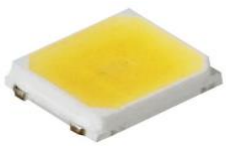
CUSTOMER : .

DATE : 2018. 02.05 .

REV : Rev 1.0 .

SPECIFICATIONS FOR APPROVAL



2835 BL202 Series

MODEL NAME : LEMWS28R80◇SZBLN

RoHS Compliant

APPROVAL	REMARK	APPENDIX

DESIGNED	CHECKED	APPROVED
2018.02.05	2018.02.05	2018.02.05
C. H. Ryu	D. H. Yu	J. H. Kim

LG Innotek

CONTENTS

1. Features

- Lighting Color : White
- Lead Frame Type LED Package : 2.8 x 3.5 x 0.7 (L x W x H) [Unit : mm]
- Viewing Angle : 120˚
- Chip Material : InGaN
- Soldering Methods : Reflow soldering
- Taping : 8 mm conductive black carrier tape and antistatic clear cover tape

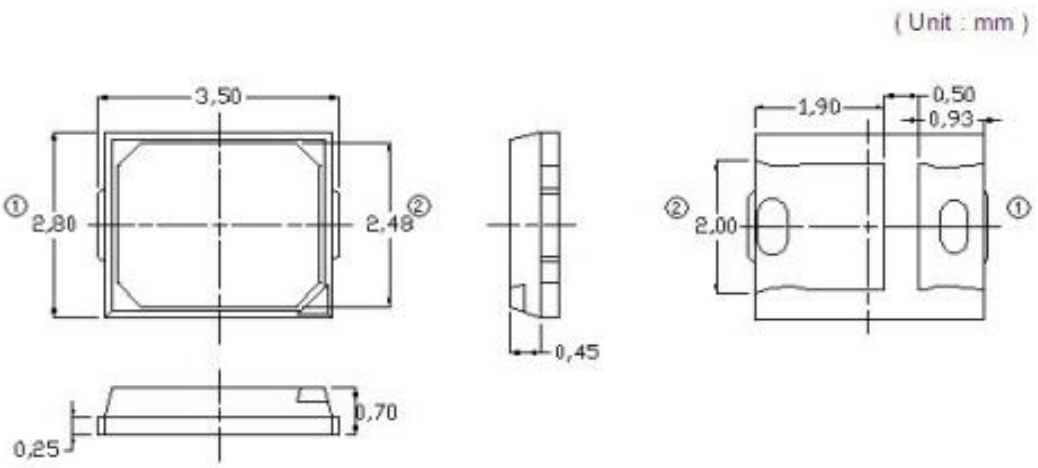
  4,000 pcs/reel, Φ178 mm reel

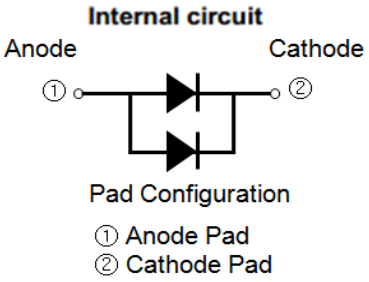
2. Application

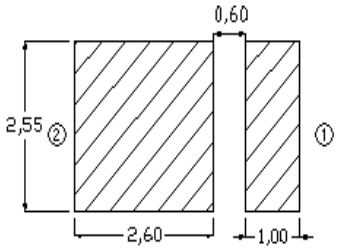
- Interior Illumination

3. Outline Dimensions

(Unit : mm)







Recommendable soldering pattern
(For reflow soldering)

Tolerances unless otherwise mentioned are ± 0.10 mm

4. Absolute Maximum Ratings

(Ta=25℃)

Item	Symbol	Rating	Unit
Forward Current	If	180	mA
Pulse Forward Current*1)	Ifp	200	mA
Operating Temperature	Topr	-30 ~ +85	℃
Storage Temperature	Tstg	-40 ~ +100	℃
Junction Temperature	Tj	125	℃
Soldering Temperature	JEDEC-J-STD-020D		

*1) Pulse width ≤10ms and duty cycle ≤10%

※ These values are provided for informational purposes only, not any warranty or guarantee. Regarding any kinds of warranty or guarantee, consult your sales representative.

