CUSTOMER : _____ .

DATE : 2012. 03. 21.

SPECIFICATIONS FOR APPROVAL

3.3W A COB (Warm White/ 3000K)

MODEL NAME : LEMWM14X80LZ10

APPROVAL	REMARK	APPENDIX

Designed	Checked	Approved

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SPECIFICATION			
MODEL	LEMWM14X80LZ10	DOCUMENT No	0
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Change History of Revision

Revision	Date	Contents of Revision Change	Remark

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1. Features

- High flux power LED module with 4 LED
-Compact design (14mmX14mm)
-110˚ light distribution pattern, uniform illumination
-Low thermal resistance Rth,j-board < 5 K/W
-High-power LED in COB technology

2. Outline Dimensions

(unit : mm)

14

14

1.17±0.15

Dome#1   Dome#2

Dome#3   Dome#4
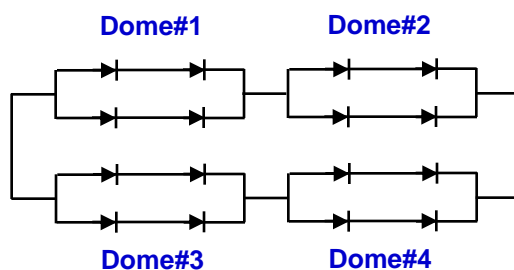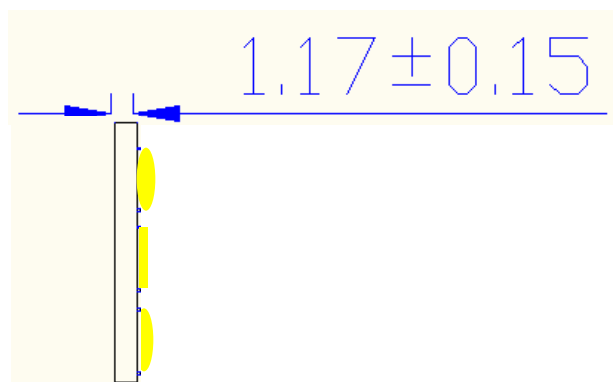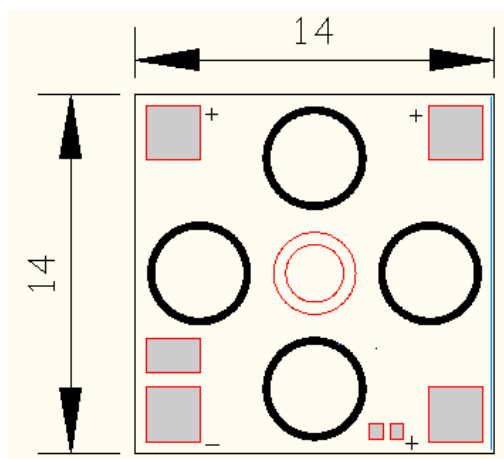
< Internal Circuit >

◆Tolerances Unless Dimension ±0.2mm

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3. Applications

- Indoor Lighting (Bulb, Down light, Spot light)

4. Characteristics

(Ta=25℃)

Items	Symbol	Min	**Typ**	Max	Unit
All data for Ta=25℃, IF=260mA					
Power [1]	Po	3.04	3.25	3.38	W
Forward Voltage [1]	VF	11.68	12.5	13.0	V
Luminance Flux [1]	Φ_V	243	270	-	lm
Luminous Efficacy	lm/W	80	83	-	lm/W
Color Temperature [1]	CCT	2870	3035	3220	K
Color Rendering Index [1]	Ra	80	-	-	-
Viewing Angle [1]	2Θ1/2	-	110	-	deg
Junction Temperature [2]	Tj	-	-	120	℃
Thermal Resistance [2]	Rth j-b	-	5	-	℃/W

※ These values measured by Optical Spectrum Analyzer of LG Innotek Co., LTD
   Tolerances are followings as below
   - Luminous Flux (lm) : ±20%, CIE Value : ±0.01, CRI : ±2

※ Rthj-b = Thermal Resistance (Junction – Board)
   If the maximum temperature limits are exceeded, the life of the module will be greatly reduced or the module may be damaged

*1) These values measured without heat sink
*2) These values is allowed to measure with a heat sink of aluminum
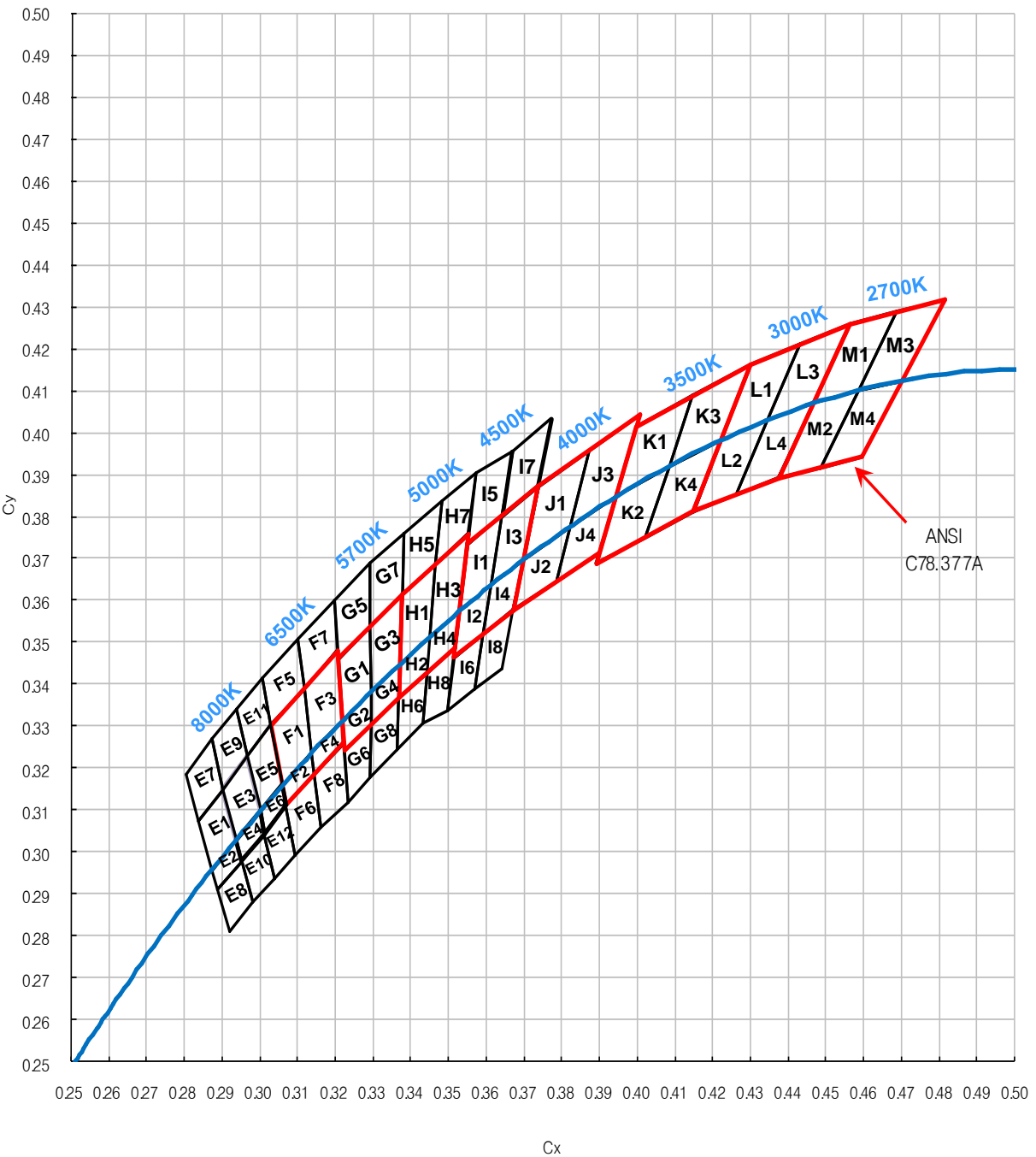
5. Absolute Maximum Ratings

