

APPROVAL SHEET

MODEL NAME SMD LED, TOP VIEW

PART NUMBER A5A1CECEAP18

CUSTOMER NAME

DATE 2014. 01.17

REMARK REV.07

[CUSTOMER APPROVAL]

APPROVAL NO.				
APPROVAL DATE				
	INSPECTOR	CHECK	APPROVAL	COMMENT
APPROVAL				

[VENDOR APPROVAL]

APPROVAL NO.				
APPROVAL DATE				
	SALES	R&D	PRODUCTION	QC
APPROVAL				

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1. Revision note

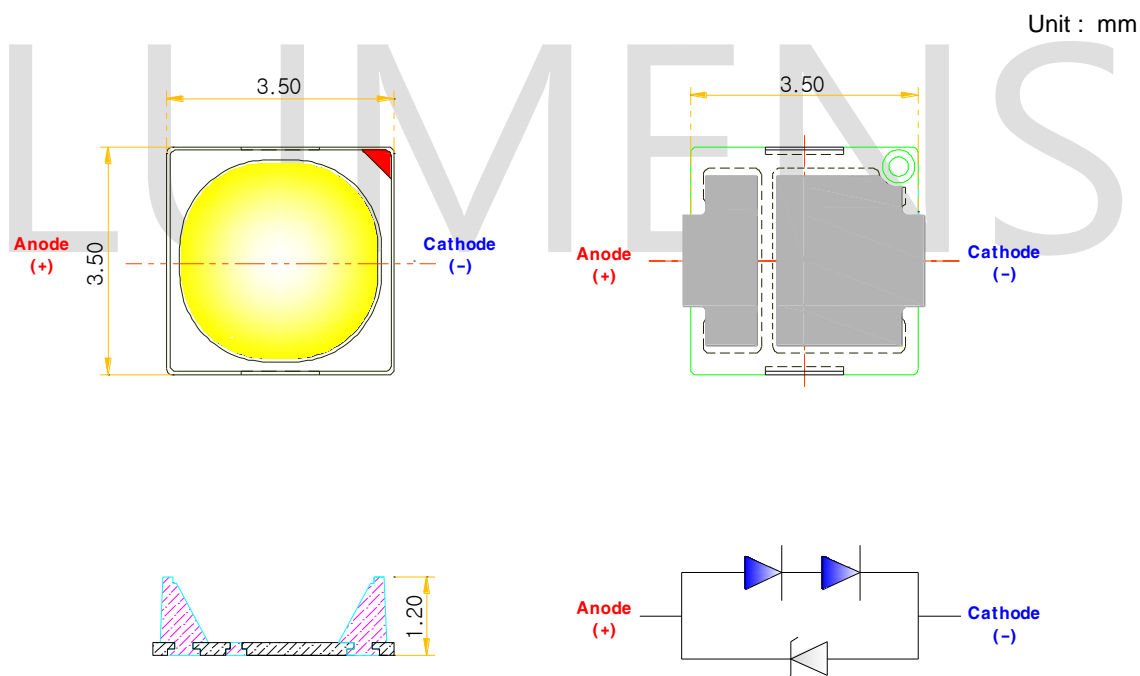
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2. DATA SHEET

Model name	SMD LED
Part number	A5A1CECEAP18
Package	PLCC type
Color	White
Application	Automotive, General lighting

1) Dimension

- High brightness Cool white-color surface mount LED.
- 120° viewing angle.
- Small package outline (LxWxH) of 3.5 x 3.5 x 1.2 mm.
- Qualified according to JEDEC moisture sensitivity Level 2.
- Compatible to both IR reflow soldering and TTW soldering.



2) Material Composition

Item	Material
LED Chip	InGaN base
Wire	Au Gold wire
Lead-frame	Cu Alloy With Ag Plating
Encapsulation	Silicone
Package Polymer	PCT

3) Absolute Maximum Ratings.

Parameters	Symbol	Maximum Value	Unit
		White	
DC forward current	I _F	200	mA
Pulse current; (t _p ≤ 10 ms, Duty cycle = 1/10)	I _{FP}	250	mA
Power dissipation (at room temperature)	P _{DL}	950	mW
ESD Sensitivity	ESD	8,000	V
Operating temperature.	T _{OPR}	-40 ~ +100	°C
Storage temperature.	T _{STG}	-40 ~ +100	°C
Soldering Temperature	T _{SOL}	Reflow Soldering :260°C /10s Hand Soldering : 350°C /3s	°C
Chip junction temperature.	T _j	125	°C

