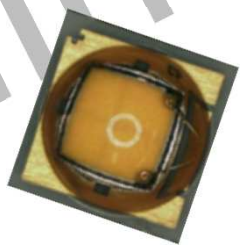
CUSTOMER : .

DATE : 2012. 01. 10.

SPECIFICATIONS FOR APPROVAL



3535 Ceramic PKG

MODEL NAME : LEMWA33X70HW00

APPROVAL	REMARK	APPENDIX

Designed	Checked	Approved

LG Innotek

SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	2 /26

Change History of Revision

Revision	Date	Contents of Revision Change	Remark

SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	3 /26

CONTENTS

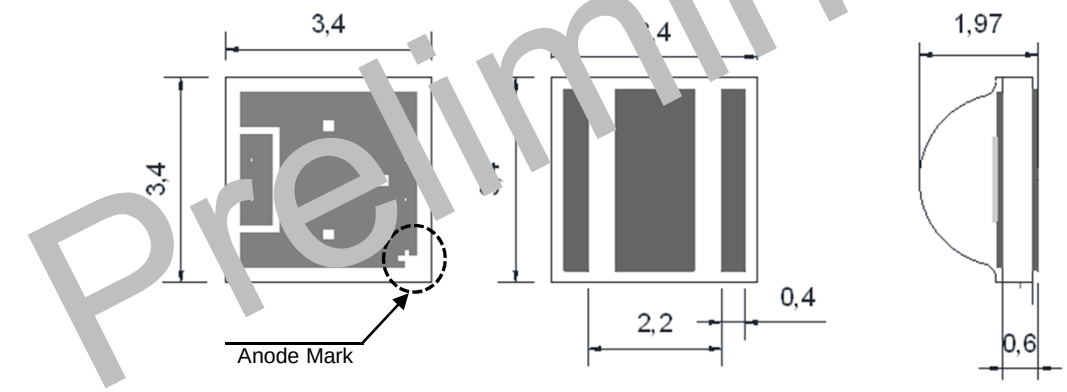
SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	4 /26

1. Features

- Lighting Color : Cool White
- Ceramic PKG type : 3.4×3.4×1.97 mm (L×W×H)
- Viewing angle : 120°
- Thermal Resistance (Rth_{j-s}) : 6℃/W
- Chip Material : InGaN
- Soldering methods : IR reflow soldering
- ESD withstand voltage : up to 2kV according to JESD22-A 114-B

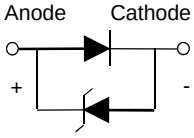
2. Outline Dimensions

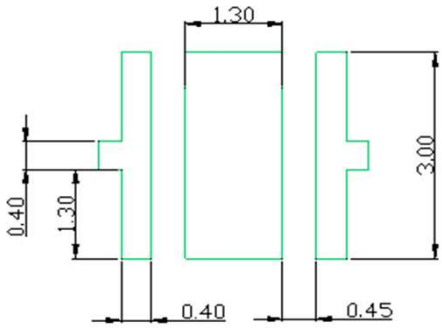
(unit : mm)



Recommendable soldering pattern
(For reflow soldering)

POLARITY





▪ Tolerances Unless Dimension ±0.13mm

SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	5 /26

3. Applications

- Interior and Exterior Illumination, Automotive Lighting

4. Absolute Maximum Ratings

(Ta=25℃)

Items	Symbols	Ratings	Unit
Forward Current *1)	I_F	1,500	mA
Pulse Forward Current *2)	I_{FP}	1,500	mA
Power Dissipation	P_D	5,200	mW
Operating Temperature	T_{opr}	-40 ~ 85	℃
Storage Temperature	T_{stg}	-40 ~ 100	℃
Junction Temperature	Tj	150	℃
ESD		2	KV

*1) Ts=60℃ (@Ta=25℃)
*2) Ta=25℃

5. Electro - Optical Characteristics

(Ta=25℃)

Items	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	V_F	350mA	2.9	3.1	3.3	V
Reverse Voltage (Zener Diode)*1)	V_R	350mA	-	-	6.5	V
Luminous Flux	Φ_V	350mA	107	-	-	lm
CIE Value	X / Y	350mA	Refer to '6. Rank Sorting Method'			-
Viewing Angle	2Θ1/2	350mA	-	120	-	deg
Color Rendering Index	Ra	350mA	70	-	-	-
Thermal resistance	Rth_{j-s}		-	6	-	℃/W

*1) The value is based on performance of Zener Diode.

※ These values measured by Optical Spectrum Analyzer of LG Innotek Co., LTD and tolerances are followings as below
- Luminous Flux (Φ_V) : ±10%, Forward Voltage(V_F) : ±0.1, CIE Value : ±0.005, CRI Value : ±3

※ All PKG are tested by LG Innotek equipment. But, the values of characteristics of PKG could be different depending on the test equipment.

SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	6 /26

5. Electro - Optical Characteristics

If (mA)	Vf (V)	Power (W)	Flux (lm)	lm/W
350	2.98	1.043	122	117.4
700	3.16	2.215	218	98.6
1000	3.30	3.296	290	87.8
1500	3.48	5.213	383	73.5

* lm values are representative references only.

6. Rank Sorting Method

▪ Rank of Luminous Flux (@ 350mA)

Rank	Φ_V (lm, @ 350mA)		
	Min	Typ	Max
X2	107	-	-
X3	114	-	-
X4	122	-	-
X5	130	-	-
X6	139	-	-

▪ Rank of Forward Voltage (@ 350mA)

Rank	V_F (V, @ 350mA)		
	Min	Typ	Max
C	2.9	-	3.1
C0	3.1	-	3.2
C1	3.2	-	3.3

▪ Rank of CRI (@ 350mA)

Rank	Ra (CRI, @ 350mA)		
	Min	Typ	Max
70	70	-	-

Rank name method : Please refer to the following example
Rank Name : X1 – C0 – H2
Φ_V rank = X1, V_F rank = C0, CIE rank = H2

▪ Rank of CIE Value (@ 350mA)