※ Operating the LED beyond the listed maximum ratings (particularly operating and junction temperature)may affect device reliability and cause permanent damage.
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.

※ The LEDs are not designed to be driven in reverse bias.

5. Electro - Optical Characteristics

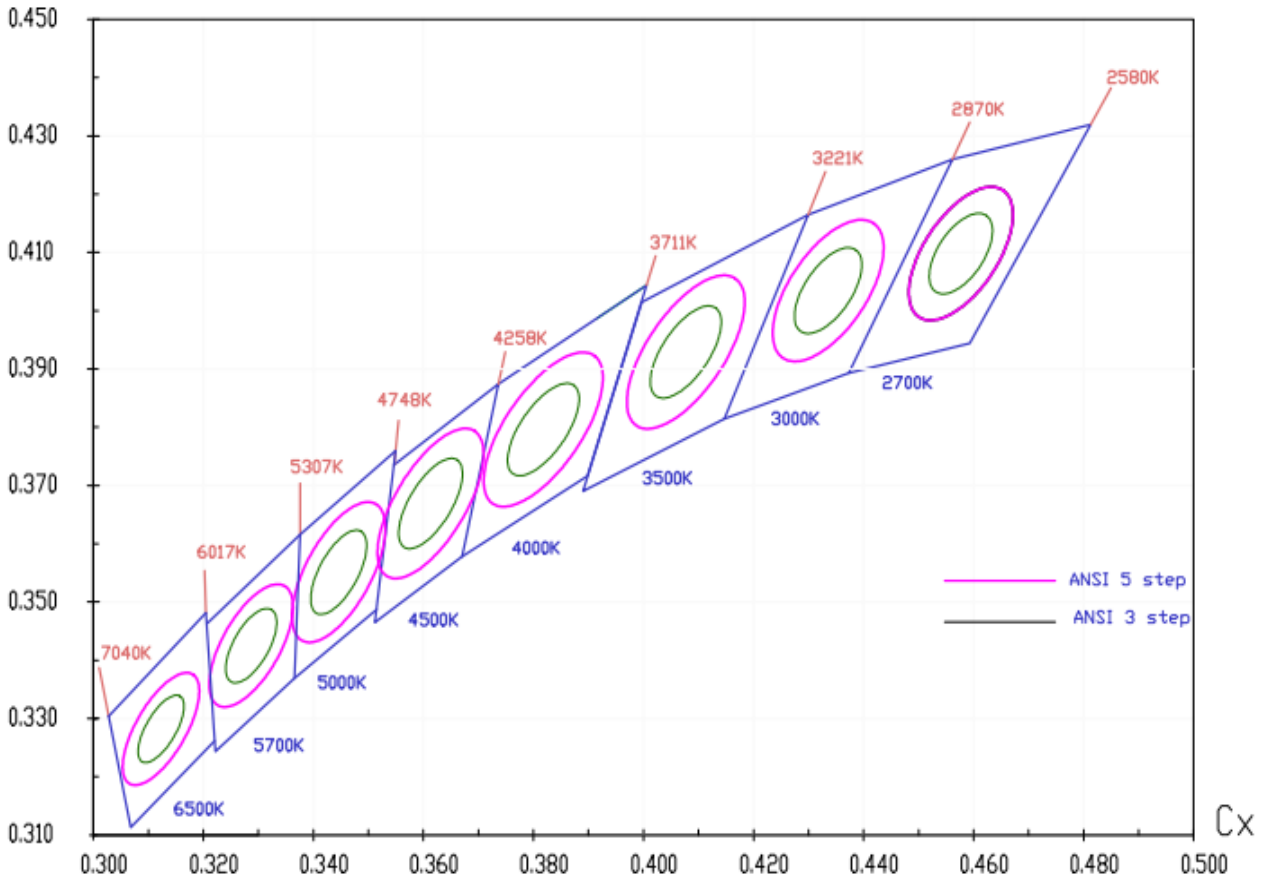
(Ta=25℃)