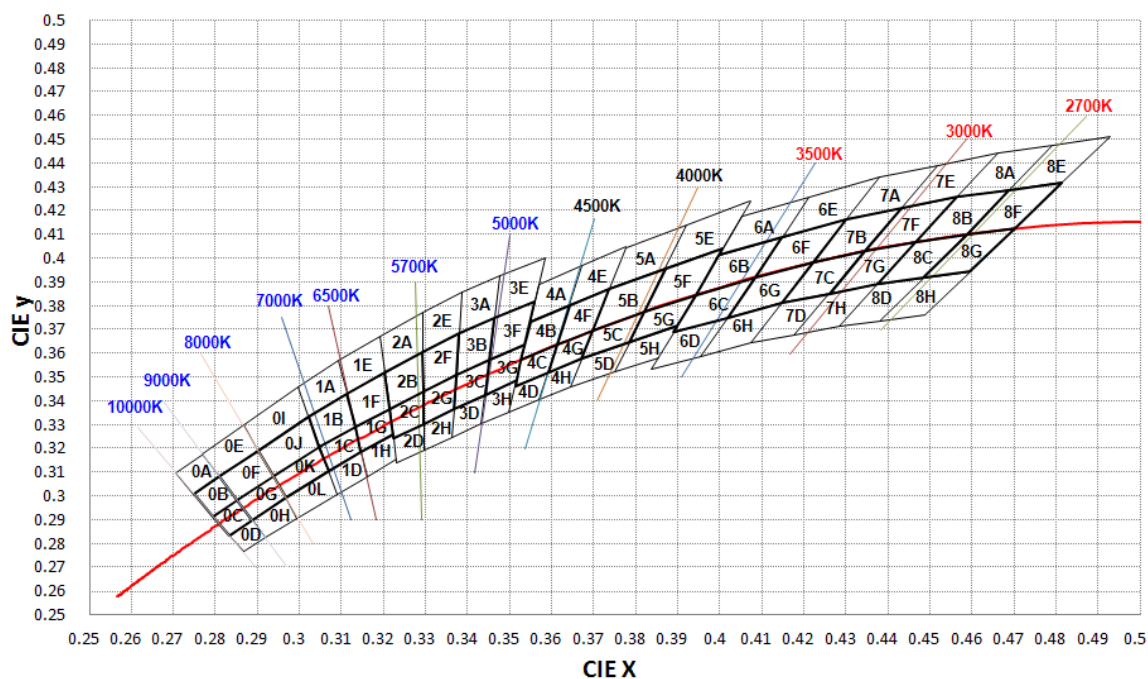
4) Electrical Properties Characteristics at Ta=25°C.

Item	Symbol	Rank	Min.	Typ.	Max.	Condition	Unit
CCT		ALL	5,700	-	7,000	IF=150mA	K
Luminous Intensity	I _v	A	80	-	82	IF=150mA	lm
		B	82	-	84	IF=150mA	lm
		C	84	-	86	IF=150mA	lm
		D	86	-	88	IF=150mA	lm
		E	88	-	90	IF=150mA	lm
		F	90	-	92	IF=150mA	lm
CRI	-	-	65	-	-	IF=150mA	Ra
Viewing Angle	2θ1/2	ALL	-	120	-	IF=150mA	deg
Forward Voltage	V _f	1	5.8	-	5.9	IF=150mA	V
		2	5.9	-	6.0	IF=150mA	V
		3	6.0	-	6.1	IF=150mA	V
		4	6.1	-	6.2	IF=150mA	V
		5	6.2	-	6.3	IF=150mA	V
		6	6.3	-	6.4	IF=150mA	V
		7	6.4	-	6.5	IF=150mA	V
Low Current Voltage	V _{f1}	ALL	1.85	-	3.0	IF = 1uA	V
Thermal resistance	R _{th}	ALL	-	18	-	IF=150mA	K/W

1. Luminous intensity is measured by **CAS-140** of Instrument System Co.
2. Luminous intensity is measured with an accuracy of ±10%.
3. Forward voltage, V_f is measured with an accuracy of ± 0.05 V

5) Chromaticity diagram

- Chromaticity coordinate groups are measured with an accuracy of ± 0.01 .



6) Color Correlated Temperature Ranges

Item	CCT Ranges	CIE Ranges	Color bins
White	5700K ~ 7000K	1B , 1C , 1F , 1G , 2B , 2C	6 Bin

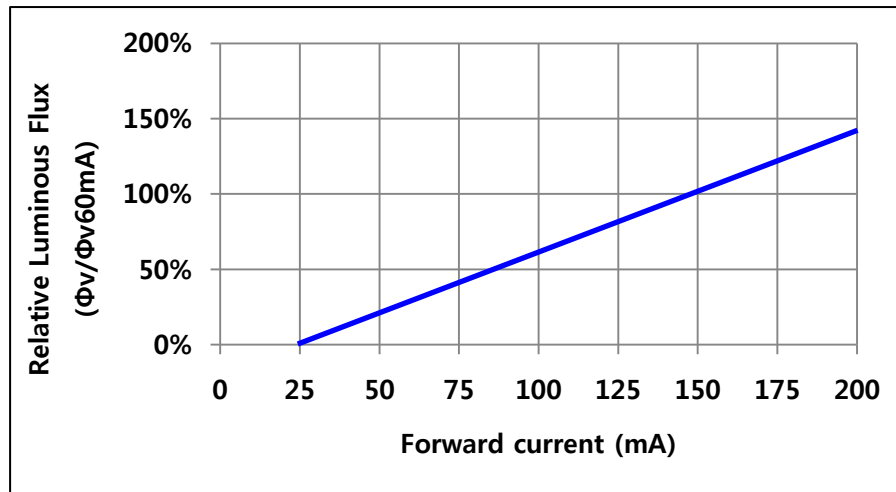
7) **Chromaticity coordinate**

CCT	Rank	CIE X	CIE Y	CCT	Rank	CIE X	CIE Y
7000K	1B	0.3111	0.3431	5700K	2B	0.3291	0.3775
		0.3020	0.3335			0.3191	0.3674
		0.3048	0.3209			0.3202	0.3520
		0.3131	0.3290			0.3292	0.3608
	1C	0.3131	0.3290		2C	0.3292	0.3608
		0.3048	0.3209			0.3202	0.3520
		0.3068	0.3108			0.3214	0.3366
		0.3145	0.3187			0.3293	0.3441
	1F	0.3202	0.3520				
		0.3111	0.3431				
		0.3131	0.3290				
		0.3214	0.3366				
	1G	0.3214	0.3366				
		0.3131	0.3290				
		0.3145	0.3187				
		0.3221	0.3261				

