256	0.202
	0.260	0.210
	0.240	0.220
U11	0.240	0.220
	0.260	0.210
	0.265	0.219
	0.246	0.232
U12	0.246	0.232
	0.265	0.219
	0.269	0.227
	0.252	0.244
U21	0.252	0.244
	0.269	0.227
	0.275	0.238
	0.258	0.256

※ Bin Structure: Please refer to the following example.
Bin Name : L1–U11–1 (Φ_V Bin = L1, CIE Bin = U11, V_F Bin = 1)

※ Voltages are tested at a current pulse duration of 10ms and an accuracy of ± 5.0%.

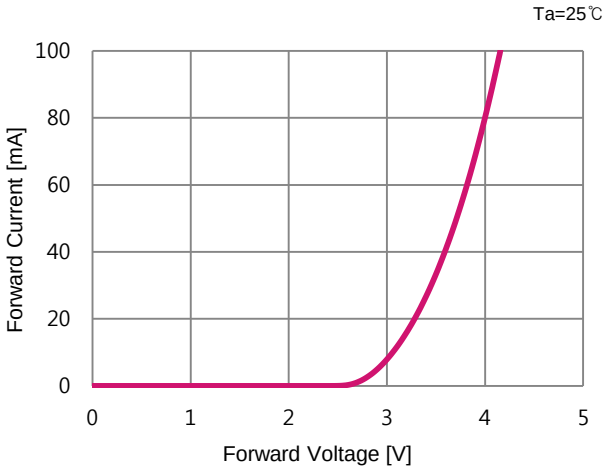
※ The bin structure is leveraged for product classification.

Color Bins Structure

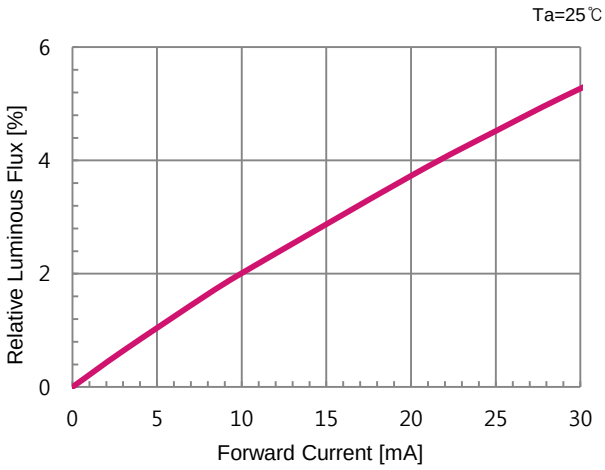


7. Typical Characteristic Curves

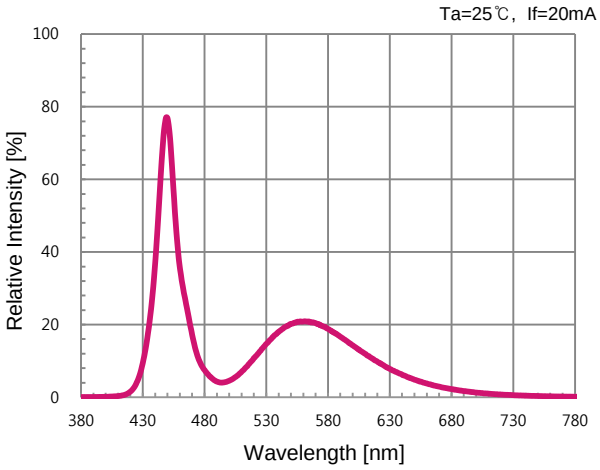
▪ Forward Current vs. Forward Voltage



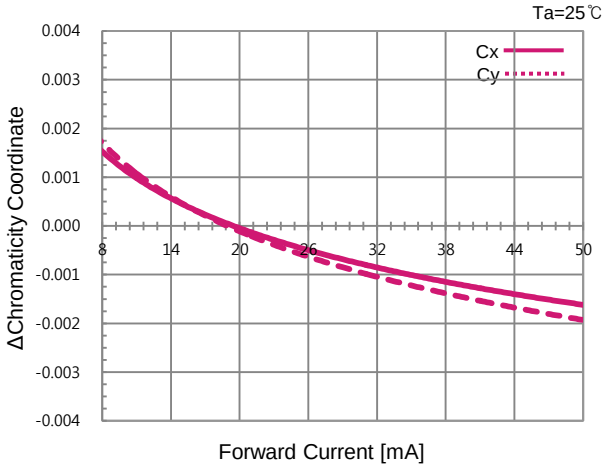
▪ Relative Luminous Flux vs. Forward Current