Item	Symbol	CCT	Luminous Flux @150mA			Unit
			Min.	Typ.	Max.	
Luminous Flux	Φv	6500 (F)	71		75	lm
		5700 (G)	73		77	
		5000 (H)	73		77	
		4000 (J)	73		77	
		3500 (K)	71		75	
		3000 (L)	67		71	
		2700 (M)	65		69	
Forward Voltage	Vf	All	2.8		3.0	V
Color Coordinate	Cx / Cy	All	Refer to '6 Bin Structures			-
Viewing Angle	2Θ1/2	All	-	120	-	deg
Color Rendering Index (CRI)	-	All	80.0	-	-	-
Thermal Resistance, Junction to Solder Point	Rth j-s	All	-	25	-	℃/W

※ These values are measured by the LG Innotek optical spectrum analyzer within the following tolerances.
Luminous Flux (Φv) : ±10%, Forward Voltage (Vf) : ±0.1V, Color Value : ±0.01, CRI Value : ±2,

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

6. Chromaticity Bins



CCT	Center		Ø	3 step		bincode	5 step		bincode
	x	y		a	b		a	b	
2700K	0.4577	0.4098	54.1	0.008	0.0041	27A3	0.0133	0.0068	27A5
3000K	0.4339	0.4032	53.7	0.0086	0.0042	30A3	0.0142	0.0069	30A5
3500K	0.4077	0.3929	53.9	0.0093	0.0042	35A3	0.0155	0.0069	35A5
4000K	0.3818	0.3796	53.4	0.0094	0.0041	40A3	0.0157	0.0068	40A5
4500K	0.3613	0.3669	57	0.0089	0.0038	45A3	0.0148	0.0063	45A5
5000K	0.3446	0.3551	59.8	0.0081	0.0035	50A3	0.0135	0.0059	50A5
5700K	0.3287	0.3425	58.8	0.0072	0.0032	57A3	0.0119	0.0052	57A5
6500K	0.3123	0.3282	58.1	0.0066	0.0027	65A3	0.011	0.0045	65A5

※ The above color temperature measurement allowance tolerance is ±150K

7. Luminous Flux Bins and Order Code

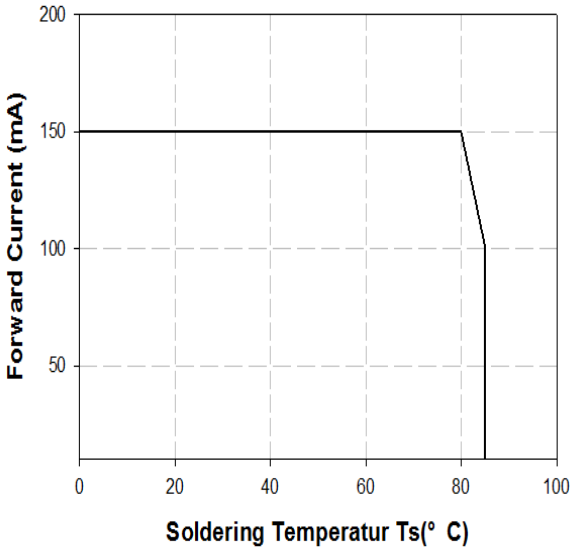
CCT(K)	Luminous Flux (lm)			Order Code
	Rank	Min.	Max.	
2700	R1	65	67	LEMWS28R80MSZBLN
	R2	67	69	
3000	R2	67	69	LEMWS28R80LSZBLN
	S1	69	71	
3500	S2	71	73	LEMWS28R80KSZBLN
	T1	73	75	
4000	T1	73	75	LEMWS28R80JSZBLN
	T2	75	77	
5000	T1	73	75	LEMWS28R80HSZBLN
	T2	75	77	
5700	T1	73	75	LEMWS28R80GSZBLN
	T2	75	77	
6500	S2	71	73	LEMWS28R80FSZBLN
	T1	73	75	