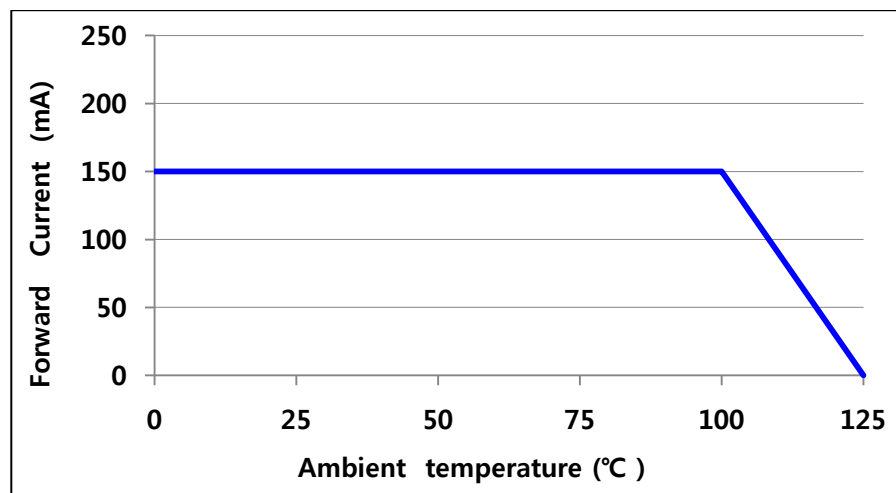
- Chromaticity coordinate groups are measure with an accuracy of ± 0.01 .

8) Optical and electrical characteristics

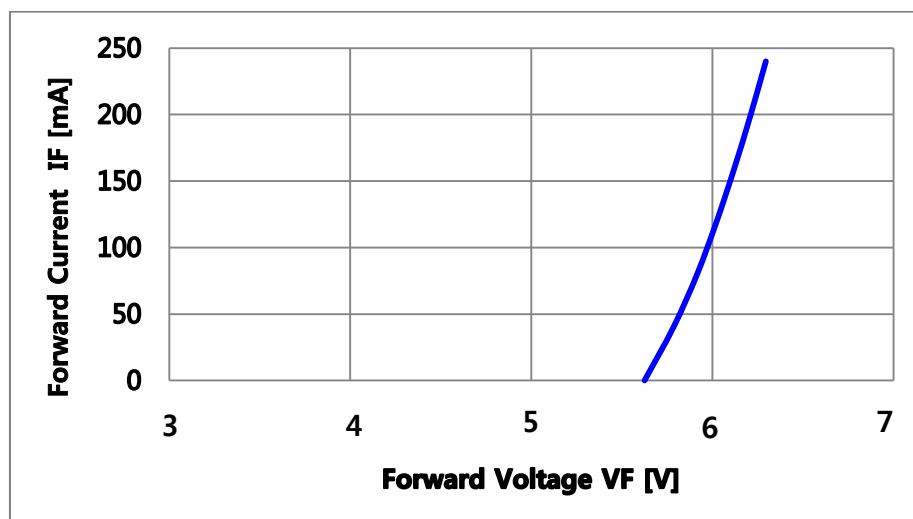
i. Relative luminous flux vs. Forward current



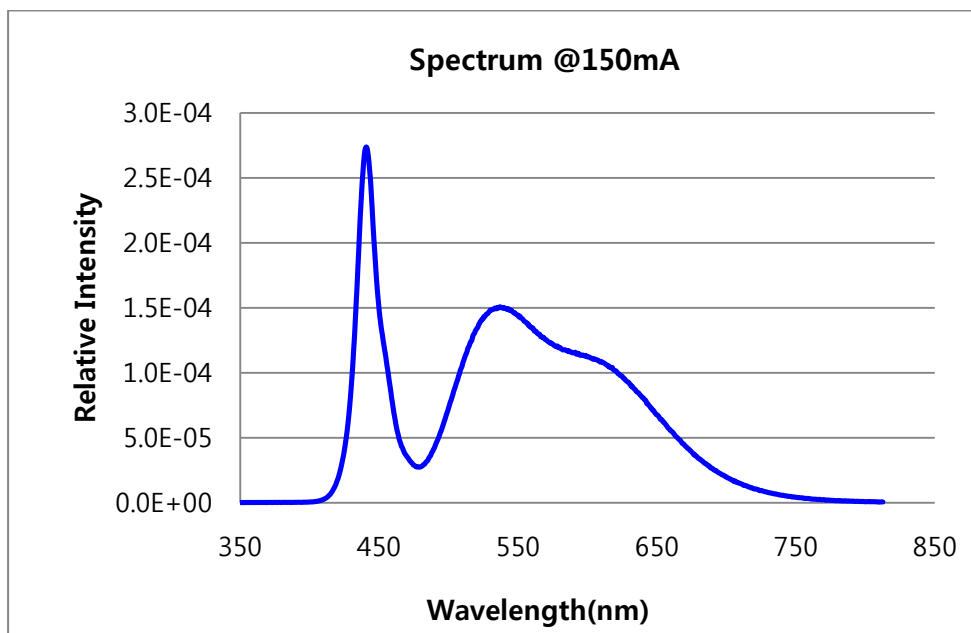
ii. Relative Forward current vs. Ambient temperature