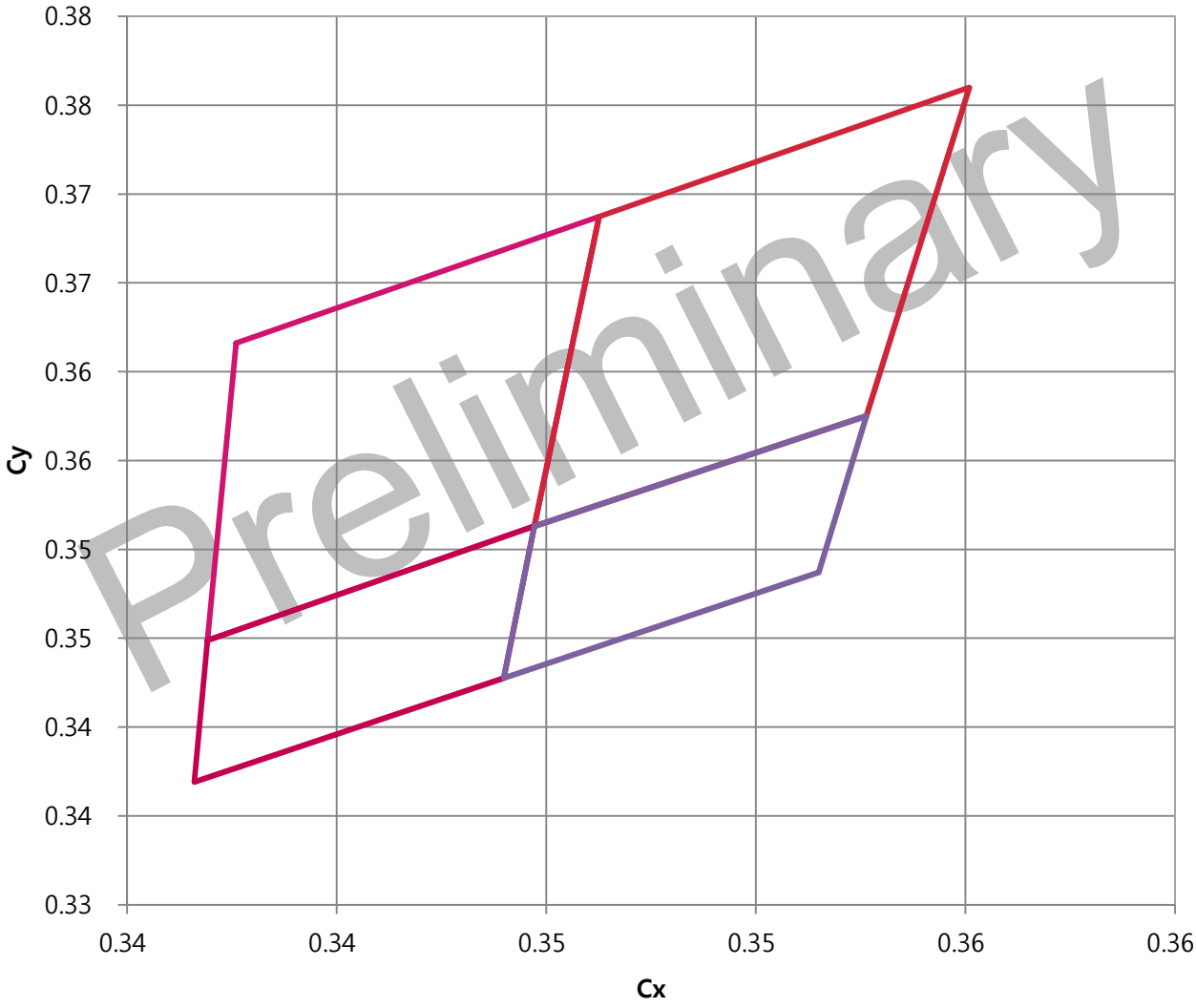
CCT	Rank	CIE X	CIE Y
5000K (5028K± 283K)	H1	0.3376	0.3616
		0.3463	0.3687
		0.3447	0.3513
	H2	0.3369	0.3449
		0.3369	0.3449
		0.3447	0.3513
		0.3440	0.3427
	H3	0.3366	0.3369
		0.3463	0.3687
		0.3551	0.3760
		0.3526	0.3575
		0.3447	0.3513
	H4	0.3447	0.3513
		0.3526	0.3575
		0.3515	0.3487
		0.3440	0.3427

* Voltages are tested at a current pulse duration of 10 ms and an accuracy of ± 5.0%.
* This categories are established for classification of products.

SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	7 /26

Chromaticity Diagram

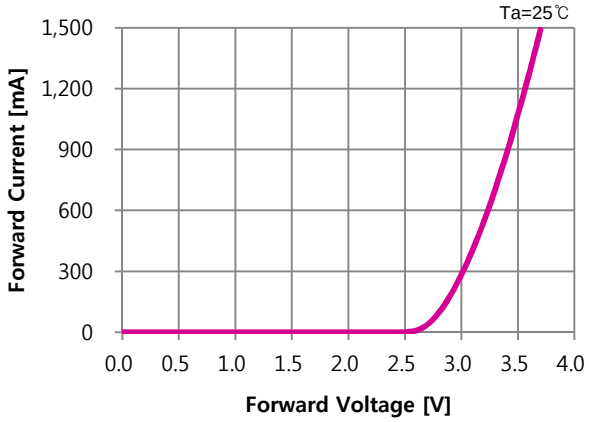


- Chromaticity coordinate groups are tested at a current pulse duration of 10 ms and a tolerance of ±0.005.
- This categories are established for classification of products.
- Color Coordinate is based on the CIE 1931 Chromaticity Diagram

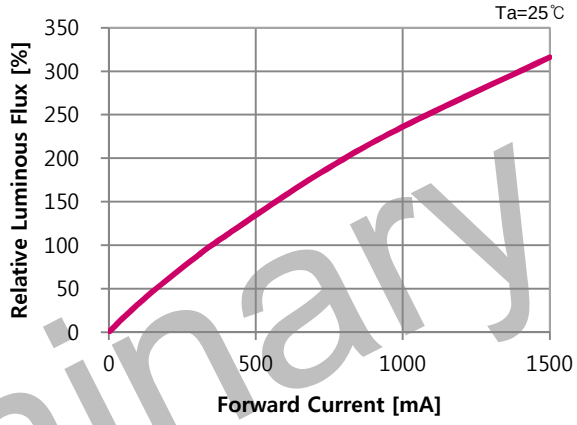
SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	8 /26

7. Typical Characteristic Curves

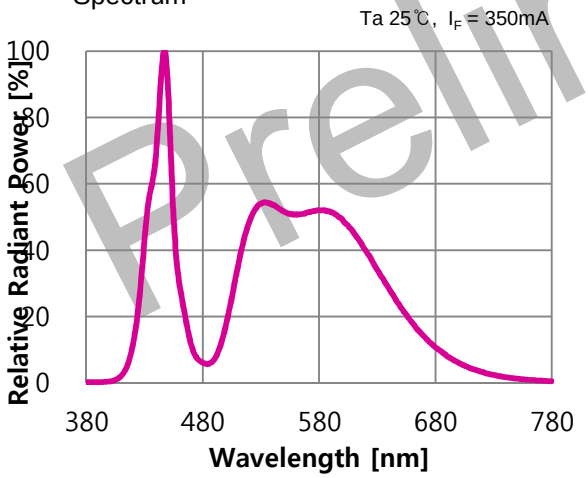
▪ Forward Current vs. Forward Voltage



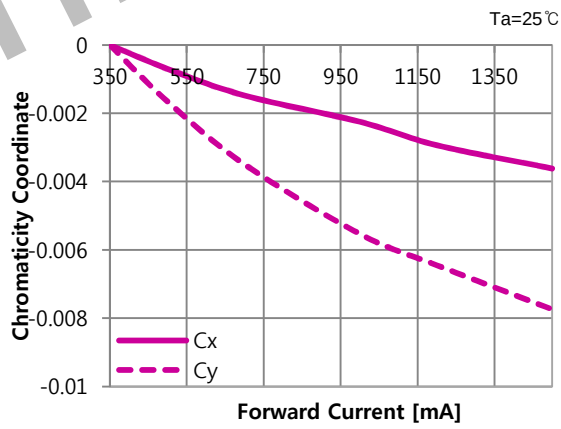
▪ Relative Luminous Flux vs. Forward Current