8. Voltage Bins

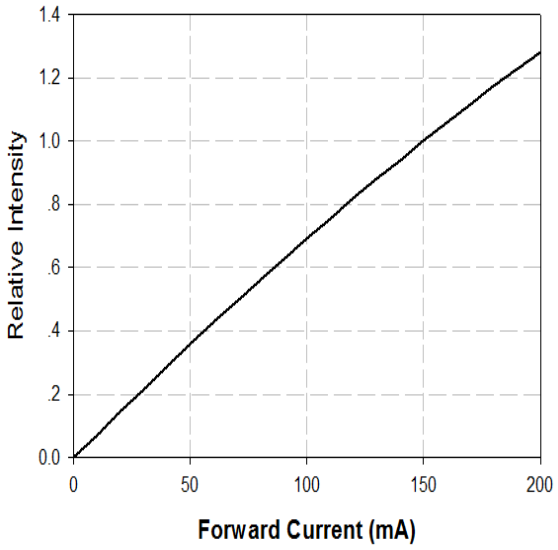
Forward voltage	Rank	Min.(V)	Max.(V)
VF	B	2.8	2.9
	C	2.9	3.0

9. Typical Characteristic Curves (Continued.)

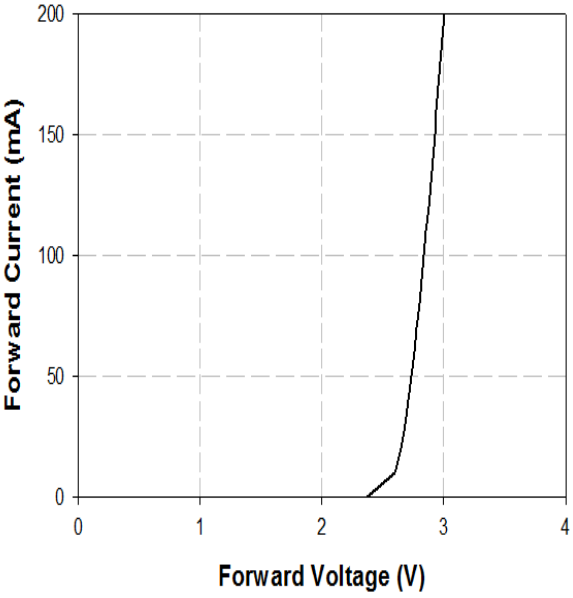
▪ Soldering Temperature vs. Forward Current



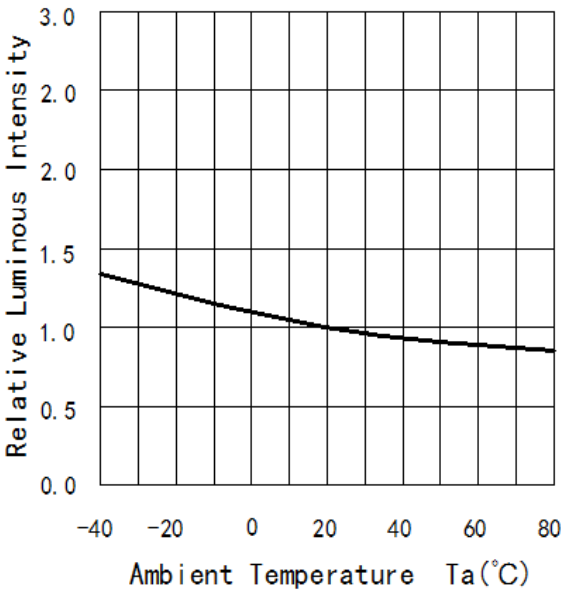
▪ Forward Current VS. Relative Intensity



