

# APPROVAL SHEET

<b>MODEL NAME</b>	<b>SMD LED, TOP VIEW</b>
<b>PART NUMBER</b>	<b>A5A1CECEMPY</b>
<b>CUSTOMER NAME</b>	
<b>DATE</b>	<b>2014. 07.14</b>
<b>REMARK</b>	<b>Rev.03</b>

## [ CUSTOMER APPROVAL ]

APPROVAL NO.				
APPROVAL DATE				
APPROVAL	INSPECTOR	CHECK	APPROVAL	COMMENT

## [ VENDOR APPROVAL ]

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

## **Lumens semiconductor lighting CO., LTD.**

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## 1. Revision note

[illegible]

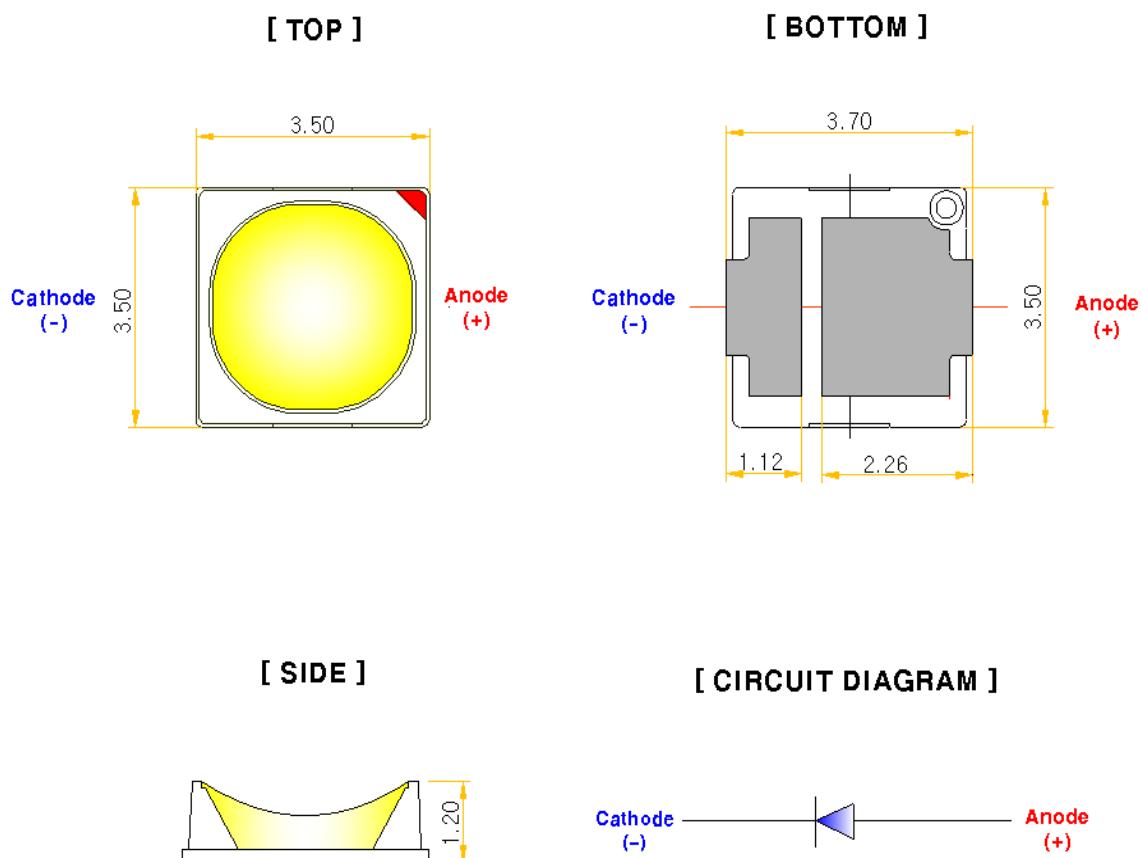
## 2. DATA SHEET

Model name	SMD LED
Part number	A5A1CECEMPY
Package	PLCC type
Color	Yellow
Application	Automotive, General lighting

### 1) Dimension

- High brightness Cool white-color surface mount LED.
- 115° 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.