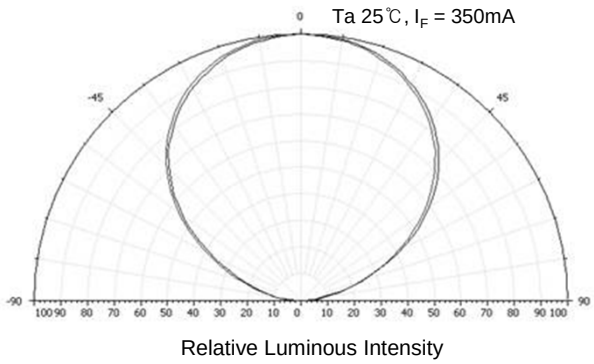
▪ Spectrum

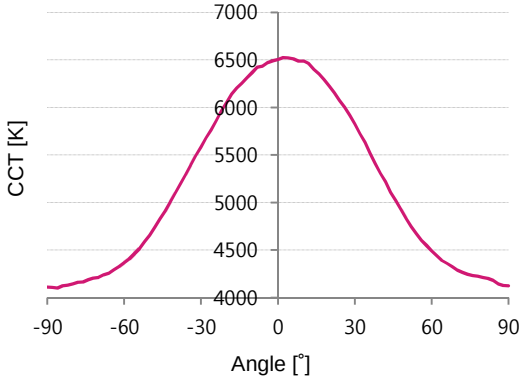


▪ CIE vs. Forward Current



▪ Radiation Characteristics

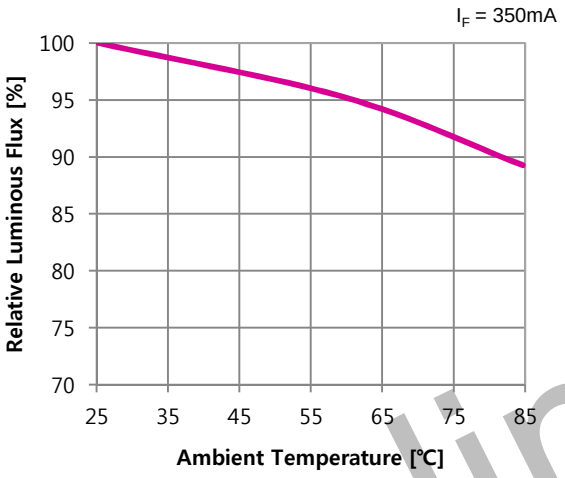




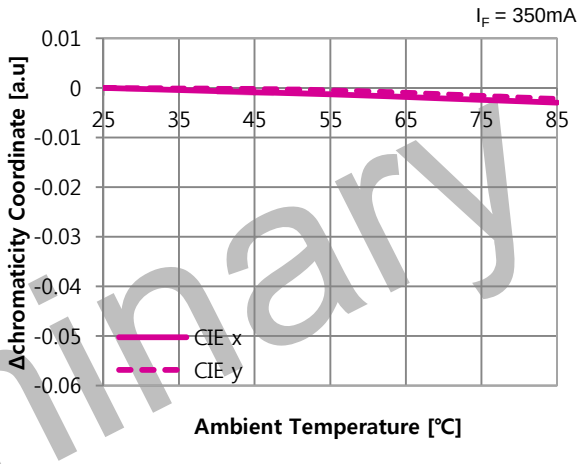
SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	9 /26

7. Typical Characteristic Curves

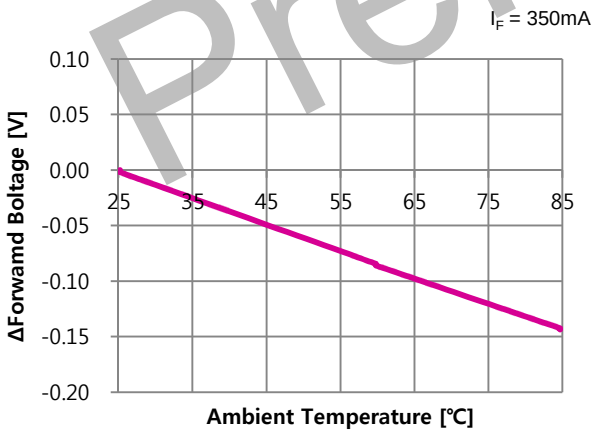
▪ Luminous Flux vs. Ambient Temp.



▪ CIE vs. Ambient Temp.



▪ ΔV_F vs. Ambient Temp.



SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	10 /26

8. Reliability Test Items and Conditions

8-1.Criteria for Judging the Damage

Item	Symbol	Test Condition	Limit	
			Min	Max
Forward Voltage	VF	IF = 350mA	-	U.S.L.× 1.3
Luminous Flux	Φ_V	IF = 350mA	S × 0.7	-

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

※ The Reliability criteria of ESD Test is judged by VF shift (±0.2V@8mA) or impedance(Ω) check data.

8-2. Item and Results of Reliability Test

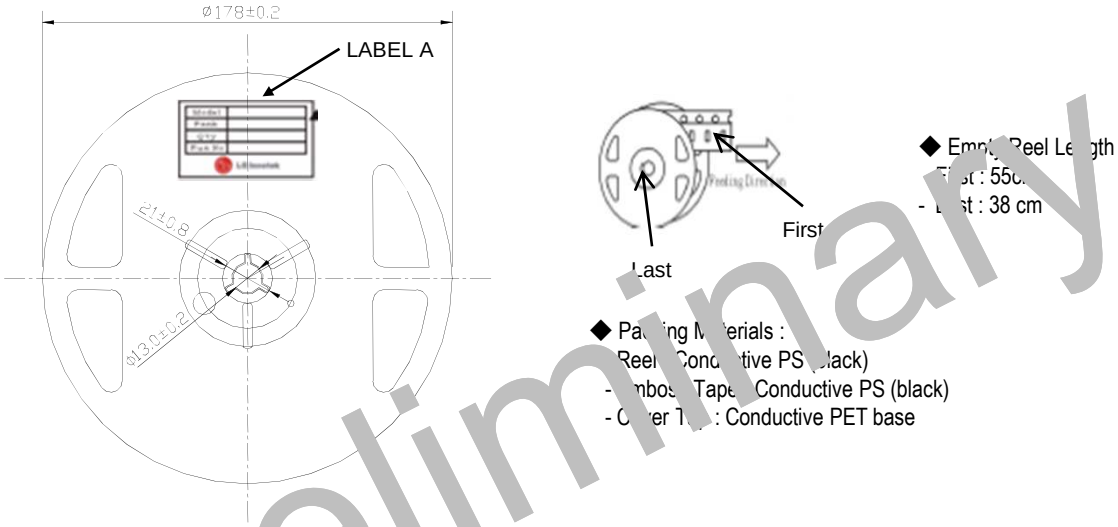
No	Item	Test Condition	Test Hours/ Cycles	Sample No	Ac/Re
1	Steady State Operating Life	Ta=25℃, I_F=1500 [mA]	1000hr	11 pcs	0 / 1
2	High Temp. Humidity Life	Ta=85℃,85% RH,I_F=1000 [mA]	1000hr	11 pcs	0 / 1
3	Steady State Operating Life of High Temperature 1	Ta=85℃, I_F=1000 [mA]	1000hr	11 pcs	0 / 1
4	Steady State Operating Life of Low Temperature	Ta=-40℃, I_F=1000 [mA]	1000hr	11 pcs	0 / 1
5	High Temp. Storage	100℃	1000hr	11 pcs	0 / 1
6	Low Temp. Storage	-40℃	1000hr	11 pcs	0 / 1
7	High Temp. Humidity Storage	Ta=85℃,85% RH	1000hr	11 pcs	0 / 1
8	Temperature Cycle	-40℃(30min) ~ 25℃(5min) ~ 100℃(30min) ~ 25℃(5min)	100cycle	11 pcs	0 / 1
9	Thermal Shock	100℃(15min) ~25℃(5min) ~ -40℃(15min)	100cycle	11 pcs	0 / 1
10	Solderability (Reflow Soldering)	Tsld=215±5℃, 5sec Lead-Free Solder (Using Flux)	1 times	11 pcs	0 / 1
11	Resistance to Soldering Heat (Reflow Soldering)	Tsld=260℃, 10sec /2times (Pre Treat. 30℃, 70%, 168hr)	4 times	11 pcs	0 / 1
12	Electrostatic Discharge (HBM, ±5kV)	R=1.5kΩ, C=100pF, Test Voltage 5kV	3times Negative/ Positive	11 pcs	0 / 1
13	Vibration	100~2000~100Hz sweep 4min, 200m/s^2, 3directions, 4cycles	48 min.	11 pcs	0 / 1

SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	11 /26

9. Package and Marking of Products

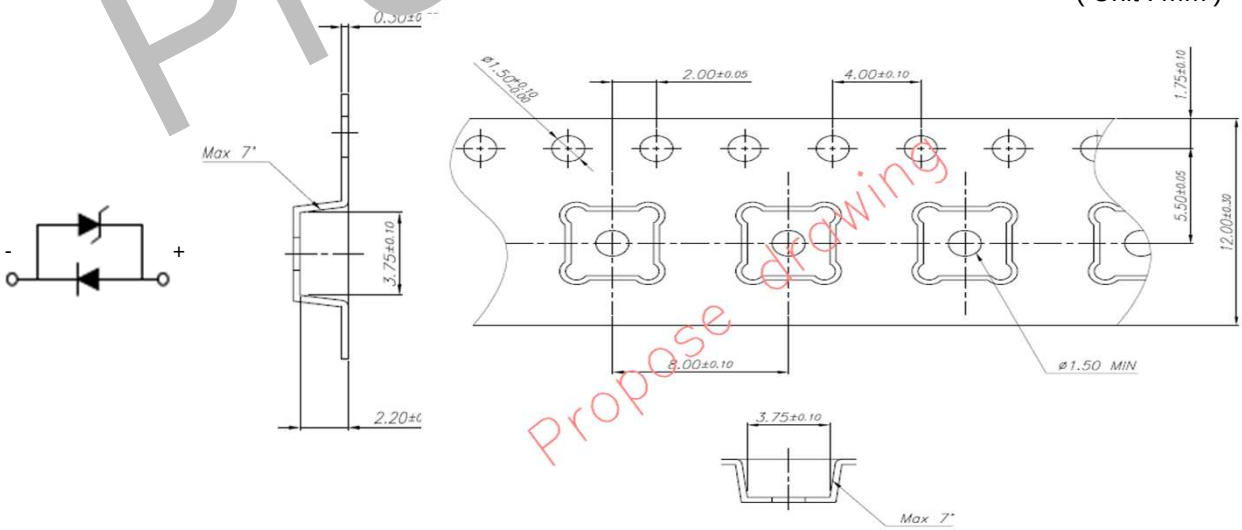
9-1. Taping Outline Dimension

Dimension of Reel

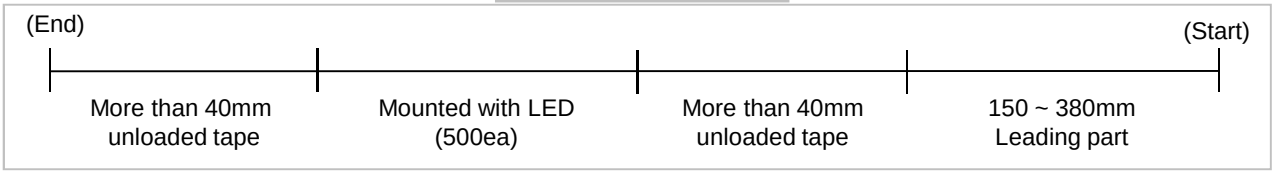


Dimension of Tape

(Unit : mm)



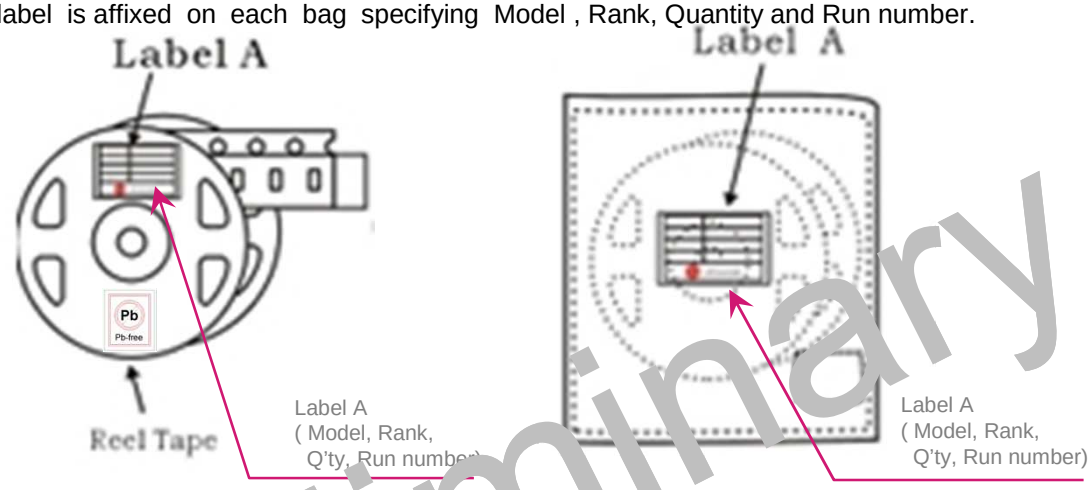
Arrangement of Tape



SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	12 /26

9-2. Package

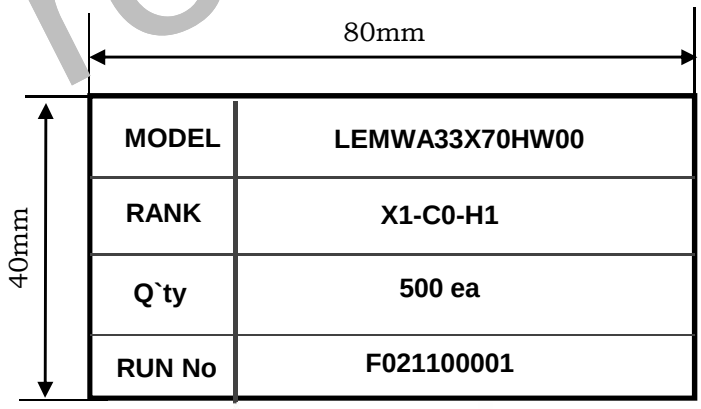
Products are packed in one bag of 500 pcs (one taping reel) and
a label is affixed on each bag specifying Model , Rank, Quantity and Run number.