(Ta=25℃)

Items	Symbol	Rating	Unit
Forward Current	IF	480	mA
Pulse Forward Current *1)	IFP	600	mA
Operating Temperature	Topr	-30 ~ +85	℃
Storage Temperature	Tstg	-40 ~ +100	℃

*1) Pulse Width ≤ 10msec, Duty ≤ 10%

6. Chromaticity on the 1931 CIE Curve

•Chromaticity coordinate groups are tested at a current pulse duration of 300 ms and a tolerance of ±0.01.

•ANSI Cool/Neutral/Warm white

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7. Performance Group - Chromaticity

Rank of CIE Value (@400mA)

CCT	Rank	CIE X	CIE Y
2700K (2725K ±145K)	M1	0.4562	0.4260
		0.4687	0.4289
		0.4586	0.4103
		0.4465	0.4071
	M2	0.4465	0.4071
		0.4586	0.4103
		0.4483	0.3918
		0.4373	0.3893
	M3	0.4687	0.4289
		0.4813	0.4319
		0.4700	0.4126
		0.4586	0.4103
	M4	0.4586	0.4103
		0.4700	0.4126
		0.4593	0.3944
		0.4483	0.3918
3000K (3045K ±175K)	L1	0.4299	0.4165
		0.4430	0.4212
		0.4344	0.4032
		0.4221	0.3984
	L2	0.4221	0.3984
		0.4344	0.4032
		0.4260	0.3853
		0.4147	0.3814
	L3	0.4430	0.4212
		0.4562	0.4260
		0.4465	0.4071
		0.4344	0.4032
	L4	0.4344	0.4032
		0.4465	0.4071
		0.4373	0.3893
		0.4260	0.3853
3500K (3465K ±245K)	K1	0.3996	0.4015
		0.4146	0.4089
		0.4082	0.3922
		0.3941	0.3848
	K2	0.3941	0.3848
		0.4082	0.3922
		0.4017	0.3752
		0.3889	0.3690
	K3	0.4146	0.4089
		0.4299	0.4165
		0.4221	0.3984
		0.4082	0.3922
	K4	0.4082	0.3922
		0.4221	0.3984
		0.4147	0.3814
		0.4017	0.3752
4000K (3985K ±275K)	J1	0.3736	0.3874
		0.3870	0.3958
		0.3819	0.3776
		0.3697	0.3697
	J2	0.3697	0.3697
		0.3819	0.3776
		0.3783	0.3646
		0.3670	0.3578
	J3	0.3870	0.3958
		0.4006	0.4044
		0.3941	0.3848
		0.3819	0.3776
	J4	0.3819	0.3776
		0.3941	0.3848
		0.3898	0.3716
		0.3783	0.3646

CCT	Rank	CIE X	CIE Y
4500K (4503K ±243K)	I1	0.3548	0.3736
		0.3641	0.3804
		0.3611	0.3638
		0.3526	0.3575
	I2	0.3526	0.3575
		0.3611	0.3638
		0.3590	0.3521
		0.3512	0.3465
	I3	0.3641	0.3804
		0.3736	0.3874
		0.3697	0.3697
		0.3611	0.3638
	I4	0.3611	0.3638
		0.3697	0.3697
		0.3670	0.3578
		0.3590	0.3521
	I5	0.3571	0.3907
		0.3668	0.3957
		0.3641	0.3804
		0.3548	0.3736
	I6	0.3512	0.3465
		0.3590	0.3521
		0.3567	0.3389
		0.3495	0.3339
	I7	0.3668	0.3957
		0.3771	0.4034
		0.3736	0.3874
		0.3641	0.3804
	I8	0.3590	0.3521
		0.3670	0.3578
		0.3640	0.3440
		0.3567	0.3389
5000K (5028K ±283K)	H1	0.3376	0.3616
		0.3463	0.3687
		0.3447	0.3513
		0.3369	0.3449
	H2	0.3369	0.3449
		0.3447	0.3513
		0.3440	0.3427
		0.3366	0.3369
	H3	0.3463	0.3687
		0.3551	0.3760
		0.3526	0.3575
		0.3447	0.3513
	H4	0.3447	0.3513
		0.3526	0.3575
		0.3515	0.3487
		0.3440	0.3427
	H5	0.3381	0.3762
		0.3480	0.3840
		0.3463	0.3687
		0.3376	0.3616
	H6	0.3366	0.3369
		0.3440	0.3427
		0.3429	0.3307
		0.3361	0.3245
	H7	0.3480	0.3840
		0.3571	0.3907
		0.3551	0.3760
		0.3463	0.3687
	H8	0.3440	0.3427
		0.3515	0.3487
		0.3495	0.3339
		0.3429	0.3307