Unit : mm



## 2) Material Composition

Item	Material
LED Chip	AlGaAs / AlGaInP
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
		Yellow	
DC forward current	I <sub>F</sub>	150	mA
Pulse current; (t <sub>p</sub> ≤ 10 ms, Duty cycle = 1/10)	I <sub>FP</sub>	200	mA
Power dissipation ( at room temperature )	P <sub>DL</sub>	380	mW
Reverse voltage	V <sub>R</sub>	10	V
Operating temperature.	T <sub>OPR</sub>	-40 ~ +100	°C
Storage temperature.	T <sub>STG</sub>	-40 ~ +100	°C
Soldering Temperature	T <sub>SOL</sub>	Reflow Soldering : 260 °C / 10s Hand Soldering : 320 °C / 3s	°C
Chip junction temperature.	T <sub>j</sub>	≤ 125	°C

\* I<sub>FP</sub> conditions : Pulse Width 10msec, and duty 1/10

## 4) Thermal Characteristics. (Ta=25 °C)

Item	Symbol	Typical	Unit
Heat resistance (R <sub>th</sub> )	R <sub>js</sub>	22	°C/W
	R <sub>ja</sub>	38	°C/W

\* R<sub>js</sub> = Heat resistance from Junction to Slug temperature (T<sub>s</sub>)

\* R<sub>ja</sub> = Heat resistance from Junction to ambient temperature (T<sub>a</sub>)

\* Using Lumens standard circuit board MPCB, T=1.6mm, Copper foil t=1/2 OZ

5) **Electrical & Optical Characteristics. (Ta=25°C)**

Item	Symbol	Rank	Min.	Typ.	Max.	Condition	Unit
Luminous Intensity	Iv	A	5.6		5.9	IF=150mA	cd
		B	5.9		6.2		
		C	6.2		6.5		
		D	6.5		6.8		
		E	6.8		7.1		
		F	7.1		7.4		
		G	7.4		7.7		
		H	7.7		8.0		
Wavelength	$\lambda_D$	a	586		588	IF=150mA	nm
		b	588		590		
		c	590		592		
Viewing Angle	2 $\theta$ 1/2	ALL	-	115	-	IF=150mA	deg
Forward Voltage	Vf	1	2.0		2.2	IF=150mA	V
		2	2.2		2.4	IF=150mA	V
		3	2.4		2.6	IF=150mA	V

1. Luminous intensity is measured by **CAS-140** of Instrument System Co.
2. Luminous intensity is measured with an accuracy of  $\pm 3.0\%$ .
3. Forward voltage, Vf is measured with an accuracy of  $\pm 0.1$  V

6) **Rank of full color LED. (Ta=25℃)**

**Total IV Rank**

RANK	Unit	IF=150mA	
		MIN	MAX
A	cd	5.6	5.9
B		5.9	6.2
C		6.2	6.5
D		6.5	6.8
E		6.8	7.1
F		7.1	7.4
G		7.4	7.7
H		7.7	8.0

**Wavelength Rank**

RANK	Unit	IF=150mA	
		MIN	MIN
a	nm	586	588
b		588	590
c		590	592

If color binning is required, only one color group is allowed for each chip within a reel.  
Wavelength groups are measured with an accuracy of  $\pm 1.0\text{nm}$ .