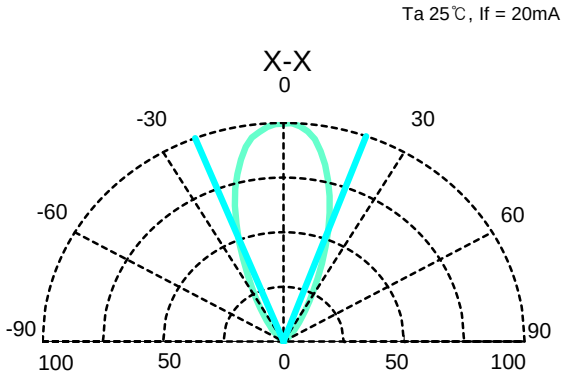
▪ Spectrum

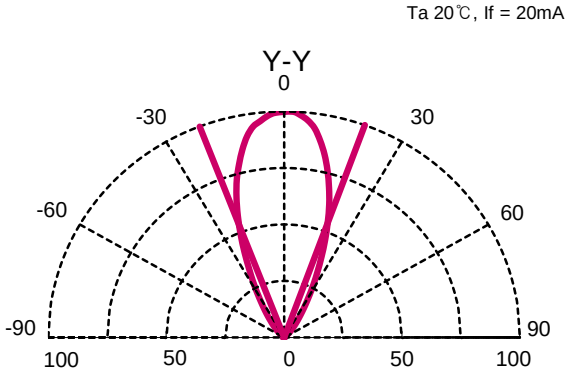


▪ Chromaticity Coordinate vs. Forward Current



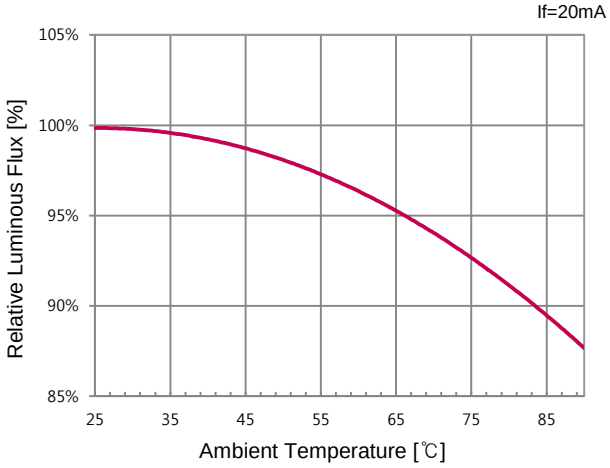
▪ Radiation Characteristics



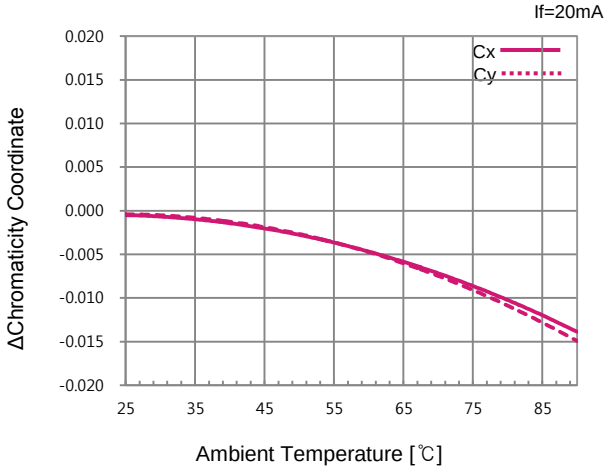


7. Typical Characteristic Curves

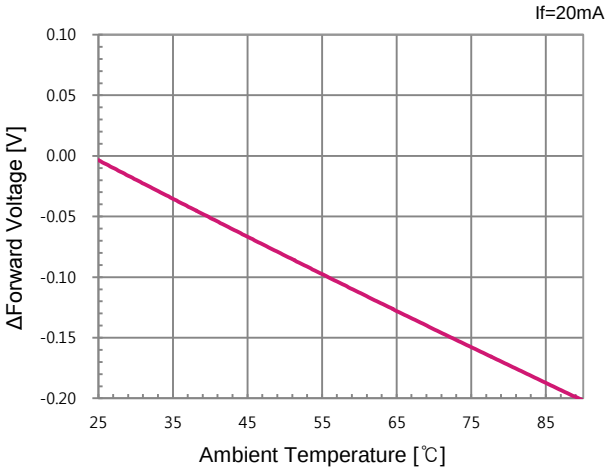
▪ Luminous Flux vs. Temperature



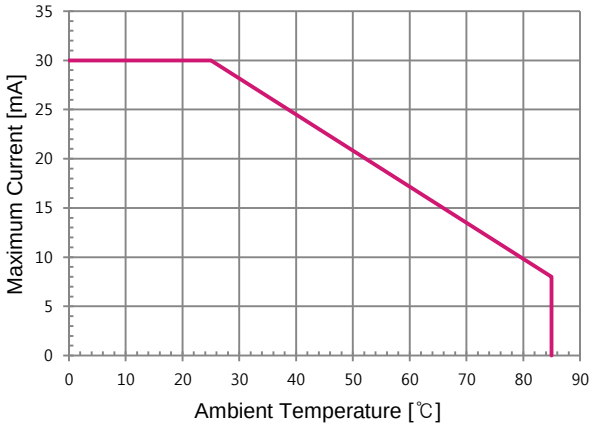
▪ Chromaticity Coordinate vs. Temperature



▪ Forward Voltage vs. Temperature



▪ Derating Curve



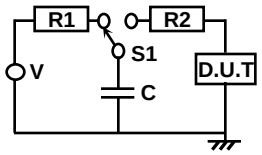
※ The ambient temperatures for each graph are based on the LG Innotek equipment.

8. Reliability Test Items and Conditions

8-1. Failure Criteria

Items	Symbols	Test Conditions	Criteria	
			Min.	Max.
Forward Voltage	Vf	If = 20mA	-	Initial Value × 1.1
Luminous Flux	Φ_V	If = 20mA	Initial Value × 0.7	-