CCT	Rank	CIE X	CIE Y
5700K (5665K ±355K)	G1	0.3207	0.3462
		0.3291	0.3538
		0.3292	0.3382
		0.3217	0.3314
	G2	0.3217	0.3314
		0.3292	0.3382
		0.3293	0.3305
		0.3222	0.3243
	G3	0.3291	0.3538
		0.3376	0.3616
		0.3369	0.3449
		0.3292	0.3382
	G4	0.3292	0.3382
		0.3369	0.3449
		0.3366	0.3369
		0.3293	0.3305
	G5	0.3196	0.3602
		0.3290	0.3690
		0.3291	0.3538
		0.3207	0.3462
	G6	0.3222	0.3243
		0.3293	0.3305
		0.3290	0.3180
		0.3231	0.3120
	G7	0.3290	0.3690
		0.3381	0.3762
		0.3376	0.3616
		0.3291	0.3538
	G8	0.3293	0.3305
		0.3366	0.3369
		0.3361	0.3245
		0.3290	0.3180
6500K (6530K ±510K)	F1	0.3028	0.3304
		0.3115	0.3391
		0.3136	0.3237
		0.3059	0.3160
	F2	0.3059	0.3160
		0.3136	0.3237
		0.3144	0.3186
		0.3068	0.3113
	F3	0.3115	0.3391
		0.3205	0.3481
		0.3217	0.3314
		0.3136	0.3237
	F4	0.3136	0.3237
		0.3217	0.3314
		0.3221	0.3261
		0.3144	0.3186
	F5	0.3005	0.3415
		0.3099	0.3509
		0.3115	0.3391
		0.3028	0.3304
	F6	0.3068	0.3113
		0.3144	0.3186
		0.3161	0.3059
		0.3093	0.2993
	F7	0.3099	0.3509
		0.3196	0.3602
		0.3205	0.3481
		0.3115	0.3391
	F8	0.3144	0.3186
		0.3221	0.3261
		0.3231	0.3120
		0.3161	0.3059

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7. Performance Group – Chromaticity (Continued)

CCT	Rank	CIE X	CIE Y	CCT	Rank	CIE X	CIE Y	CCT	Rank	CIE X	CIE Y
8000K (8020K ±980K)	E1	0.2835 0.2772 0.2807 0.2870	0.3075 0.2992 0.2884 0.2957	8000K (8020K ±980K)	E7	0.2803 0.2735 0.2772 0.2835	0.3185 0.3100 0.2992 0.3075				
	E2	0.2870 0.2807 0.2824 0.2885	0.2957 0.2884 0.2840 0.2910		E8	0.2885 0.2824 0.2860 0.2920	0.2910 0.2840 0.2740 0.2810				
	E3	0.2900 0.2835 0.2870 0.2935	0.3150 0.3075 0.2957 0.3029		E9	0.2870 0.2803 0.2835 0.2900	0.3270 0.3185 0.3075 0.3150				
	E4	0.2935 0.2870 0.2885 0.2950	0.3029 0.2957 0.2910 0.2980		E10	0.2950 0.2885 0.2920 0.2980	0.2980 0.2910 0.2810 0.2880				
	E5	0.2965 0.2900 0.2935 0.3000	0.3230 0.3150 0.3029 0.3100		E11	0.2938 0.2870 0.2900 0.2965	0.3343 0.3270 0.3150 0.3230				
	E6	0.3000 0.2935 0.2950 0.3010	0.3100 0.3029 0.2980 0.3045		E12	0.3010 0.2950 0.2980 0.3037	0.3045 0.2980 0.2880 0.2937				

※ **Model name method: Please refer to the following**
example Model Name : LEMWM112 02 MZ00
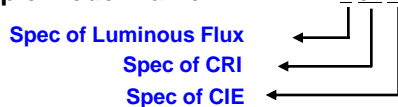
Spec of Luminous Flux
Spec of CRI
Spec of CIE

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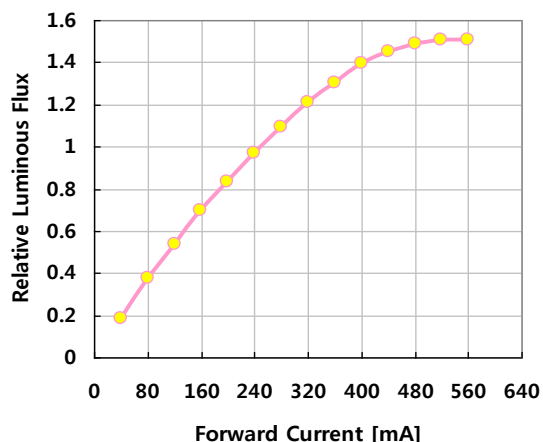| SPECIFICATION			
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8. Typical Characteristic Curves