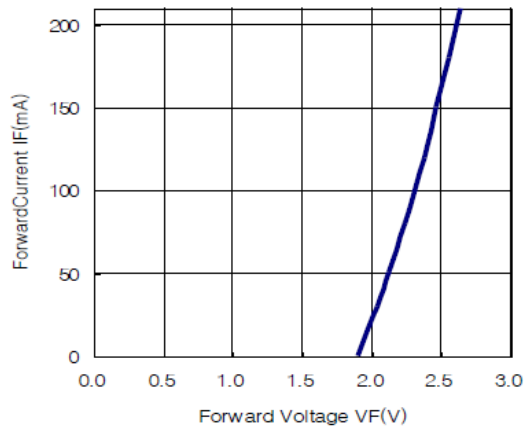
**Voltage Rank**

RANK	Unit	IF=150mA	
		MIN	MIN
1	V	2.0	2.2
2		2.2	2.4
3		2.4	2.6

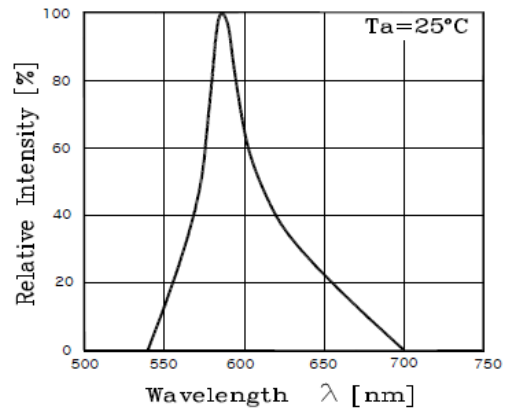
\* Voltages are tested at a current pulse duration of 1 ms and accuracy of 0.05V.

7) **Optical and electrical characteristics. (Ta=25°C)**

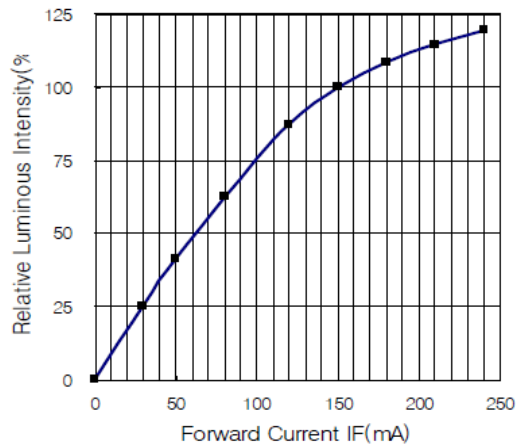
Forward current vs. forward voltage.



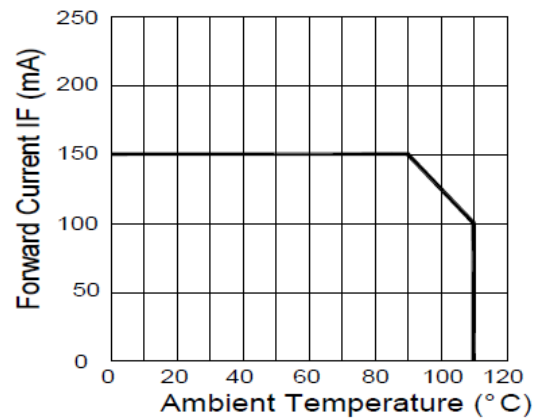
Relative Spectra Emission



Relative luminous intensity vs. forward current.