8-2. Reliability Test

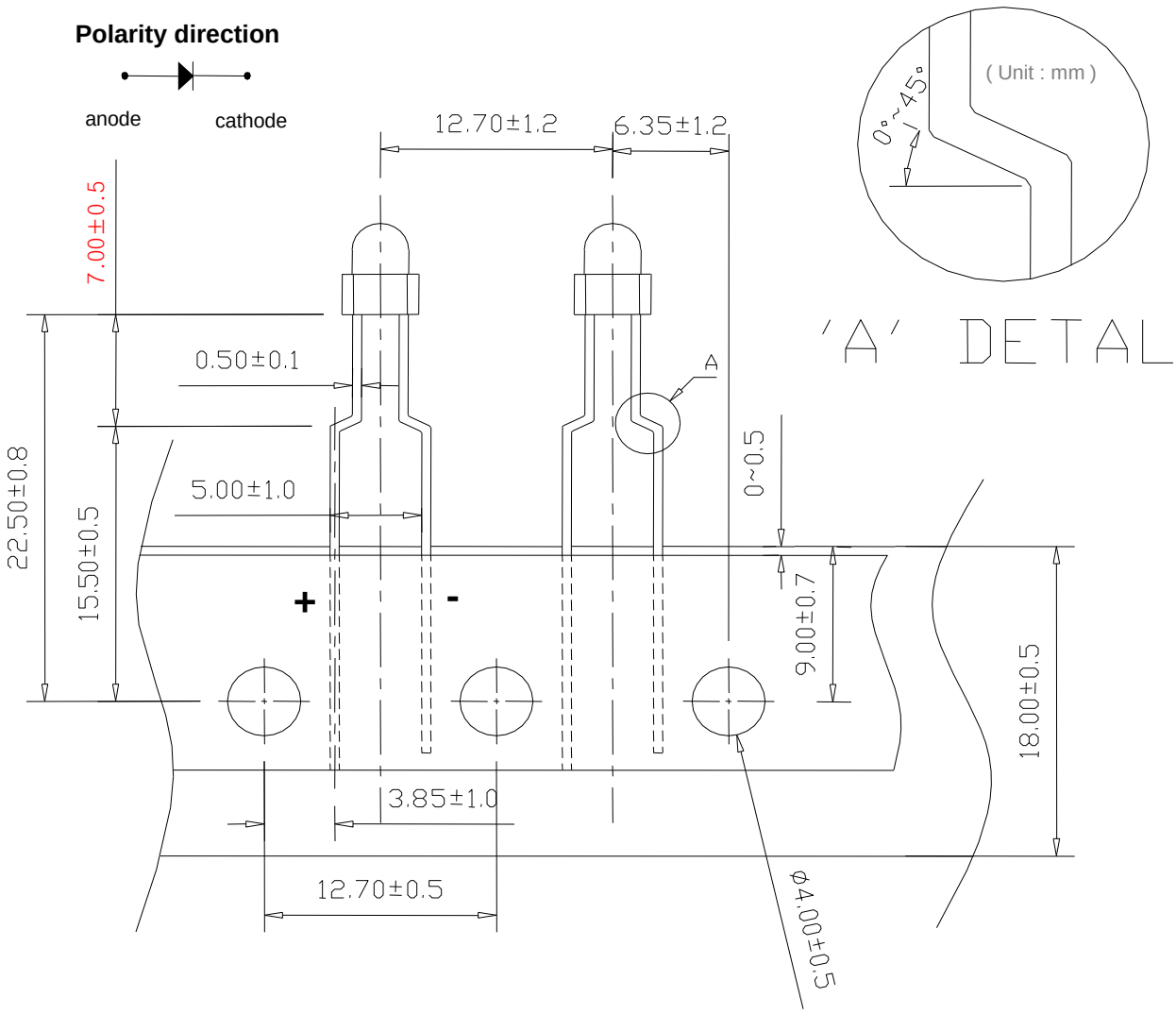
No	Items	Test Conditions	Test Hours /Cycles
1	Room Temperature Operating Life (RTOL)	Ta=25℃, If=30mA	1,000 Hours
2	Wet High Temperature Operating Life (WHTOL)	Ta=85℃, RH=85%, If=8mA	100 Hours
3	High Temperature Operating Life (HTOL)	Ta=85℃, If=8mA	1,000 Hours
4	Low Temperature Operating Life (LTOL)	Ta=-30℃, If=20mA	1,000 Hours
5	High Temperature Storage Life (HTSL)	Ta=100℃	1,000 Hours
6	Low Temperature Storage Life (LTSL)	Ta=-40℃	1,000 Hours
7	Wet High Temperature Storage Life (WHTSL)	Ta=85℃, RH=85%	1,000 Hours
8	Thermal Shock (TS)	100℃ ~ -40℃ Dwell : 15 min., Transfer : 10 sec.	200 Cycles