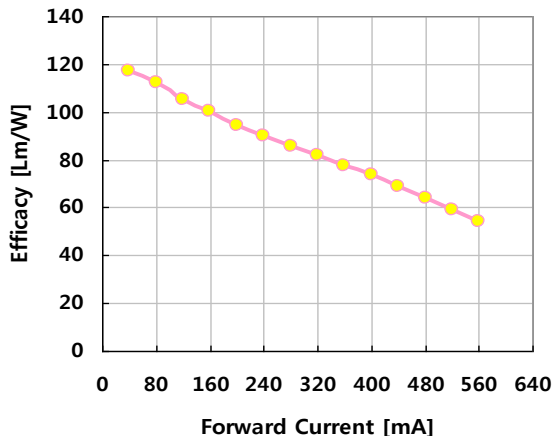### ■ Forward Voltage vs. Forward Current
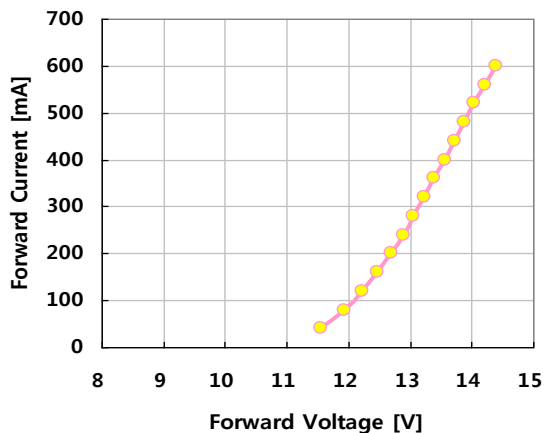
■ Spectrum
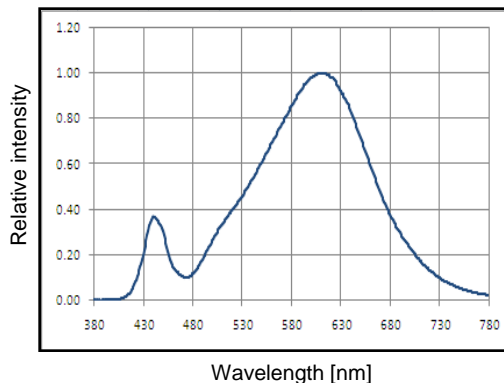
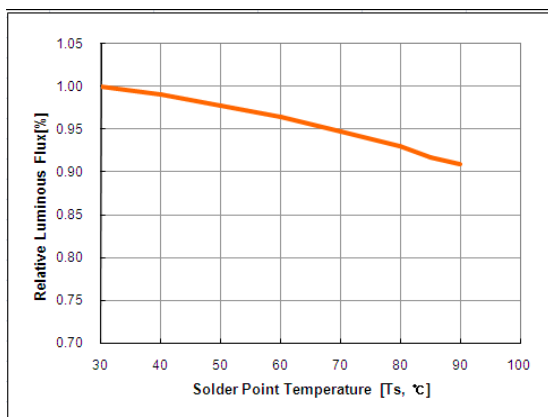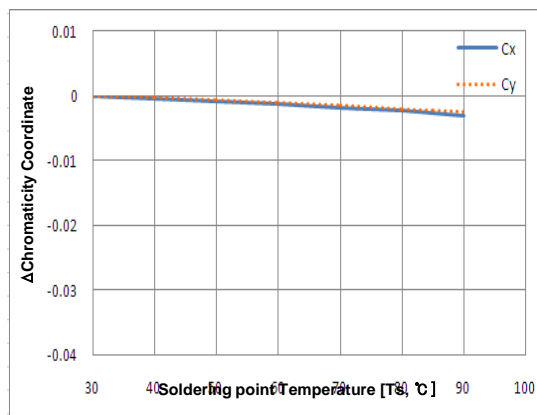### ■ Forward Current vs. Luminous Flux

■ Input Watt vs. Luminance Flux

■ Luninous Flux Vs TEMP.

■ CIE Vs TEMP

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8. Typical Characteristic Curves (Continued)

■ Viewing Angle
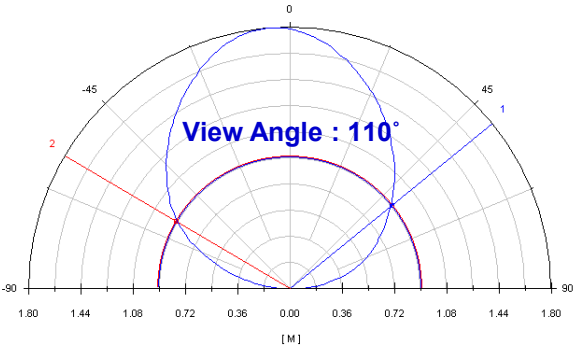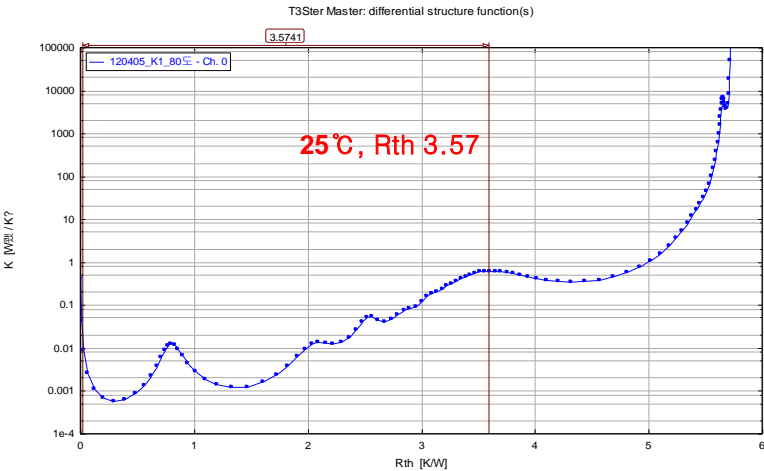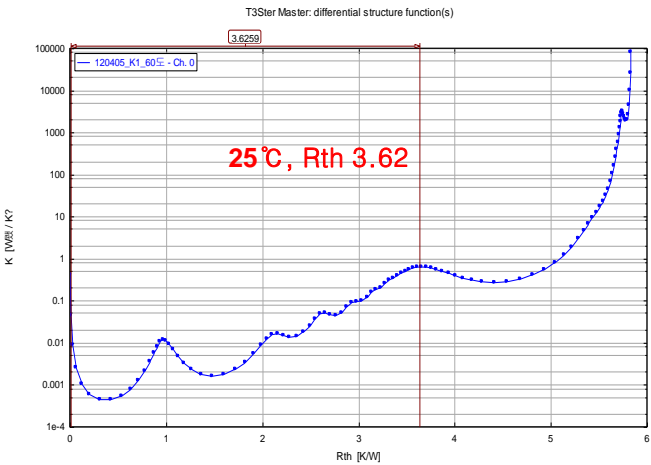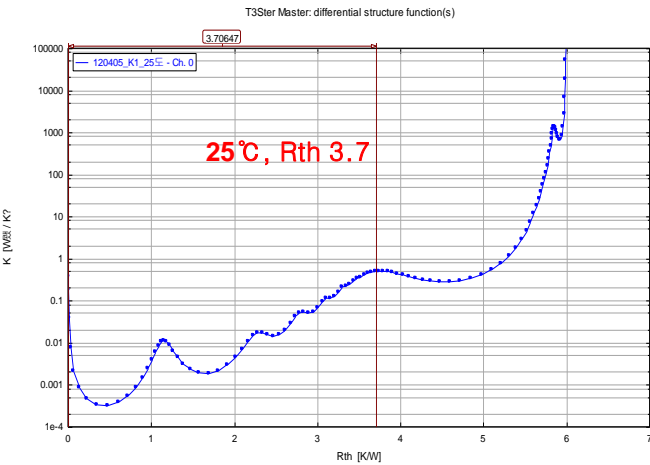
View Angle : 110˚