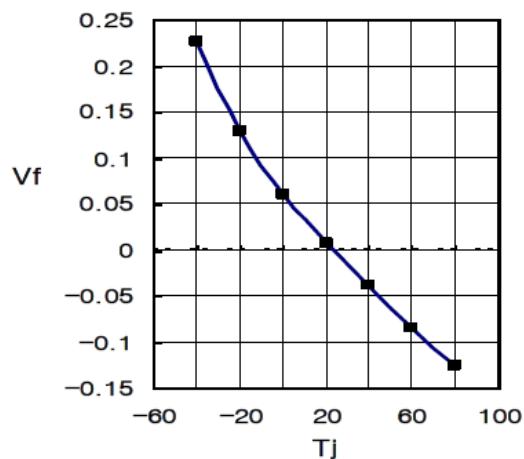


Relative Forward current vs. Ambient temperature



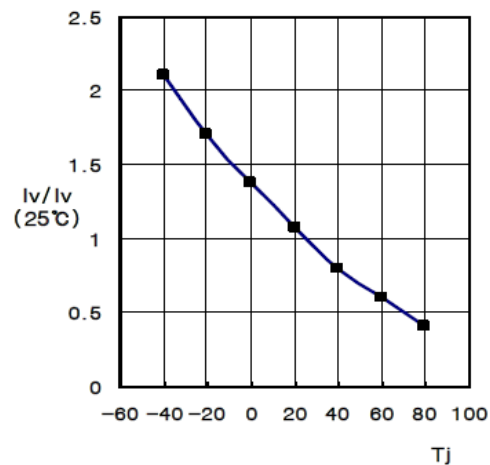
Relative Forward Voltage

$$V_F = V_F - V_{F(25^\circ\text{C})} = \beta(T_j); I_F = 150 \text{ mA}$$

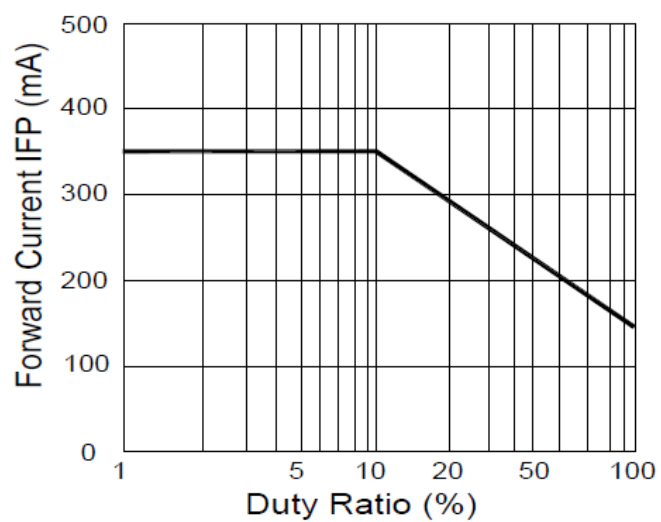


Relative Luminous Intensity

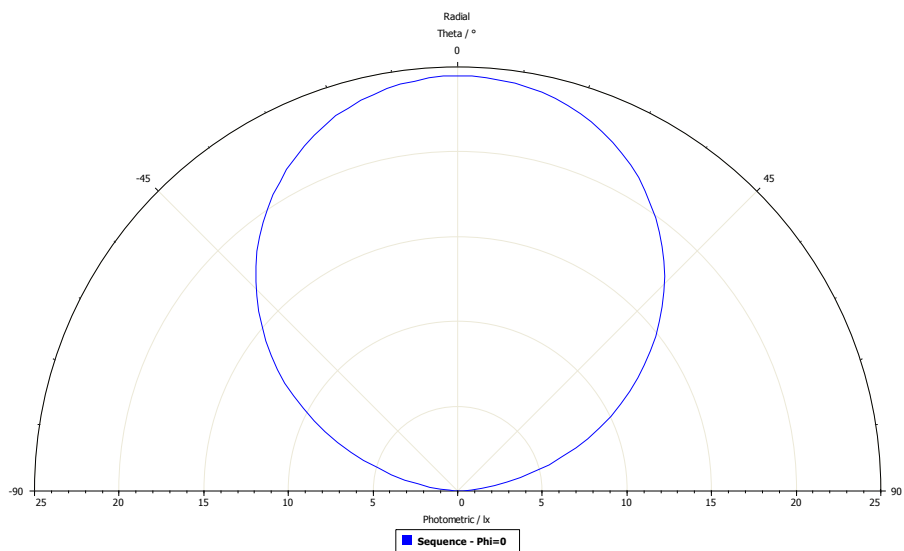
$$I_v = I_v - I_{v(25^\circ\text{C})} = \beta(T_j); I_F = 150 \text{ mA}$$



### Duty Ratio vs. Allowable Forward Current



### Radiation pattern





## 8) 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 <sup>(1)</sup> × 1.2
Luminous Intensity	$I_v$	$I_F = 150\text{mA}$	LSL <sup>(2)</sup> × 0.5	-