9	Pressure Cooker Test (PCT)	Ta=121℃, RH=100% P=202 kPa	48 Hours.
10	Electrostatic Discharge (HBM Mode)	 Test Voltage ±1.0 KV R1 :10MΩ, R2:1.5KΩ C:100pF	1 Times

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

9. Packing and Labeling of Products

9-1. Taping Outline Dimensions

▪ Taping



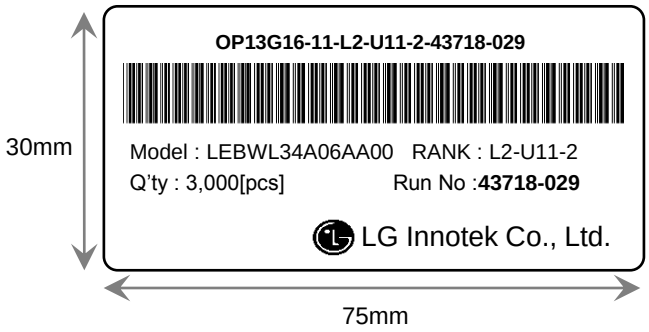
▪ Taping Arrangement

9. Packing and Labeling of Products

9-2. Label Structure

※. Label A

Specifying Model Name, Rank, Rack, Quantity and Run number



▪ Run No. indication

1	2	3	4	5	—	6	7	8
Manufacture Site	Manufacture Year	Manufacture Month	Manufacture date			Serial No		
	2013 : 3 2014 : 4 … 2020 : 0 2021 : 1	1~9 : 1~9 10 : A 11 : B 12 : C	(01~31)			(000 ~ 999)		