■ Thermal Resistance (junction~Board)

25℃, Rth 3.7

25℃, Rth 3.62

25℃, Rth 3.57

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9. Reliability Test Items and Conditions

9-1.Criteria for Judging the Damage

Item	Symbol	Test Condition	Limit	
			Min	Max
Forward Voltage	V_F	$I_F =$	$S. \times 0.80$	$S. \times 1.20$
Luminous Flux Ⅰ[*1]	P_O	$I_F =$	$S \times 0.85$	-
Luminous Flux Ⅱ[*2]	P_O	$I_F =$	$S \times 0.70$	-

* U.S.L : Upper Spec. Limit, S : Initial Value

9-2. Item and Results of Reliability Test

No	Item	Test Condition	Test Hours/ Cycles	Sample No	Ac/ Re
1	Steady State Operating Life[*1]	Ta=25℃, I_F=260 [mA]	1000hr	22 pcs	0 / 1
2	High Temp. Humidity Life	Ta=60℃,90% RH,I_F=260 [mA]	1000hr	22 pcs	0 / 1
3	Steady State Operating Life of High Temperature Ⅰ	Ta=60℃, I_F=260 [mA]	1000hr	22 pcs	0 / 1
4	Steady State Operating Life of High Temperature Ⅱ	Ta=85℃, I_F=260 [mA]	1000hr	22 pcs	0 / 1
5	Steady State Operating Life of Low Temperature[*1]	Ta= -30℃, I_F=260 [mA]	1000hr	22 pcs	0 / 1
6	High Temp. Storage	100℃	1000hr	22 pcs	0 / 1
7	Low Temp. Storage	-40℃	1000hr	22 pcs	0 / 1
8	Temperature Cycle	-40℃(30min) ~ 25℃(5min) ~ 100℃(30min) ~ 25℃(5min)	100cycle	22 pcs	0 / 1
9	Thermal Shock	100℃(30min) ~ -40℃(30min)	100cycle	22 pcs	0 / 1
10	Resistance to Soldering Heat (Reflow Soldering)	Tsld = 260℃, 10s (pre treat. 30℃, 70%, 168hr)	1 times	22 pcs	0 / 1
11	Vibration	200m/s^2,100~2000Hz(sweep 4min) 48min, 3 directions	4 times	22 pcs	0 / 1
12	Electrostatic Discharge	R=1.5kΩ, C=100pF, Test Voltage 2kV	3times Negative/ Positive	22 pcs	0 / 1

*The operating test is allowed with a heat sink of aluminum

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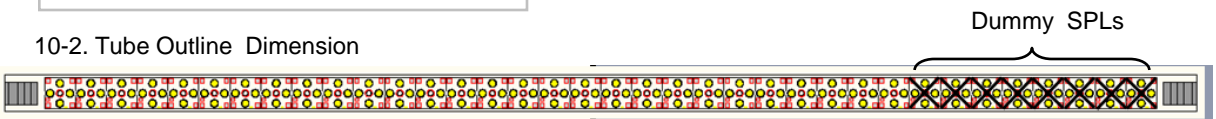## 10. Package and Marking of Products

(unit : mm)
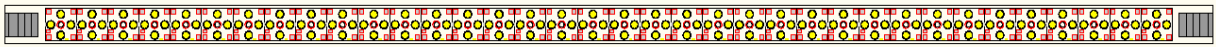
✓ Dimension of Tube : 540 x 16 x 5.5
✓ Insert Direction : 36units Per Tube

◆ Packing Materials : - Tube : PET
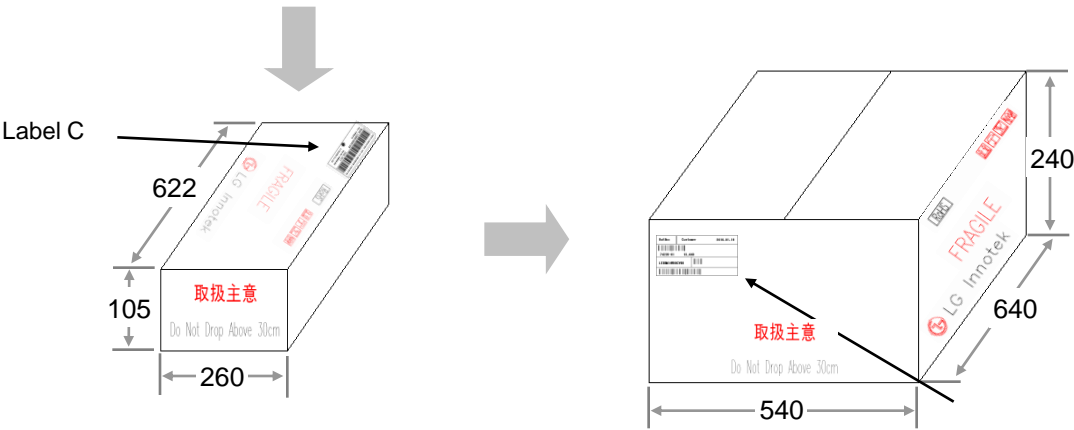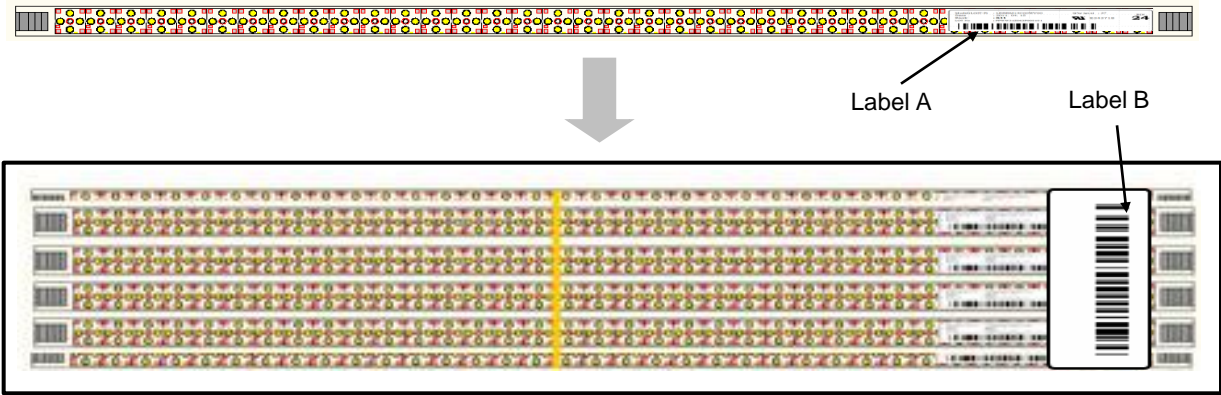
10-2. Tube Outline Dimension