iii. Forward current vs. Forward voltage

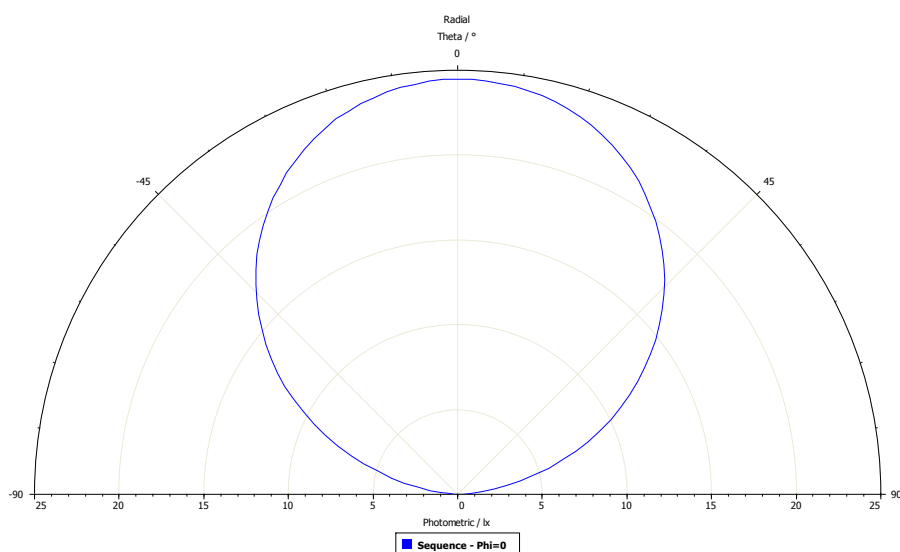


iv. Relative Spectrum vs. Intensity



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v. Radiation pattern (Phi=0)



9) Reliability Test Items and Conditions

Item	Reference	Test Conditions	Duration / Cycle	Number of Damaged
Thermal Shock	EIAJ ED-4701	Ta = -40℃ (30min) ~ 100℃ (30min)	150 Cycle	0/30
Operating Endurance Test	Internal Reference	Ta = 25℃, IF = 150mA	1,000 Hours	0/30
High Temperature High Humidity Life Test	Internal Reference	Ta = 60℃, RH=90%, IF = 150mA	500 Hours	0/30
High Temperature Life Test	Internal Reference	Ta = 85℃, IF = 150mA	500 Hours	0/30
ESD(HBM)	MIL-STD-883D	1KV at 1.5kΩ; 100pF	3 Times	0/30
Reflow	Tso	260℃ < 10sec. Reflow Soldering	3 Times	0/30

◆ CRITERIA FOR JUDGING THE DAMAGE

Item	Symbol	Condition	Criteria for Judgment	
			MIN	MAX
Forward Voltage	V_F	$I_F = 150\text{mA}$	-	USL ⁽¹⁾ × 1.2
Luminous Intensity	I_v	$I_F = 150\text{mA}$	LSL ⁽²⁾ × 0.5	-

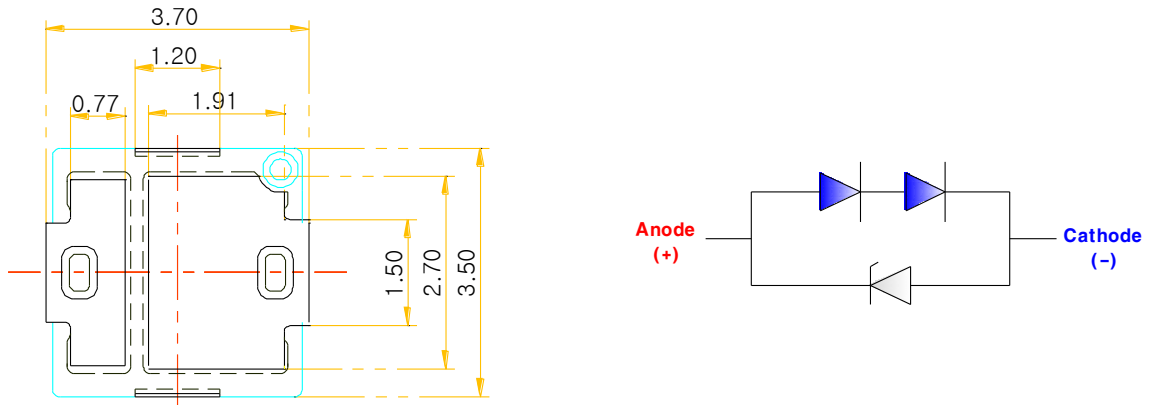
** Note

(1) USL : Upper Standard Level

(2) LSL : Lower Standard Level

10) Standard Solder Pad

Note: Individual high power LED must not be turned on unless soldered on PCB in order to ensure proper heat dissipation.



Shown is recommended pad geometry only. Customer PCB design shall include adequate thermal heat sink design & thermal analysis.