- Package : damp-proof package made of aluminum

※. Label A

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



LG Innotek Co., Ltd.

▪ Run No indication

1	2	3	4	5	6	–	7	8	9	10
Code	Site	Manufacture Year (Last number) (1, 2, 3, 4, 5 6, 7, 8, 9, 0)	Manufacture Month (1, 2, 3, 4, 5, 6, 7, 8, 9, x, y, z)	Manufacture date (01 ~ 31)			Serial No (0001 ~ 9999)			

SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	13 /26

※. Label B

Specifying Customer, Model, Customer Part no, Lot No, Quantity

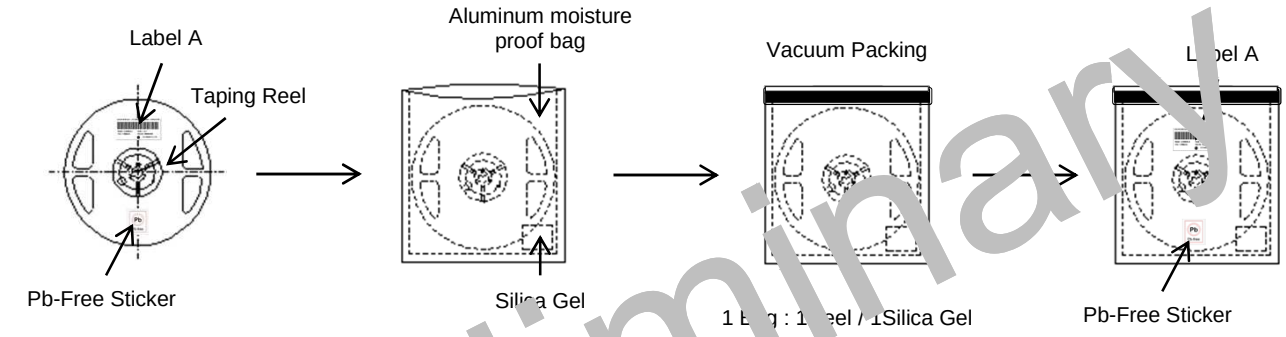
- Lot No. indication

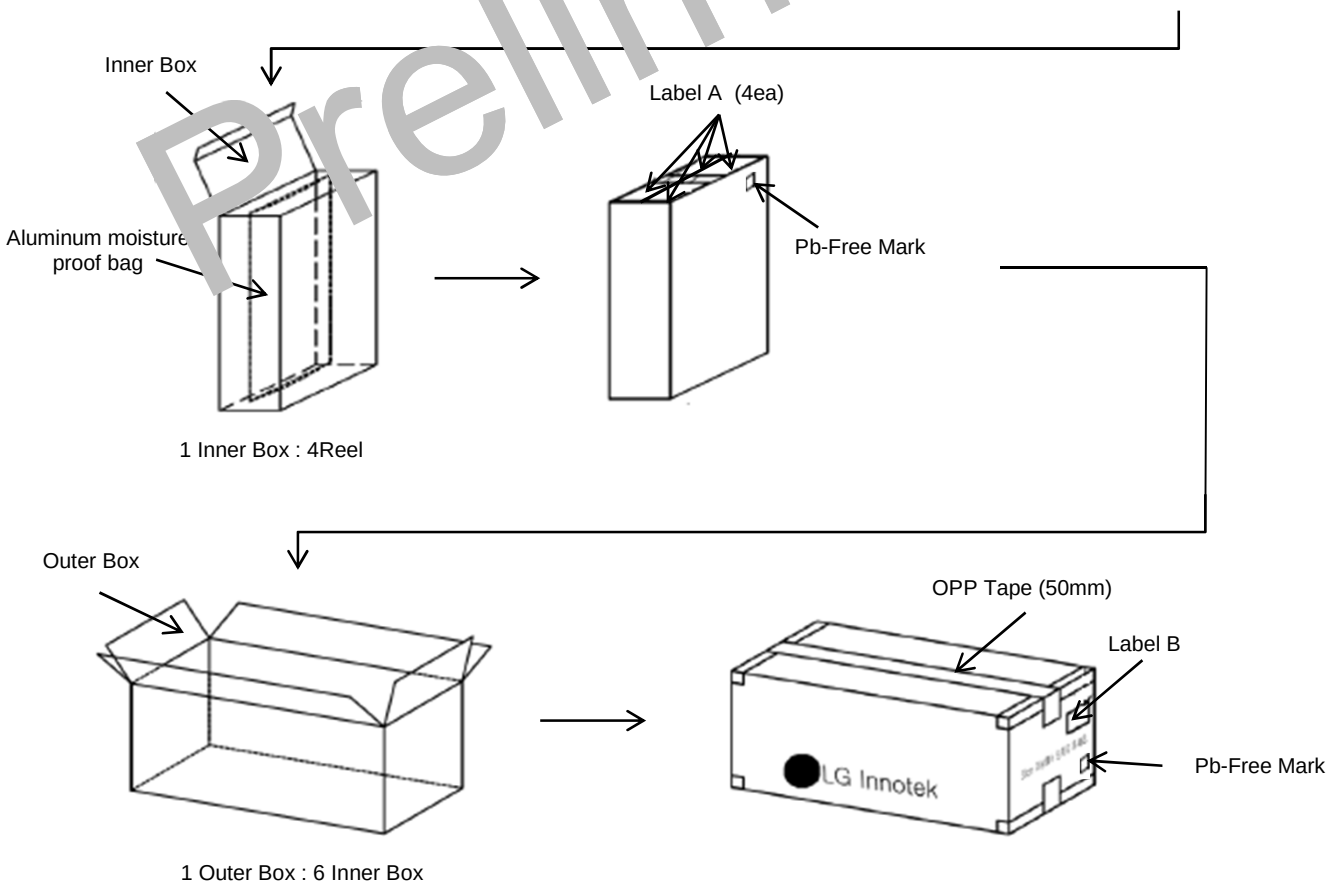
1	2	3	4	5	–	4	5
Code	QA Inspection Year (Last number) (1, 2, 3, 4, 5 6, 7, 8, 9, 0)	QA Inspection Month (1, 2, 3, 4, 5, 6, 7, 8, 9, x, y, z)	QA Inspection Data (01 ~ 31)			Serial No (01 ~ 99)	

SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	14 /26

9-3. Packing Specifications

Reeled products (numbers of products are 500 pcs) packed in a seal off aluminum moisture-proof bag along with desiccants (Silica gel).
Four aluminum bags (total maximum number of products are 2,000 pcs) packed in an inner box and Six inner boxes are put into an outer box.





SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	15 /26

10. Cautions on use

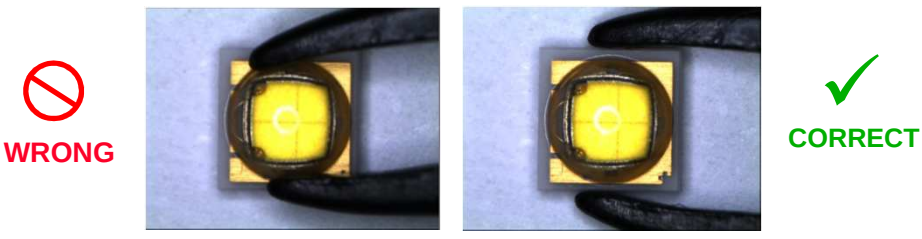
10-1. Moisture Proof Package

- When moisture is absorbed into the SMD package it may vaporize and expand during soldering.
- There is possibility that this can cause exfoliation of the contacts and damage the optical characteristics of the LEDs.

10-2. For the Usage

- LED PKG should not be used in directly exposed environment containing hazardous substances.
- Do not expose the LEDs to corrosive atmosphere during storage and using.
- Avoid rapid transitions in ambient temperature, especially in high humidity.
- In designed a circuit, the current through each LED must not exceed the absolute maximum rating
- Pick and Place

  Use teflon tweezers to grab these products LEDs at the base. Do not touch the encapsulating resin (Lens) with the teflon tweezers. Do not touch the lens with fingers. Do not place pressure on the encapsulating resin (lens).



SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	16 /26

10-3. For the Storage

Before opening the package

- Proper temperature and RH conditions for storage are : 5℃~35℃, less than 60% RH
- Do not open Moisture-Proof bag before the products are ready to use.

After opening the package

- Proper temperature and RH conditions for storage are : 5℃~35℃, less than 60% RH.
- The LEDs should be soldered within 168hours (7days) after opening the package.
- If unused LEDs remain, they should be stored in moisture-proof bag with a absorbent Material. (ex. Silica Gel)
- If the Moisture absorbent material(ex. Silica Gel) loses its color or the LEDs have exceeded the storage time, baking treatment should be performed using the following condition. Conditions for baking : 60±5℃, 20% RH and 24 hours maximum

10-4. 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 resin of the LEDs.
- It is recommended the IPA be used as a solvent for cleaning the LEDs. Please refer to following solvents and conditions.
  Cleaning Condition : Solvent : IPA, 25℃ max X 60 sec. max
- Do not clean the LEDs by the ultrasonic, When it is absolutely necessary, the influence of ultrasonic cleaning on the LEDs depends on factors such as ultrasonic power and the assembled condition.
- Do not clean th LEDs by the ultrasonic, When it is absolutely necessary, the influence of ultrasonic cleaning on the LEDs depends on factors such as ultrasonic power and the assembled condition.
- Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs will occur.

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

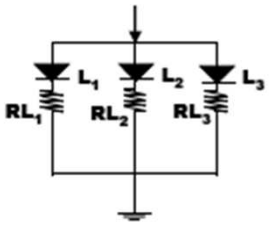
SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	17 /26

10-6. Static Electricity

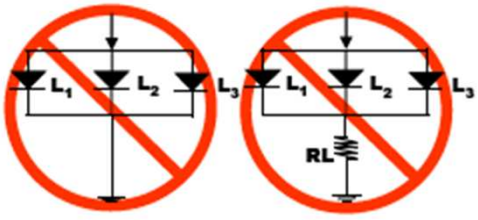
- If over-voltage, which exceeds the absolute maximum rating, is applied to the LEDs, it will damage the LEDs and result in destruction. Since the LED s are sensitive to the static electricity and surge, it is strongly recommended to use a wristband or anti-electrostatic glove when handling the LEDs 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 remarkable increase, 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 V_F test at a low current.

10-7. 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 current 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 LEDs 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

SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	18 /26

- 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.

10-8. Application limits of LED Driver IC controller

- GaN based LED is relatively week 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 0.3mA. LGIT cannot make a guarantee on the LED using in Drive IC with start up current level of < 0.3mA.
- 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.

10-9. 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.

10-10. Others

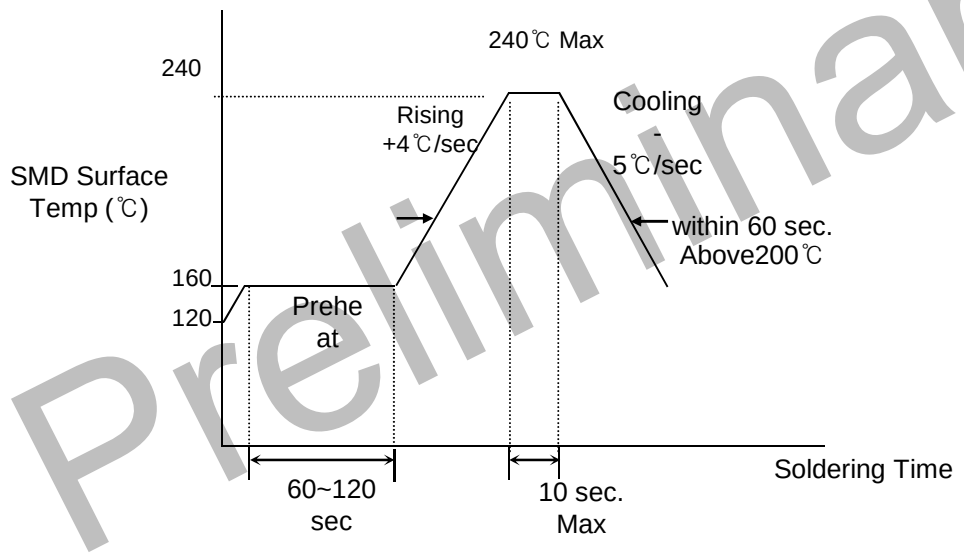
- LG innoek will not be held responsible for any damage to the user that may result from accidents or any other reasons during operation of the user's unit if use to exceed the absolute maximum rations. Or not keep the matters that demand special attention.
- The LEDs described in this brochure are intended to be used for ordinary electronic equipment.
- Consult LG innotek, sales staff in advance for information on the applications in which exceptional quality and reliability are required, particularly when the failure or malfunction of the LEDs, may directly jeopardize life or health.
- The customer shall not reverse engineer by disassembling or analysis of the LEDs without having prior written consent from LG innotek. When defective LEDs are found, the customer shall inform LG Innotek disassembling or analysis.
- The formal specifications must be exchanged and signed by both parties before large volume purchase begins.
- The appearance and specification of the product may be modified for improvement without notice.

SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	19 /26

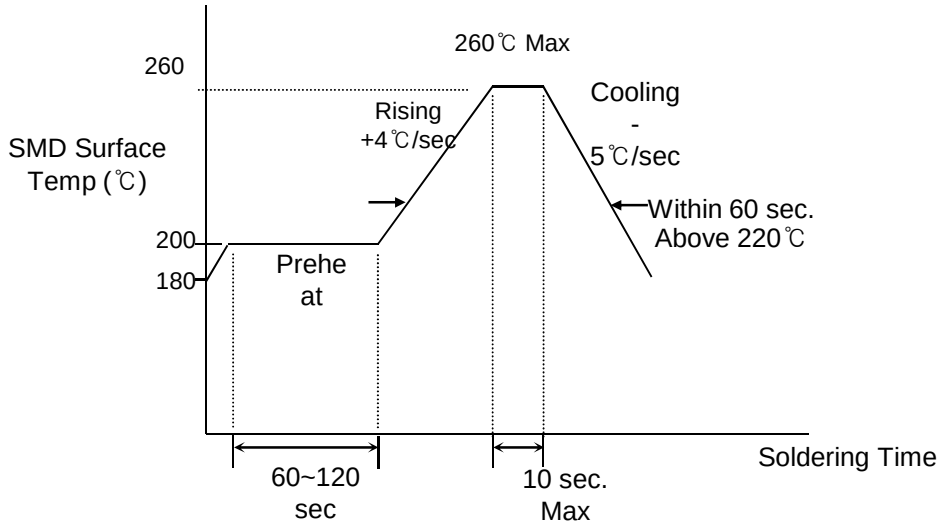
11.Reflow Soldering Characteristics

- 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.

11-1. Pb Solder



11-2. Pb Free Solder



SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	20 /26

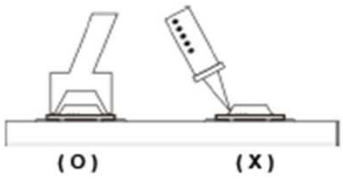
- Although the recommended soldering conditions are specified in the front page diagram, reflow or hand soldering at the lowest possible temperature is desirable for the LEDs.
- A rapid-rate process is not recommended for cooling the LEDs down from the peak temperature.
- Occasionally there is a brightness decrease caused by the influence of heat of ambient atmosphere during air flow. 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 LEDs(Lens) . Precautions should be taken to avoid the strong pressure on the encapsulated part. (Lens) So when using the chip mounter, the picking up nozzle that does not affect the silicone resin (Lens) should be used.
- Reflow soldering should not be done more than two times.

11-3. Soldering Iron

- Basic spec is ≤5sec when 260℃
- If temperature is higher, time shorter (+10℃ → -1 sec).
- Power dissipation of Iron should be smaller than 15W, and temperature should be controllable. Surface temperature of the device should be under 230℃.

11-4. Repair

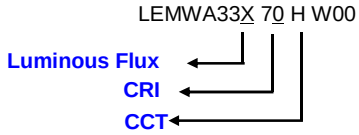
- Repairing should not be done after the LEDs have been soldered.
- When repairing is unavoidable, a double-head soldering iron should be used.
- If should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.
- When soldering, do not put stress on 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.



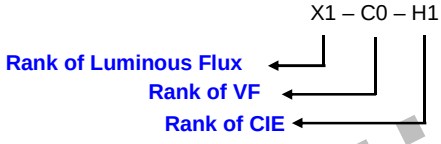
SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	21 /26

12. Appendix

※ Model name method: Please refer to the following example Model Name



※ Rank name method: Please refer to the following example Rank Name



▪ Performance Groups of Voltage(@350mA)

Rank	V_F (V, @ 350mA)		
	Min	Typ	Max
C	2.9	-	3.1
C0	3.1	-	3.2
C1	3.2	-	3.3

SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	22 /26

▪ Performance Groups of Brightness(@350mA)

Color	CCT Range		Min. Luminous Flux (lm)		Order Code
	Min.	Max.	Group	Flux (lm)	
Cool White	5,000K	9,000K	X2	107	
			X3	114	
			X4	122	
			X5	130	
			X6	139	
Neutral White	3,700K	5,000K	W3	94	
			X1	100	
			X2	107	
			X3	114	
			X4	122	
			X5	130	
Warm White	2,600K	3,700K	W1	81	
			W2	87	
			W3	97	
			X1	100	
			X2	107	

Notes :

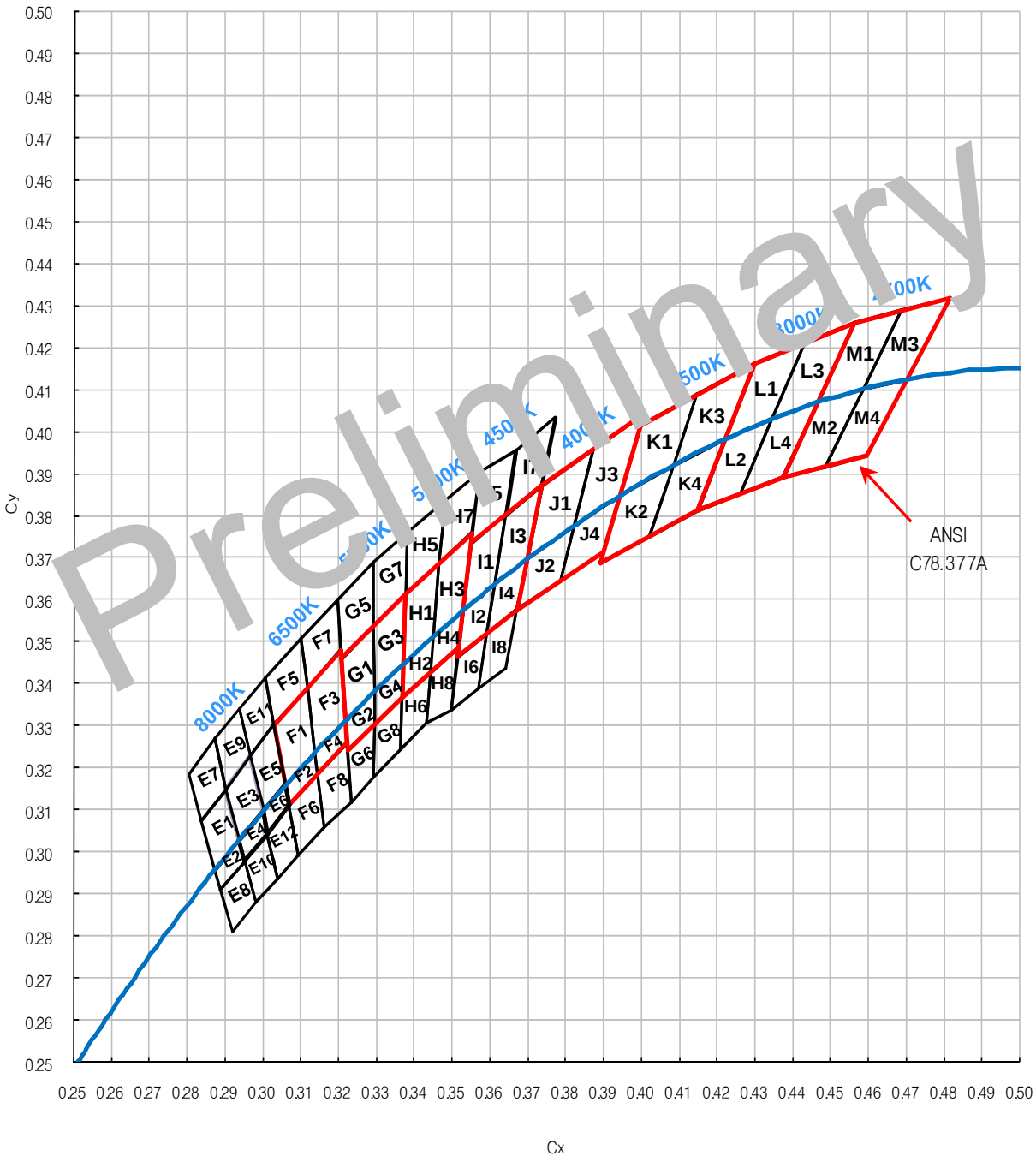
▪ LGIT maintains a tolerance of ±10% on flux and power measurements

▪ Minimum CRI for Cool White & Neutral White (3,700K – 9,000K CCT) is 70.