Dummy SPLs

We will put some dummy samples to fulfill the last tube in case the tube is not fully filled as above.

10-3. Packing Specifications

A rubber band ties the 10 Tubes (the number of PKGs are 360 pcs) and then that packed in a seal off Packing Bag along with desiccants (Silicagel). 10 Packing Bag (total maximum number of products are 3,600 pcs) packed in an inner box and 4 inner boxes are put into an outer box. (total maximum number of products are 14,400 pcs)
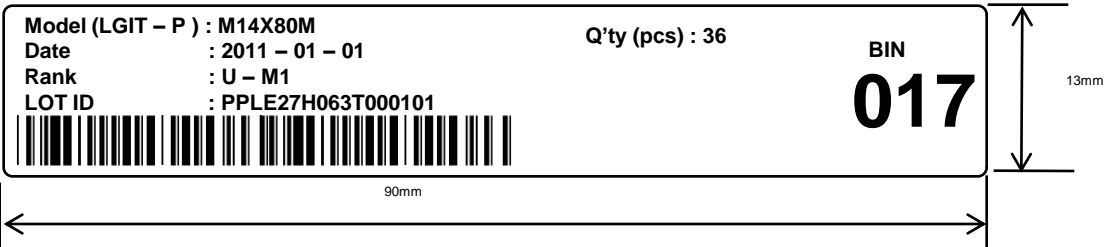

Label A   Label B

Label C

622
105
260

取扱主意
Do Not Drop Above 30cm

240
640
540

取扱主意
Do Not Drop Above 30cm

FRAGILE
LG Innotek

⚙ LG Innotek

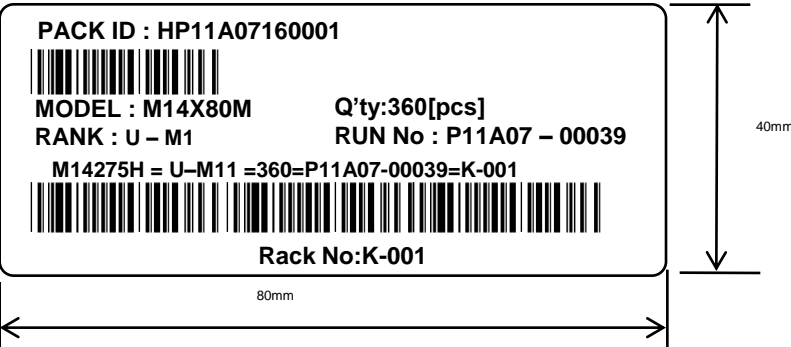| SPECIFICATION			
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※. Label A (Tube Label)

Model(Company's Name - Location of manufacture) , Date, Rank, LOT ID,
Quantity, UL Trademark and UL File number

Model (LGIT – P) : M14X80M
Date   : 2011 – 01 – 01
Rank   : U – M1
LOT ID   : PPLE27H063T000101

Q'ty (pcs) : 36

BIN

017

13mm

90mm

※ Label B (Packing Bag)
PACK ID, MODEL, RANK, Quantity, RUN NO, Rack No

PACK ID : HP11A07160001

MODEL : M14X80M   Q'ty:360[pcs]
RANK : U – M1   RUN No : P11A07 – 00039
M14275H = U–M11 =360=P11A07-00039=K-001

Rack No:K-001

40mm

80mm

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※ Label C (Inner Box Label)

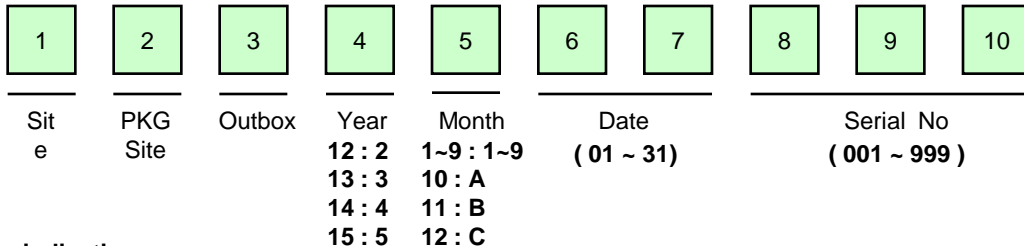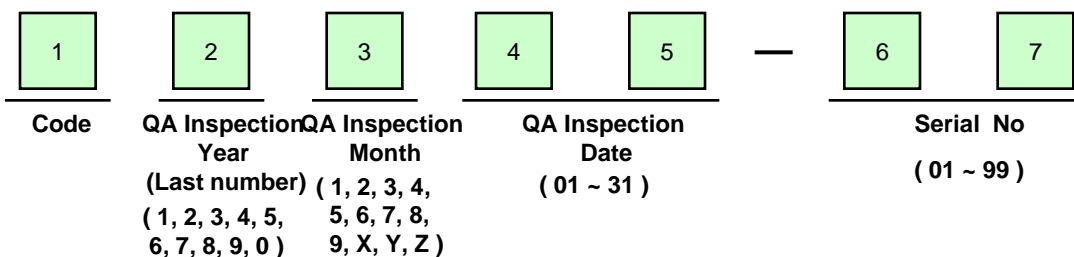　　LOT NO, MODEL, Quantity, Date, Rank (Multi-Rank)