11) Recommended Soldering Temperature – Time Profile (Reflow Soldering)

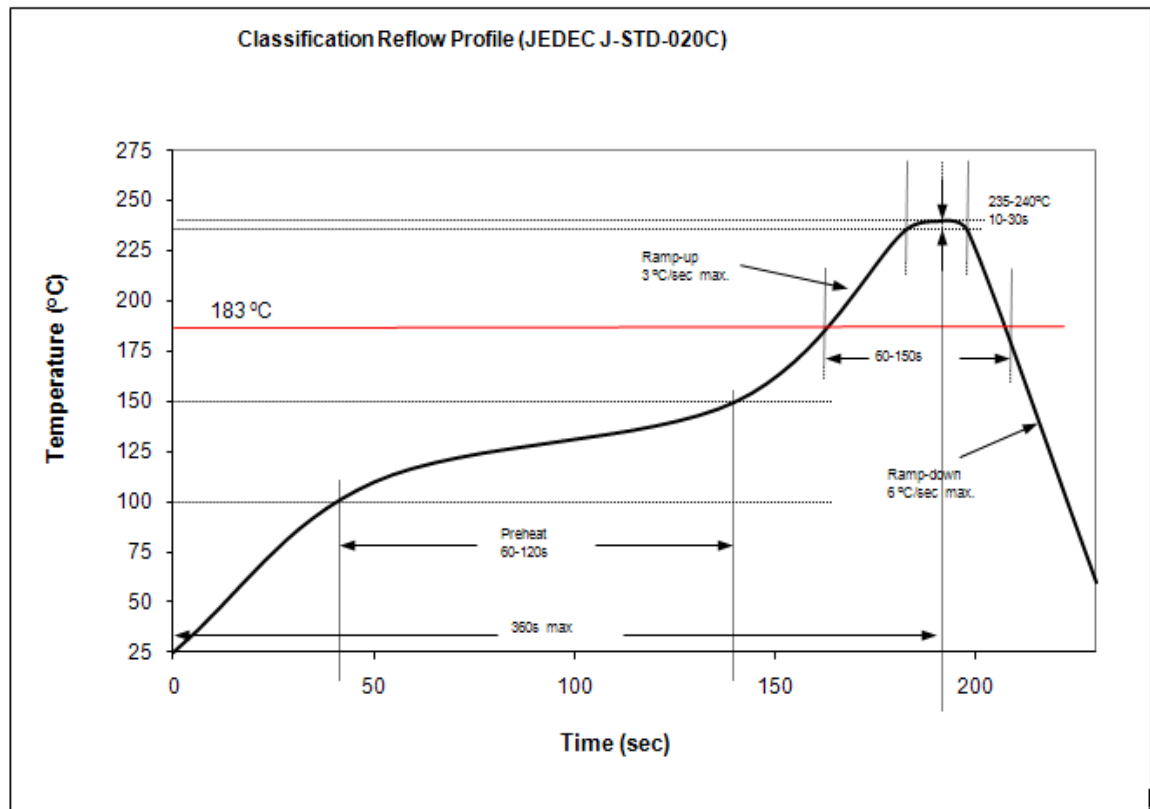
Surface Mounting Condition

In automatic mounting of the SMD LEDs on printed circuit boards, any bending, expanding and pulling forces or shock against the SMD LEDs should be kept minimum to prevent them from electrical failures and mechanical damages of the devices.

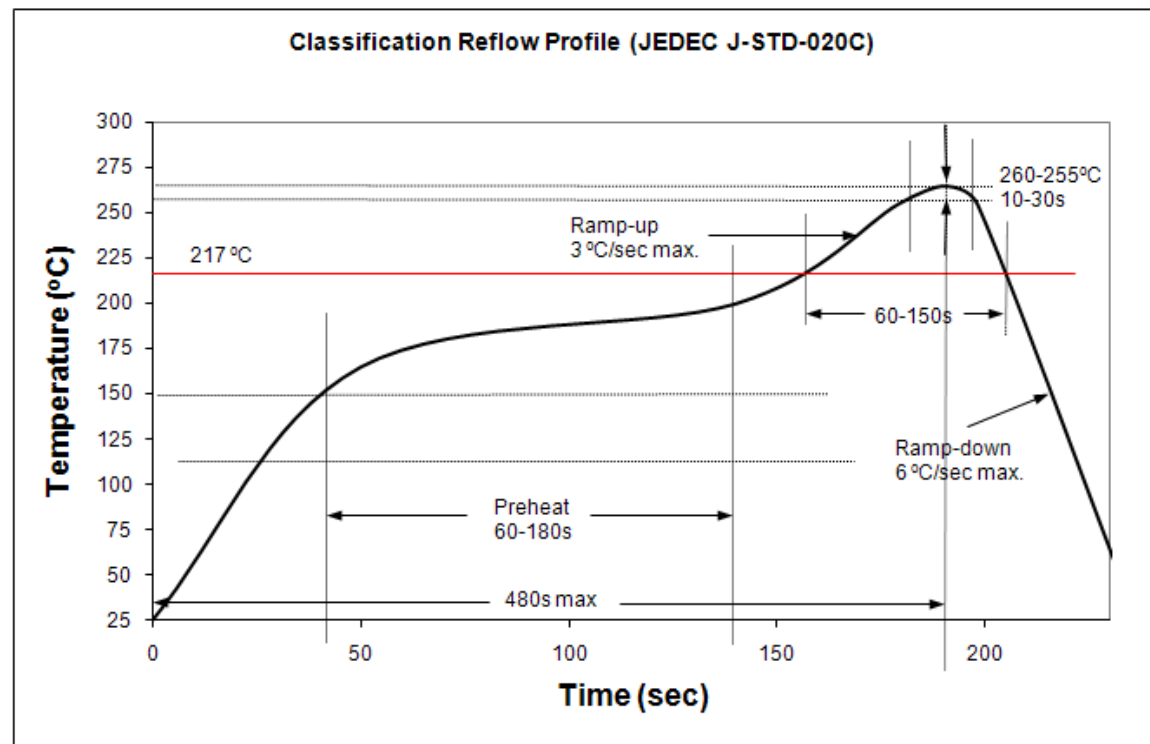
Soldering Reflow

- Soldering of the SMD LEDs should conform to the soldering condition in the individual specifications.
- SMD LEDs are designed for reflow soldering.
- In the reflow soldering, too high temperature and too large temperature gradient such as rapid heating/cooling may cause electrical & optical failures and damages of the devices.
- Lumens cannot guarantee the LEDs after they have been assembled using the solder dipping method.