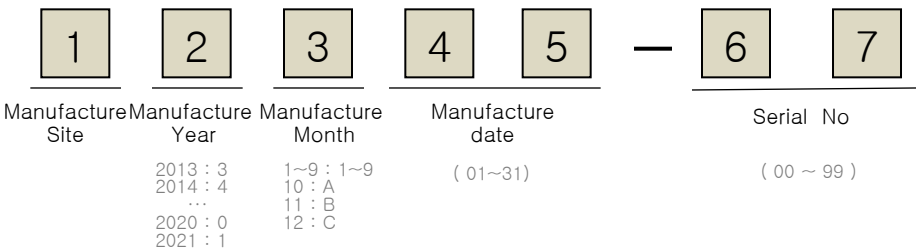
9. Packing and Labeling of Products

9-2. Label Structure

※. Label C

Specifying Customer, Date, Model Name, Quantity, Customer Part no, Outbox ID, Rank/Rank Q'ty

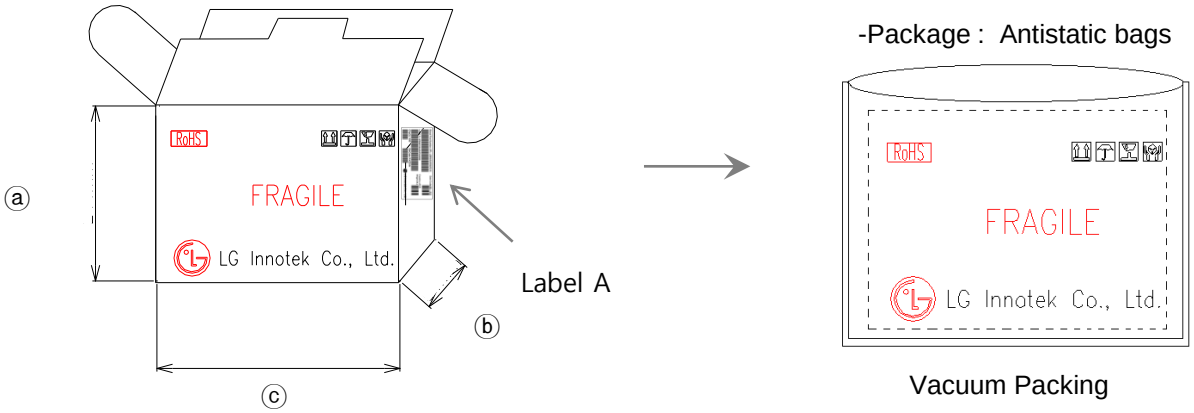
▪ Box ID. indication

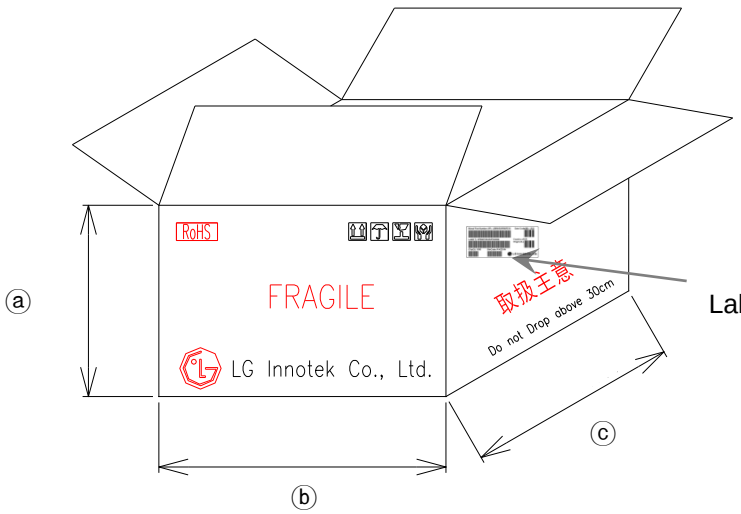


9. Packing and Labeling of Products

9-3. Packing Structure

Taped products (numbers of products are 3,000pcs) packed in a inner box.
One inner box packed in a Antistatic bags.
Ten Antistatic bags (total maximum number of products are 3,000pcs) packed in Ten inner boxes are put into an outer box.