▪ Forward Voltage VS. Forward Current

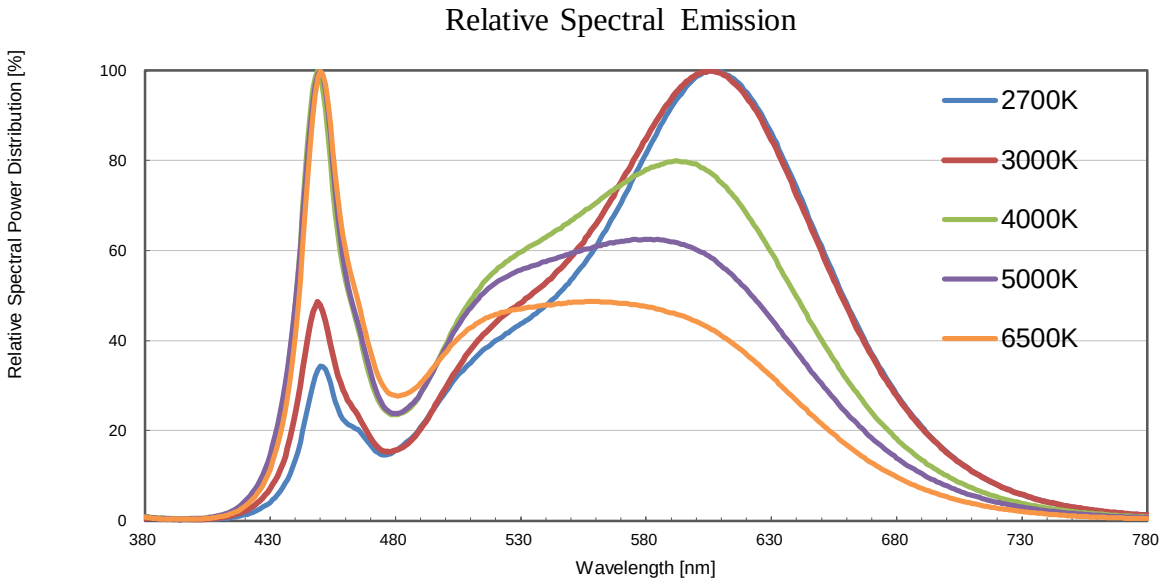


▪ Ambient Temperature VS. Relative Intensity

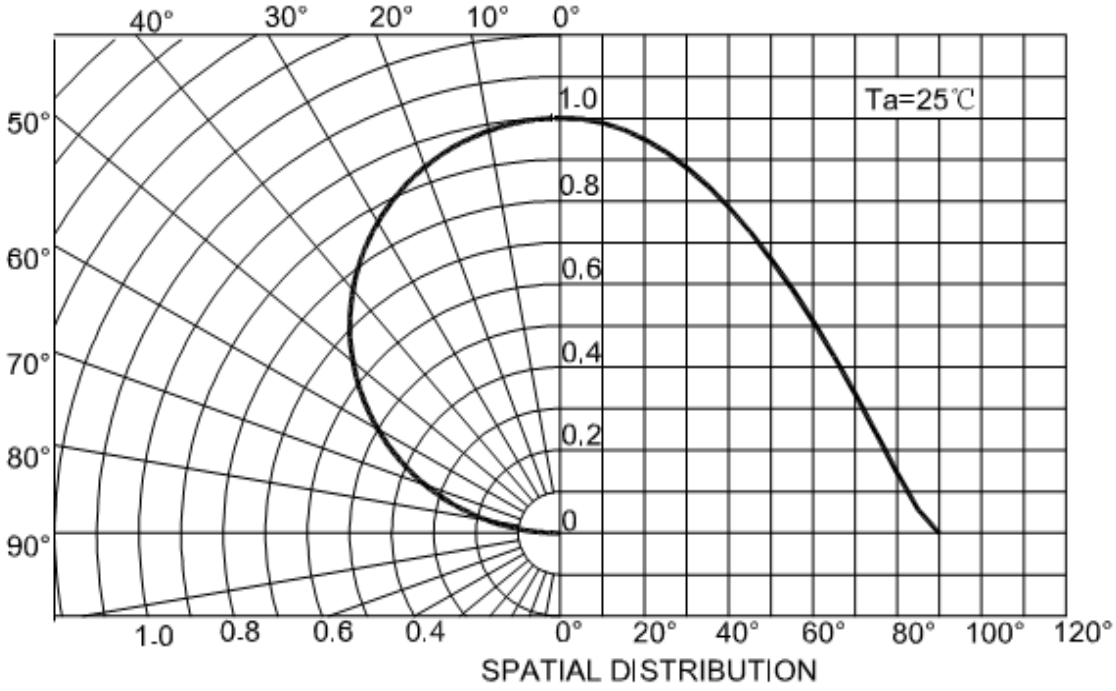


9. Typical Characteristic Curves (Continued.)