▪ Minimum CRI for Warm White (2,600K – 3,700K CCT) is 80.

SPECIFICATION			
MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	23 /26

▪ Performance Groups of Chromaticity(@350mA)



SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	24 /26

CCT	Rank	CIE X	CIE Y	CCT	Rank	CIE X	CIE Y	CCT	Rank	CIE X	CIE Y
2700K (2725K ±145K)	M1	0.4562	0.4260	3500K (3465K ±245K)	K1	0.3996	0.4015	4500K (4503K ±243K)	I1	0.3548	0.3462
		0.4687	0.4289			0.4146	0.4089			0.3641	0.3538
		0.4586	0.4103			0.4082	0.3922			0.3611	0.3382
		0.4465	0.4071			0.3941	0.3848.			0.3526	0.3314
	M2	0.4465	0.4071		K2	0.3941	0.3848		I2	0.3526	0.3314
		0.4586	0.4103			0.4082	0.3922			0.3611	0.3382
		0.4483	0.3918			0.4017	0.3752			0.3590	0.3305
		0.4373	0.3893			0.3889	0.3690			0.3512	0.3243
	M3	0.4687	0.4289		K3	0.4146	0.4089		I3	0.3641	0.3538
		0.4813	0.4319			0.4299	0.4165			0.3736	0.3616
		0.4700	0.4126			0.4221	0.3984			0.3697	0.3449
		0.4586	0.4103			0.4082	0.3922			0.3611	0.3382
	M4	0.4586	0.4103		K4	0.4082	0.3922		I4	0.3611	0.3382
		0.4700	0.4126			0.4221	0.3984			0.3697	0.3449
		0.4593	0.3944			0.4147	0.3814			0.3670	0.3369
		0.4483	0.3918			0.4017	0.3751			0.3590	0.3305
3000K (3045K ±175K)	L1	0.4299	0.4165	4000K (3985K ±275K)	J1	0.3736	0.3874		I5	0.3571	0.3602
		0.4430	0.4212			0.3870	0.3958			0.3668	0.3690
		0.4344	0.4032			0.3819	0.3776			0.3641	0.3538
		0.4221	0.3984			0.3697	0.3697			0.3548	0.3462
	L2	0.4221	0.3984		J2	0.3697	0.3697		I6	0.3512	0.3243
		0.4344	0.4032			0.3819	0.3776			0.3590	0.3305
		0.4260	0.3853			0.3783	0.3646			0.3567	0.3180
		0.4147	0.3814			0.3670	0.3578			0.3495	0.3120
	L3	0.4430	0.4212		J3	0.3870	0.3958		I7	0.3668	0.3690
		0.4562	0.4260			0.4006	0.4044			0.3771	0.3762
		0.4465	0.4071			0.3941	0.3848			0.3736	0.3616
		0.4344	0.4032			0.3819	0.3776			0.3641	0.3538
	L4	0.4344	0.4032		J4	0.3819	0.3776		I8	0.3590	0.3305
		0.4465	0.4071			0.3941	0.3848			0.3670	0.3369
		0.4373	0.3893			0.3898	0.3716			0.3640	0.3245
		0.4260	0.3853			0.3783	0.3646			0.3567	0.3180

SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	25 /26

CCT	Rank	CIE X	CIE Y	CCT	Rank	CIE X	CIE Y	CCT	Rank	CIE X	CIE Y
5000K (5028K ±283K)	H1	0.3376	0.3616	5700K (56650K ±355K)	G1	0.3207	0.3462	6500K (6530K ±510K)	F1	0.3028	0.3304
		0.3463	0.3687			0.3291	0.3538			0.3115	0.3391
		0.3447	0.3513			0.3292	0.3382			0.3136	0.3237
		0.3369	0.3449			0.3217	0.3314			0.3059	0.3160
	H2	0.3369	0.3449		G2	0.3217	0.3314		F2	0.3059	0.3160
		0.3447	0.3513			0.3292	0.3382			0.3136	0.3237
		0.3440	0.3427			0.3293	0.3305			0.3144	0.3186
		0.3366	0.3369			0.3222	0.3243			0.3068	0.3113
	H3	0.3463	0.3687		G3	0.3291	0.3538		F3	0.3115	0.3391
		0.3551	0.3760			0.3376	0.3616			0.3205	0.3481
		0.3526	0.3575			0.3369	0.3449			0.3217	0.3314
		0.3447	0.3513			0.3292	0.3382			0.3136	0.3237
	H4	0.3447	0.3513		G4	0.3292	0.3382		F4	0.3136	0.3237
		0.3526	0.3575			0.3369	0.3449			0.3217	0.3314
		0.3515	0.3487			0.3366	0.3369			0.3221	0.3261
		0.3440	0.3427			0.3293	0.3305			0.3144	0.3186
	H5	0.3381	0.3762		G5	0.3196	0.3602		F5	0.3005	0.3415
		0.3480	0.3840			0.3290	0.3690			0.3099	0.3509
		0.3463	0.3687			0.3291	0.3538			0.3115	0.3391
		0.3376	0.3616			0.3207	0.3462			0.3028	0.3304
	H6	0.3366	0.3369		G6	0.3222	0.3243		F6	0.3068	0.3113
		0.3440	0.3427			0.3293	0.3305			0.3144	0.3186
		0.3429	0.3307			0.3290	0.3180			0.3161	0.3059
		0.3361	0.3245			0.3231	0.3120			0.3093	0.2993
	H7	0.3480	0.3840		G7	0.3290	0.3690		F7	0.3099	0.3509
		0.3571	0.3907			0.3381	0.3762			0.3196	0.3602
		0.3551	0.3760			0.3376	0.3616			0.3205	0.3481
		0.3463	0.3687			0.3291	0.3538			0.3115	0.3391
	H8	0.3440	0.3427		G8	0.3293	0.3305		F8	0.3144	0.3186
		0.3515	0.3487			0.3366	0.3369			0.3221	0.3261
		0.3495	0.3339			0.3361	0.3245			0.3231	0.3120
		0.3429	0.3307			0.3290	0.3180			0.3161	0.3059

SPECIFICATION

MODEL	LEMWA33X70HW00	DOCUMENT No	
REG.DATE	2012. 01. 10	REV. No	0.0
REV.DATE		PAGE	26 /26

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