12) Recommended Pb IR-Reflow Soldering Profile.



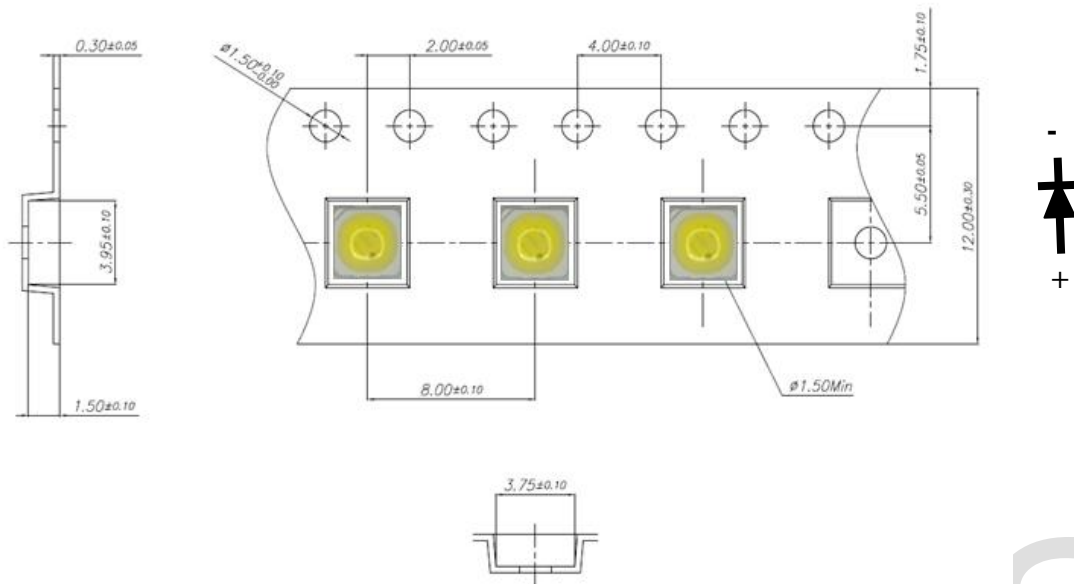
13) Recommended Pb Free IR-Reflow Soldering Profile.



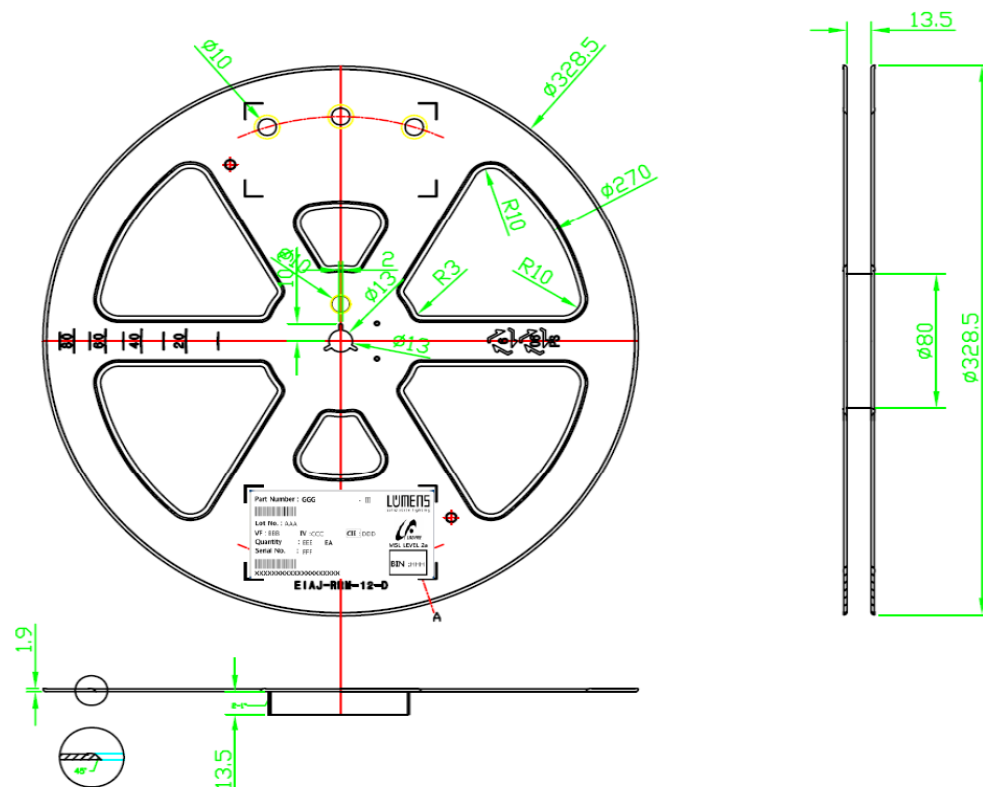
14) Taping And Orientation.