▪ Relative Spectral Emission



▪ Radiation Characteristics

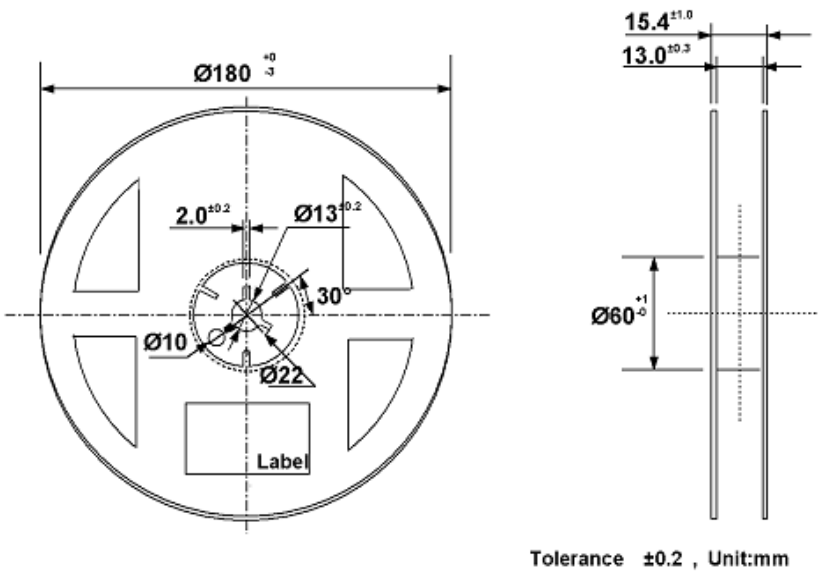


10. Packing and Labeling of Products

10-1. Taping Outline Dimension

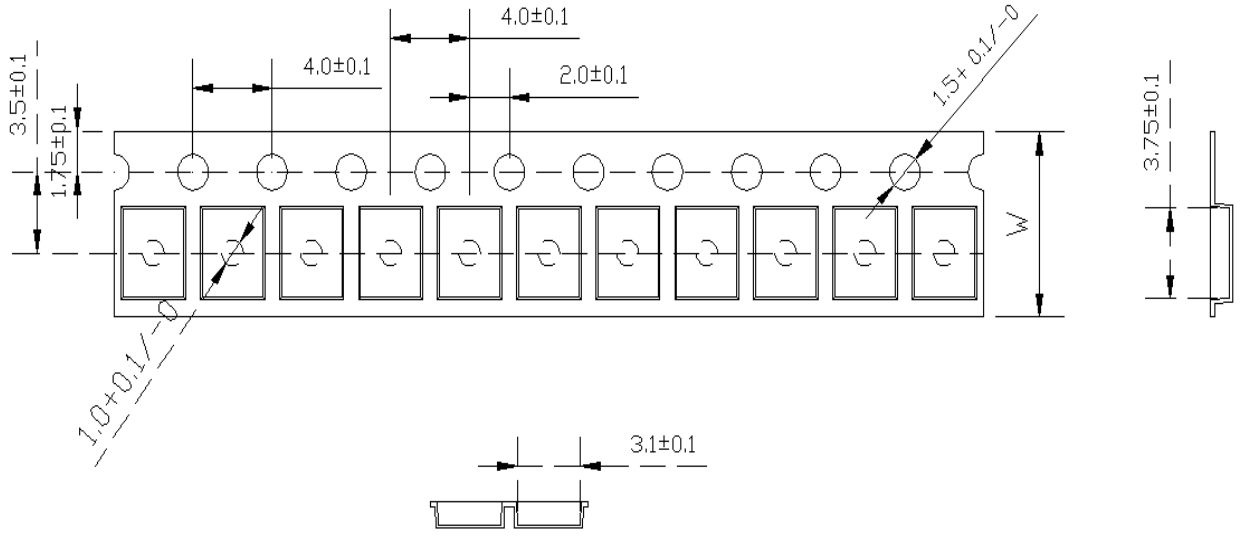
▪ Reel

(Unit : mm)