LOT No:PPWW31Z063M000101　R3-D34L-A　D04q

PKG MODEL : LEMWM14X80MZ00
Rank : U-M1   Q'ty:1,800[pcs]
Run No:Z00507-0714   Rack No:C-017
MRM Code:140HCL-0510-R3d-01B-n-04

40mm / 80mm

LOT No:PPWW31Z063M000101　R3-D34L-B　D04q

PKG MODEL : LEMWM14X80MZ00
Rank : U-M1   Q'ty:1,800[pcs]
Run No:Z00507-0714   Rack No:C-017
MRM Code:140HCL-0510-R3d-01B-n-04

40mm / 80mm
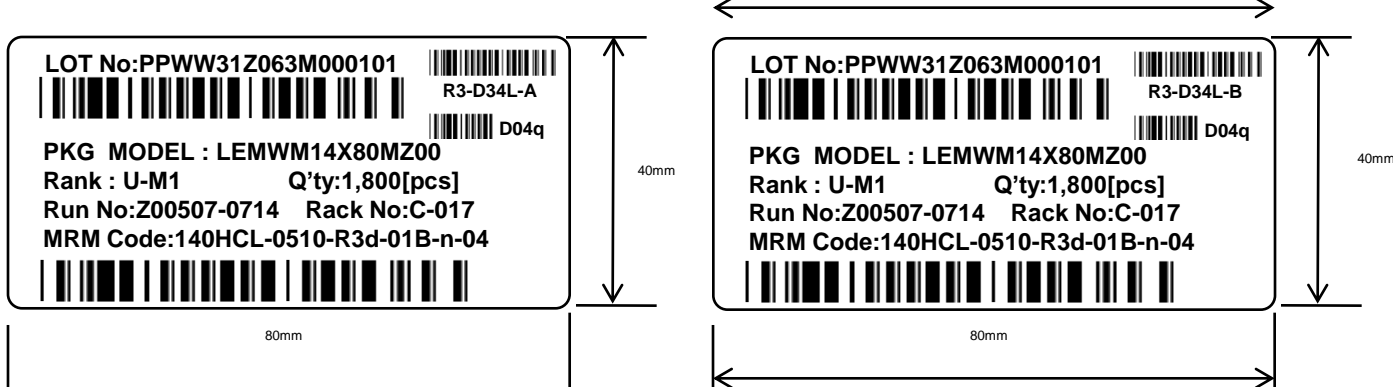
※ Label D

　　Specifying Customer, Date, Model Name, Quantity, Customer Part no, Outbox ID
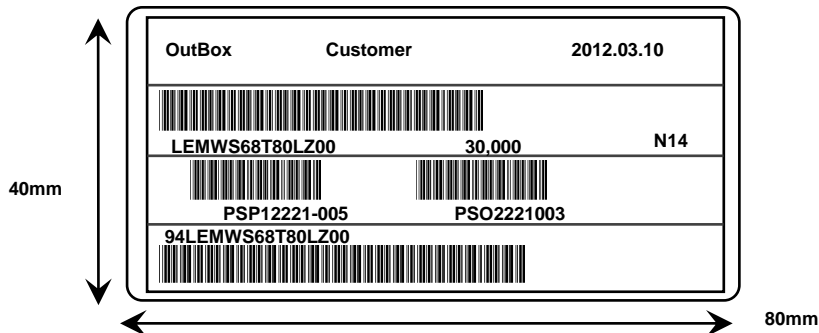
OutBox   Customer   2012.03.10

LEMWS68T80LZ00   30,000   N14

PSP12221-005   PSO2221003

94LEMWS68T80LZ00

40mm / 80mm

▪ **Outbox ID. indication**

1	2	3	4	5	6	7	8	9	10
Site	PKG Site	Outbox	Year **12 : 2** **13 : 3** **14 : 4** **15 : 5**	Month **1~9 : 1~9** **10 : A** **11 : B** **12 : C**	Date **(01 ~ 31)**		Serial No **(001 ~ 999)**		

▪ **Lot No. indication**

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

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11. Cautions on use

11-1. Over-current-proof

Customer must apply resistors for protection, others slight voltage shift will cause big current change. (Burn out will happen)

LG Innotek will not be held responsible for any damage to the user that may result from accidents or any other reasons during operation of the user's unit if use to exceed the absolute maximum ratings, or not keep the matters that demand special attention.

11-2. For the Storage

- Proper temperature and RH conditions for storage are : 5 ℃ ~35 ℃ , RH 60%.
- 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.
- These products should be used within 168 hours after opening the bag based upon storage condition.
- These products must be baked to remove moisture before using them if the Silica gel loses its color. Conditions for baking are 60±5℃, 20% (RH) and 24 hours maximum. (For reeled status without bag)

11-3. For the Usage

- LED PKG should not be used in directly exposed environment containing hazardous substances.
- The LEDs has silver plated metal parts. The silver plating become tarnished when being exposed to an environment which contains corrosive gases.
- After assembly and during use, silver plating can be affected by the corrosive gases emitted by components and materials in close proximity of the LEDs within an end product, and the gases entering into the product from the external atmosphere.
- Do not expose the LEDs to corrosive atmosphere during storage and using.
- Avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.
- In designed a circuit, the current through each LED must not exceed the absolute maximum rating.

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11. Cautions on use (Continued)

11-4. Cleaning
- Please avoid using a brush for cleaning and do not wash the product in organic solvents such as acetone, Organic solvent (TCE, etc..) will damage the surface of LED. Please refer to following olvents and conditions.
   Solvent : alcohol, 25℃ max × 600sec max

11-5. Bolting
- M2 size Bolts must be applied. If customer apply more than M2 size, the PCB hole will be damaged.

11-6. Handling
- Do not exceed 2kgf on top-Lens. (Do not exceed 1kgf side Lens)
- Do not drop above 30cm.

11-7. 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 component.
- It necessary to avoid intense heat generation and operate within the maximum ratings given in the specification.