1. Moisture proof bag.
2. 1 Reel/bag.
3. Q'ty: 1,000(Max)/reel.

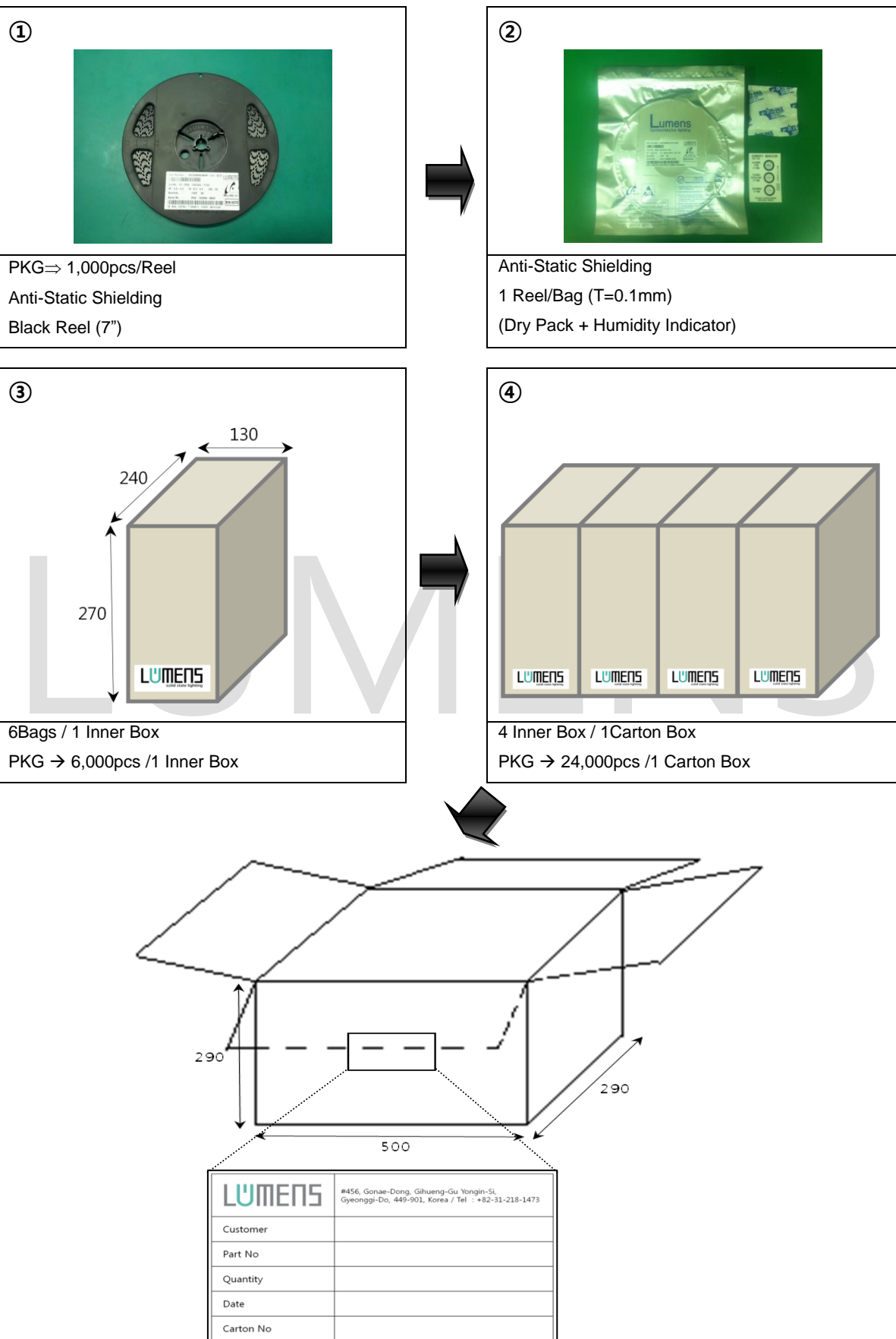
Carrier tape Dimension>



Reel Dimension>






15) Packaging Specification



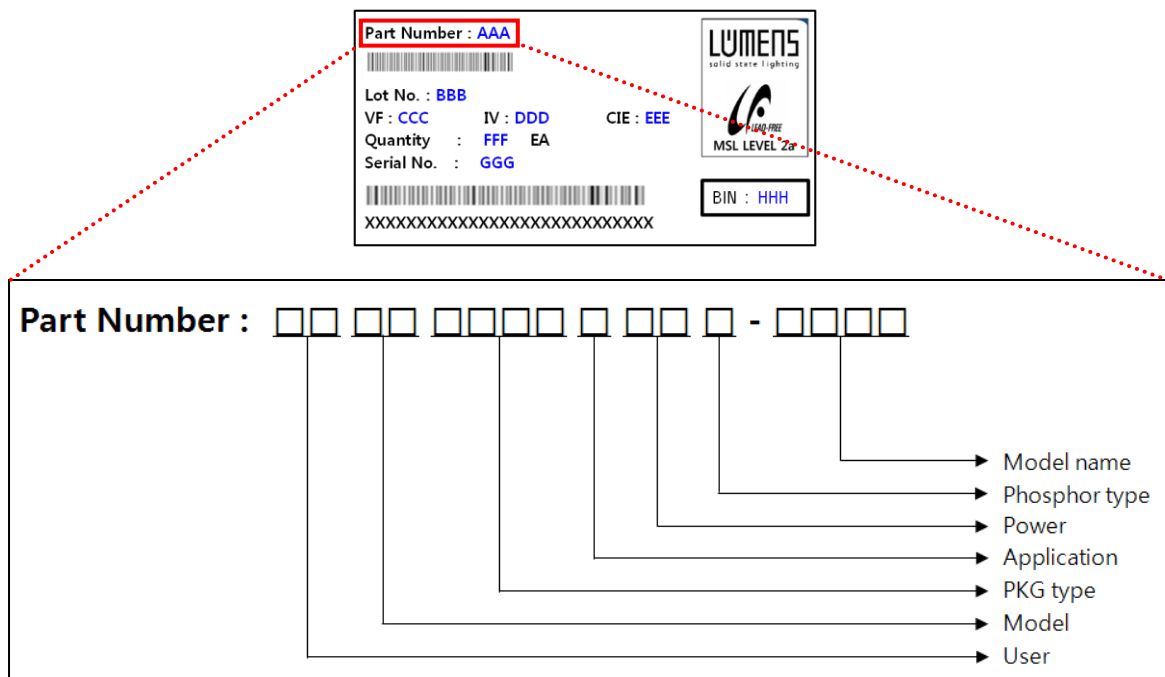
16) Label Format and Serial Number

(1) Label format




Part Number : AAA		
		
Lot No. : BBB		
VF : CCC IV : DDD CIE : EEE		
Quantity : FFF EA		
Serial No. : GGG		<div style="border: 1px solid black; padding: 2px;">BIN : HHH</div>
		
XXXXXXXXXXXXXXXXXXXXXXXXXXXX		

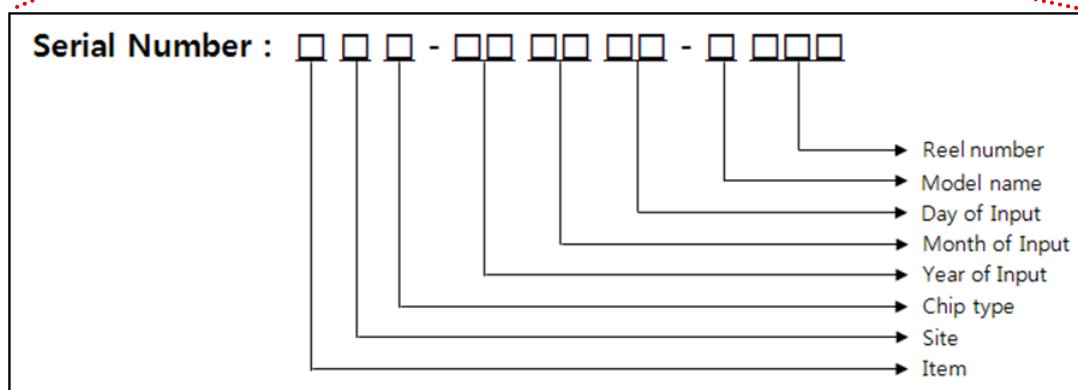
- AAA : Part Number
- BBB : Lot Number
- CCC : Forward Voltage (V)
- DDD : Brightness of LEDs (cd/mcd, lm/mlm)
- EEE : CIE Rank
- FFF : Quantity of LEDs (ea)
- GGG : Serial Number
- HHH : BIN Number

(1) Part Number



(3) Serial Number

Part Number : AAA		 solid state Lighting  LEAD-FREE MSL LEVEL 2a	
Lot No. : BBB			
VF : CCC	IV : DDD		CIE : EEE
Quantity : FFF	EA		
Serial No. : GGG			
 XXXXXXXXXXXXXXXXXXXXXXXXXXXX		BIN : HHH	



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17) Cautions

- 1 Moisture-Proof Package
 - 1.1 When moisture is absorbed into the LED package it may vaporize and expand products during soldering. There is a possibility that this may cause exfoliation of the contacts and damage to the optical characteristics of the LEDs. For this reason, the moisture-proof package is used to keep moisture to a minimum in the package.
 - 1.2 A package of a moisture-absorbent material (silica gel) is inserted into the shielding bag. The humidity indicator card changes its color from blue to pink as it absorbs moisture.
- 2 Current limiting
 - 2.1 A resistor should be used to limit current spikes that can be caused by voltage fluctuations.
 - 2.2 Otherwise damage could occur.
- 3 Iron Soldering