Tolerance ±0.2 , Unit:mm

▪ Tape

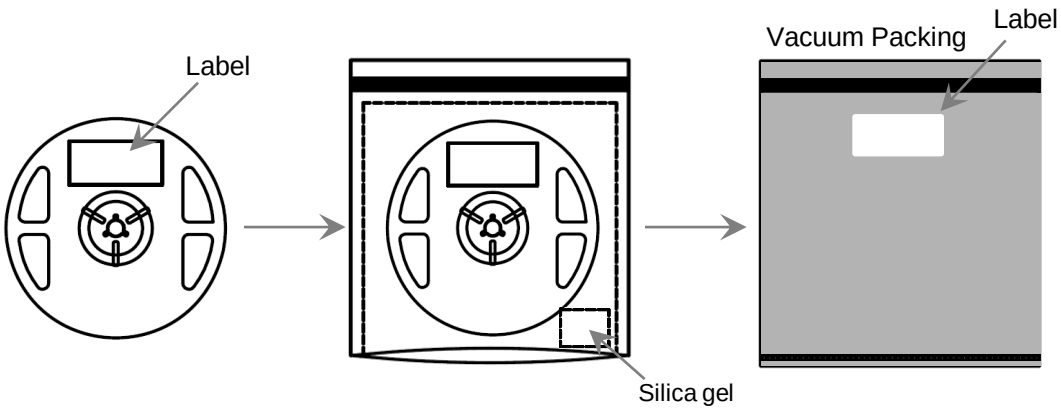


LG Innotek

10. Packing and Labeling of Products

10-2. Packing Structures

Reeled products are packed in a sealed-off and moisture-proof aluminum bag with desiccants (silica gel).



11. Cautions on Use

11-1. Moisture-Proof Package

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

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

11-2. During Storage

Conditions		Temperature	Humidity	Time
Storage	Before Opening Aluminum Bag	5℃ ~ 30℃	< 50%RH	Within 1 Year from the Delivery Date
	After Opening Aluminum 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 or more after being shipped from LGIT, a sealed container with a nitrogen gas should be used for storage.

-. When storing the LEDs after opening aluminum bag, reseal with a moisture absorbent material inside.

11-3. 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 luminaires 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 users.

-. The metal parts(Including silver plated metal) 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(Including silver plated metal) 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.

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.

-. 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.

11. Cautions on Use

11-5. 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.

11-6. 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.

11-7. Recommended Circuit

-. 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 in 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.

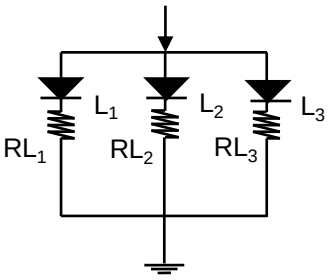


Fig.1 Recommended Circuit in Parallel Mode
: Separate resistors must be used for each LED.

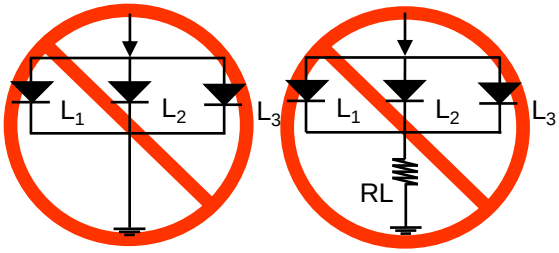


Fig.2 Abnormal Circuit
Circuits to Avoid : The current through the LEDs may vary due to the variation in LED forward voltage.

-. The driving circuits must be designed 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.