TYPE	SIZE (mm)		
	ⓐ	ⓑ	ⓒ
Inner Box	244	54	565
Outer Box	265	565	350

10. Cautions on Use

10-1. Moisture Proof Package

-. The moisture in the package may vaporize and expand during soldering.

-. The moisture can damage the optical characteristics of the LEDs due to the encapsulation.

10-2. During Storage

Conditions		Temperature	Humidity	Time
Storage	Before Opening Bag	< 30℃	< 50%RH	Within 1 Year from Delivery Date
	After Opening Bag	< 30℃	< 60%RH	≤ 168 hours
	Baking	65±5℃	< 10%RH	10 ~ 24 hours

-. If unused LEDs remain, they should be stored in a moisture-proof bag with a absorbent Material. (ex. silica gel)

10-3. During Usage

-. LED should avoid the direct contact with exposure to hazardous materials such as Sulfur, Chlorine, Phthalate.

-. 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.

-. The absolute maximum current should not be exceeded for each LED circuit design.

10-4. Cleaning

-. Please avoid using a brush for cleaning and do not wash the product in organic solvents (i.e. Acetone, TCE, etc..) as they will damage the resin of the LEDs.

-. It is recommended that IPA be used as a solvent for cleaning the LEDs. Please refer to following solvents and conditions. (Clearing Condition: IPA, 25℃ max × 60 sec. max)

-. Ultrasonic cleaning is not recommended. If you don't specify the conditions to which ultrasonic cleaning will be safe for the LED, then I would not leave the door open with a vague statement that is currently included in the datasheet .

-. Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs will occur.

10. Cautions on Use

10-5. Heat Generation

-. Thermal design of the end product is of paramount importance.

-. Please consider the heat generation of the LED when making the system design.

-. The coefficient of temperature increase per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board. as well as other components.

-. It is necessary avoid intense heat generation and operate within the maximum ratings given in the specification.

10-6. Static Electricity

-. If a voltage level is applied to the LEDs, which exceeds the absolute maximum rating, it will damage the LEDs and will result in a catastrophic failure. Since the LEDs are sensitive to static electricity and surge, it is strongly recommended to use a wristband or anti-electrostatic glove when handling the LEDs where all devices, equipment and machinery must be properly grounded.

-. It is recommended that precautions be taken against surge voltage to the equipment that mounts the LEDs.

-. Damaged LEDs will show some unusual characteristics such as significant increase in leakage current, decrease of turn-on voltage, or the LEDs do not light up at a low current.

-. When examining the final product, it is recommended to verify whether the assembled LEDs are damaged by static electricity. Static-damaged LEDs can easily be discovered via a light-on test or the Vf test at a low current.

10-7. Recommended Circuit

-. In designing a circuit, the current through each LED must not exceed the absolute maximum rating specified for each LED.

-. In general, there is variation in LED forward voltage. Driving LEDs of different forward voltages in parallel via a single resistor will result in different forward currents to each LED. This may lead to a variation in luminous flux. In the worst case, some LEDs may be subjected to stress exceeding the absolute maximum rating. To avoid luminous flux variations, the use of a matrix circuit with one resistor for each LED string is recommended.

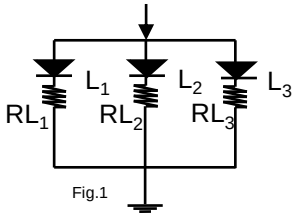


Fig.1

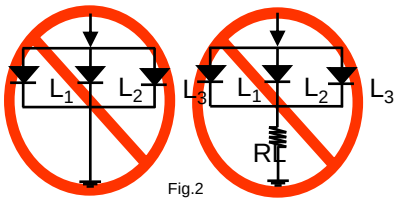


Fig.2

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.

-. LED should be operated in forward bias. A driving circuit must be designed so that the LED is not subjected to either forward or reverse voltage while it is off. In particular, if a reverse voltage is continuously applied to the LED, such operation can cause migration resulting in LED damage.

-. Reverse voltage can damage the zener diode and cause destructions.