 - 3.1 Hand soldering is not recommended for regular production. These guidelines are for rework only.
 - 3.2 Soldering iron tip should contact each terminal no more than 3 sec at 350°C, using soldering iron with nominal power less than 25W. Allow min. 2 sec. between soldering intervals.
- 4 Storage Conditions
 - 4.1 Before opening the package: The LEDs should be kept at 30°C or less and 60%RH or less. The LEDs should be used within a year. When storing the LEDs, moisture-proof packaging with moisture-absorbent material (silica gel) is recommended.
 - 4.2 After opening the package: The LEDs should be kept at 30°C or less and 60%RH or less. The LEDs should be soldered within 168 hours (7 days) after opening the package. If unused LEDs remain, they should be stored in moisture-proof packages, such as sealed containers with packages of moisture-absorbent material (silica gel). It is also recommended to return the LEDs to the original moisture-proof bag and to reseal the moisture-proof bag again.
 - 4.3 If the moisture-absorbent material (silica gel) has faded away or the LEDs have exceeded the recommended storage time, baking treatment should be performed using the following conditions. Baking treatment: more than 24 hours at 65±5°C
 - 4.4 Lumens LED electrode sections are comprised of a silver-plated copper alloy. The silver surface may be affected by environments which contain corrosive gases and so on. Please avoid condition which may cause difficulty environments during soldering operations. It is recommended that the User use the LEDs as soon as possible.
 - 4.5 Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.
- 5 Usage
 - 5.1 Do not exceed the values given in this specification.

NOTE :

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