11-8. Static Electricity
- If over-voltage, which exceeds the absolute maximum rating, is applied to the LEDs, it will damage the LEDs and result in destruction. Since the LEDs are sensitive to the static electricity and surge, it is strongly recommended to use a wristband or anti-electrostatic glove when handling the LEDs and all devices, equipment and machinery must be properly grounded.
- It is recommended that precautions be taken against surge voltage to the equipment the mounts the LEDs.
- Damaged LEDs will show some unusual characteristics such as the leak current remarkably increases, the turn-on voltage becomes lower, or the LEDs do not light at the low current.
- When examining the final product, it is recommended to check whether the assembled LEDs are damaged by static electricity or not. Static-damaged LEDs can easily be found by light-on test or the VF test at a low current.

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11. Cautions on use (Continued)

11-9. Recommended Circuit

- In designed a circuit, the current through each LED must not exceed the absolute maximum rating specified for each LED.
- In general, the LEDs have a variation of forward voltage. Using LEDs with different forward voltages in a circuit with on resistor for the complete circuit causes different forward currents for each LED. This may lead to a variation in brightness. In the worst case, some LED may be subjected to the stresses in excesses of the absolute maximum rating. To avoid brightness variation of LEDs, the use of matrix circuit with one resistor for each LED is recommended.
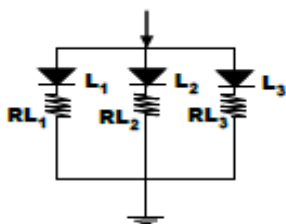
Pic.1 Recommended Circuit in parallel mode
: Separate resistor must be used in each LED
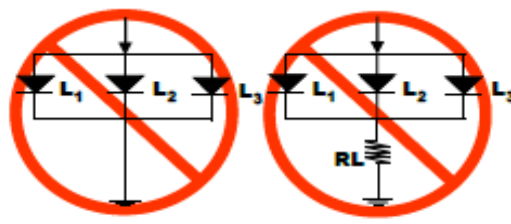
Pic.2. Abnormal Circuit
The Current through the LEDs may vary due to the variation in forward voltage (V_F) of the LEDs.

- 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.
- If reverse voltage is applied to the LEDs, it will damage the Zener diode and LEDs and result in destruction.

11-10. Application limits of LED Driver IC controller

- GaN based LED is relatively weak to electrical damage (such as static electricity and over current stress). Forward leakage of LED occurred by such damage in the forward low current region may result in turn-on-delay of Lighting Module, which is dependent on a specific function of driver IC.
- For reasons mentioned above, minimum current level (source start-up current) of LED driver IC must be more than 0.3 mA. LGIT cannot make a guarantee on the LED using in Driver IC with start up current level of < 0.3 mA.
- When parallel circuit LED driver IC is applied in Lighting Module, Hot spot may occur in low current operation region (dimming mode) by difference of LED voltage in low current region. So, driver IC with Individual LED controller is recommended.

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11. Cautions on use (Continued)

11-11. Repair

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

- When repairing is unavoidable, a double-head soldering iron should be used.

- If should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.

- When Soldering, do not put stress on the LEDs during heating customer must finish rework within 5sec. under 245℃.

- The head of Iron can not touch copper foil.

- Twin-head type is preferred.

(O)   (X)
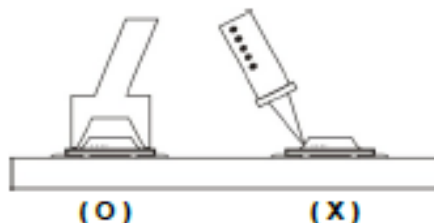
11-12. Safety Guideline for Human Eyes.

- Users should be cautioned not to stare at the light of this LED product.

- Great care should be taken when viewing directly the LED driven at high current or the LED with optical instruments, which may greatly increase the hazard to your eyes.

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12. Reflow Soldering Characteristics

12-1. Soldering Conditions.

- The LEDs can be soldered in place using the reflow soldering method.
- LG Innotek cannot make a guarantee on the LEDs after they have been assembled using dip soldering method.
- Recommended soldering conditions.
- Pb Solder
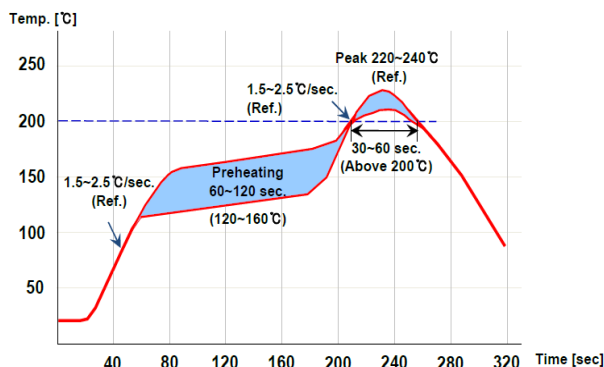
- Pb-free Solder
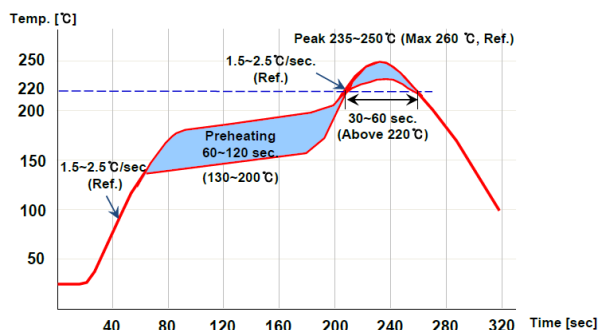
- Although the recommended soldering conditions are specified in the above diagram, reflow or hand soldering at the lowest possible temperature is desirable for the LEDs.
- A rapid-rate process is not recommended for cooling the LEDs down from the peak temperature.
- Occasionally there is a brightness decrease caused by the influence of heat of ambient atmosphere during air reflow. It is recommended that the customer use the nitrogen reflow method.
- The encapsulated material of the LEDs is silicone, Therefore the LEDs have a soft surface on the top of the package. The pressure to the surface will be influence to the reliability of the LEDs. Precautions should be taken to avoid the strong pressure on the encapsulated part. So When using the chip mounter, the picking up nozzle that does not affect the silicone resin should be used.
- Reflow soldering should not be done more than two times.

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12. Reflow Soldering Characteristics

12-2. Soldering Iron

Basic spec is ≤3sec when 350℃. If temperature is higher, time shorter (+10℃ → -1sec). Power dissipation of Iron should be smaller than 15W, and temperature should be controllable. Surface temperature of the device should be under 230℃.

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