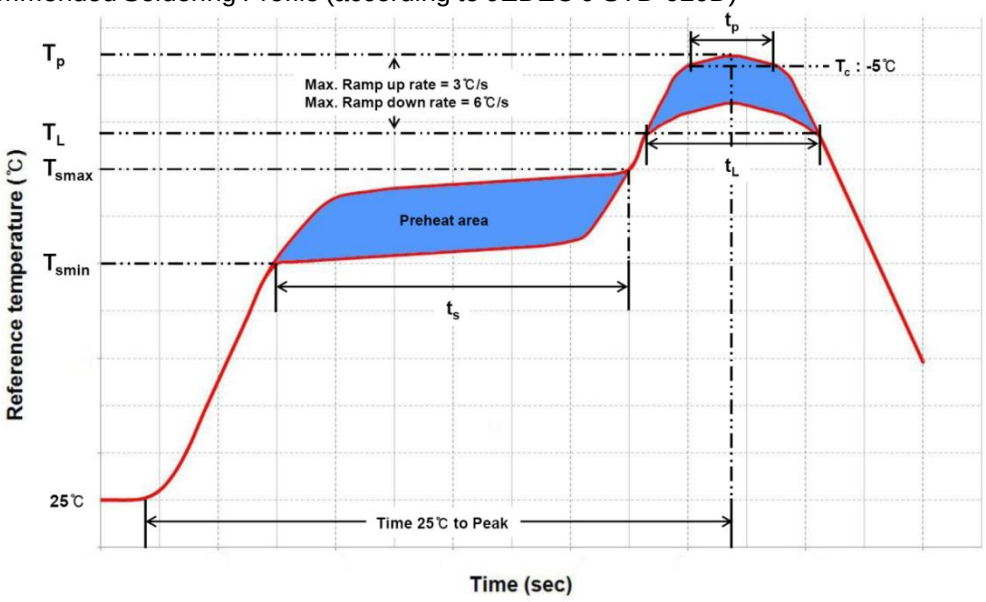
11. Cautions on Use

11-8. Soldering Conditions

-. Reflow soldering is the recommended method for assembling LEDs on a circuit board.

-. LG Innotek does not guarantee the performance of the LEDs assembled by the 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}) Temperature Max (T_{smax}) Maximum time(t_s) from T_{smin} to T_{smax}	 150℃ 200℃ 60~120 seconds	 100℃ 150℃ 60~120 seconds
Ramp-up rate (T_L to T_p)	3℃/ second max.	3℃/ second max.
Liquidus temperature (T_L)	217℃	183℃
Time (t_L) maintained above T_L	60~150 seconds	60~150 seconds
Maximum peak package body temperature (T_p)	260℃	235℃
Time(t_p) within 5℃ of the specified temperature (T_c)	30 seconds	20 seconds
Ramp-down rate (T_p to T_L)	6℃/second max.	6℃/second max.
Maximum Time 25℃ to peak temperature	8 minutes max.	6 minutes 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 silicone encapsulant at the top of the LED package is a soft surface, which can easily be damaged by pressure. Precautions should be taken to avoid strong pressure on the silicone resin when leveraging the pick and place machines.

-. Reflow soldering should not be done more than two times.

11. Cautions on Use

11-9. Soldering Iron

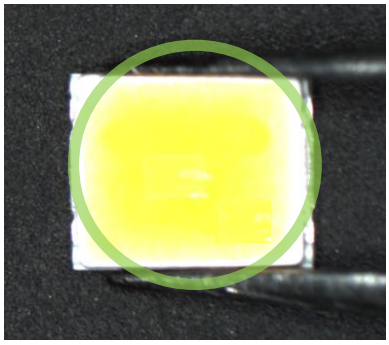
-. The recommended condition is less than 5 seconds at 260℃.
-. The time must be shorter for higher temperatures. (+10℃ → -1sec).
-. The power dissipation of the soldering iron should be lower than 15W and the surface temperature of the device should be controlled at or under 230℃.

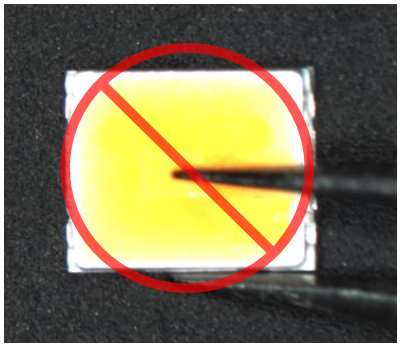
11-10. Eye Safety Guidelines

-. 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.

11-11. Manual Handling

-. Use Teflon-type tweezers to grab the base of the LED and do not apply mechanical pressure on the surface of the encapsulant.





12. 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.

History of Revision

Revision	Date	Contents Revision	Remark
Rev. 1.0	2018.02.05	New Establishment	