-. Constant-current operation by driver IC controller is recommended.

10. Cautions on Use

10-8. Soldering Conditions

-. The LEDs can be soldered in place using the Wave soldering method.

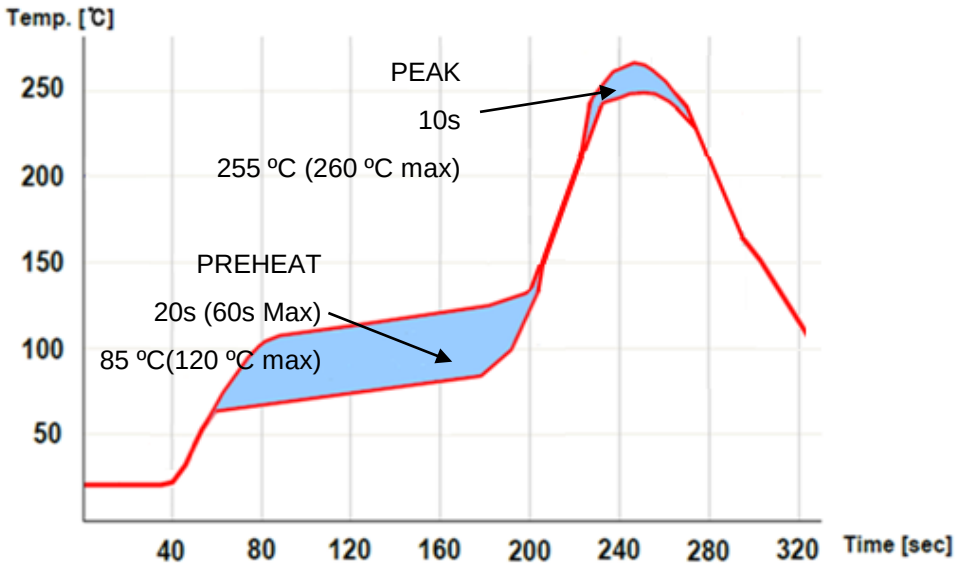
-. LG Innotek cannot make a guarantee on the LEDs after they have been assembled using dip soldering method.

-. Recommended soldering conditions

Preliminary heating to be at 85ºC(120 ºC max) for 20 seconds(60 seconds max).

Soldering heat to be at 255 ºC (260ºC max) for 10 seconds

Soak time above 200 ºC is 5 seconds



Pb Free Solder	
Pre-heat	85~120˚C
Pre-heat time	60 sec. Max.
Peak-Temperature	260˚C Max
Soldering time Condition	10 sec. Max

-. Although the recommended soldering conditions are specified in the above diagram, Wave or hand soldering at the lowest possible temperature is desirable for the LEDs.

-. A rapid-rate process is not recommended for cooling the LEDs down from the peak.

-. When soldering Dome LED , Heat may affect the electrical and optical characteristics of the LEDs.

-. In soldering, do not stress the lead frame and the resin part under the high temperature.

-. The epoxy part should be protected from mechanical stress or vibration until the Dome

-. Soldering must be a just one times.

10. Cautions on Use

10-9. Soldering Iron

-. Basic specification is ≤5sec when 260℃.

-. If the temperature is higher, the time must be shorter (+10℃ → -1sec).

10-10. Repair

-. Repairing should not be done after the LEDs have been soldered.

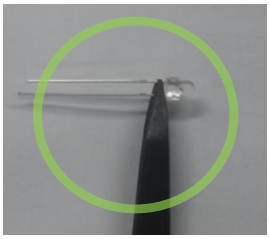
10-11. Eye Safety Guidelines

-. Precautions should be taken to not directly stare at the light of the LEDs.

-. When examining the LEDs with optical instruments, it is important to proceed with caution in order to minimize the risk of damaging the eyes.

10-12. Manual Handling

-. Use tweezers to grab base of LED PKG. Do not touch the lens with the tweezers.



11. Disclaimers

-. LG Innotek is not responsible for any damages caused by any accidents or operational environments exceeding the absolute maximum ratings.

-. Generally accepted electronics equipments 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 official specifications must be mutually confirmed and exchanged by all parties prior to all official purchase orders.

-. The products can be modified and upgraded without prior notice.