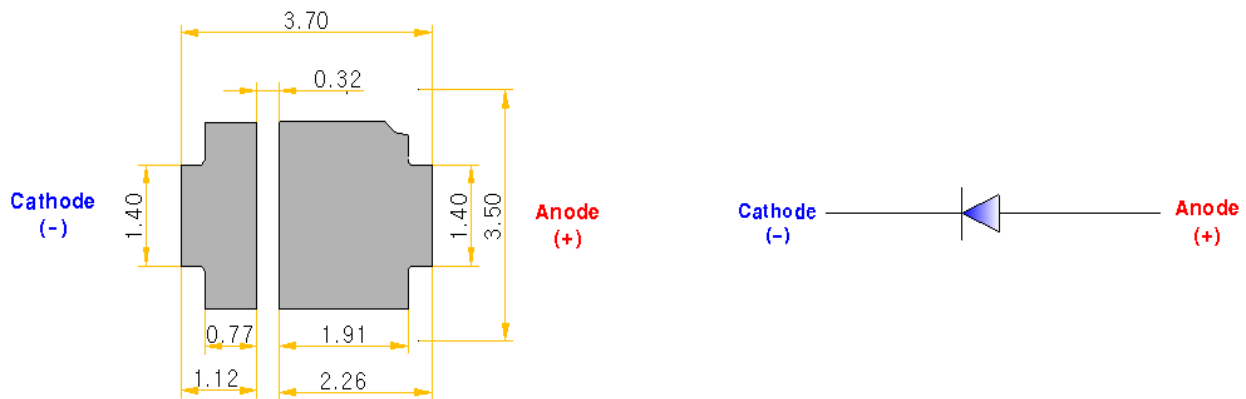
### \*\* Note

(1) USL : Upper Standard Level

(2) LSL : Lower Standard Level

## 9) 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.

## 10) Recommended Soldering Temperature – Time Profile (Reflow Soldering)

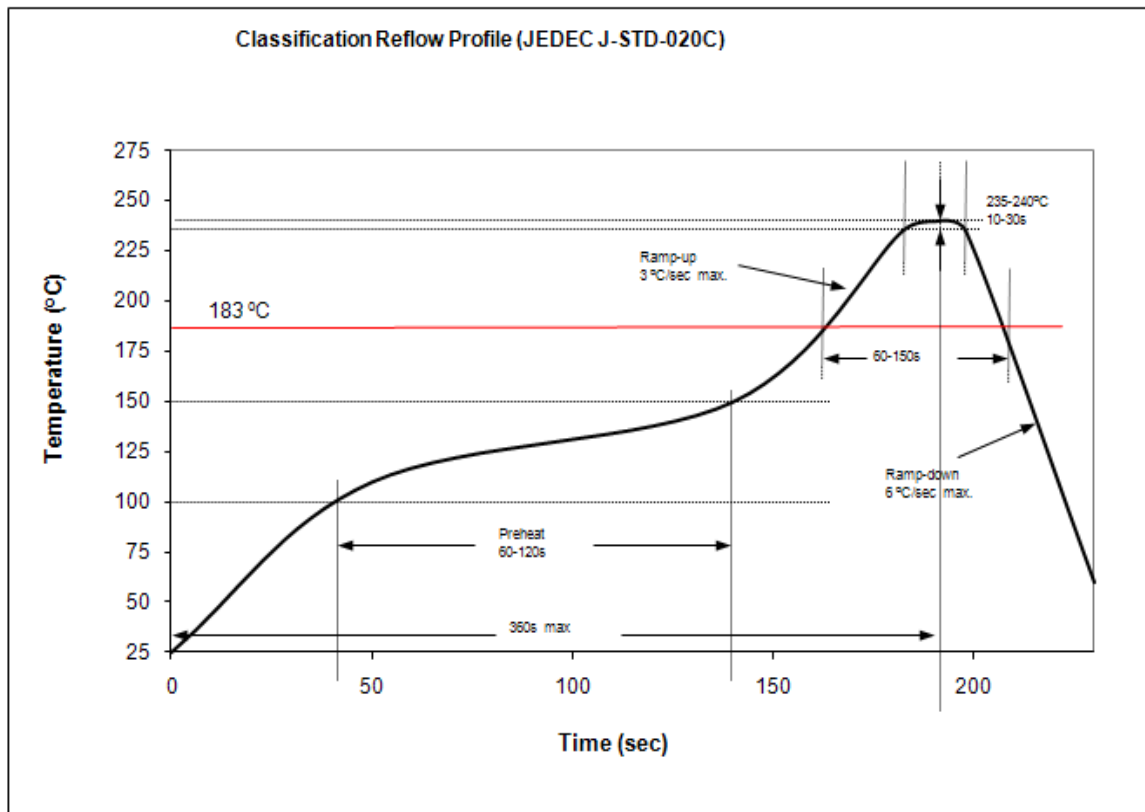
### Surface Mounting Condition

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.

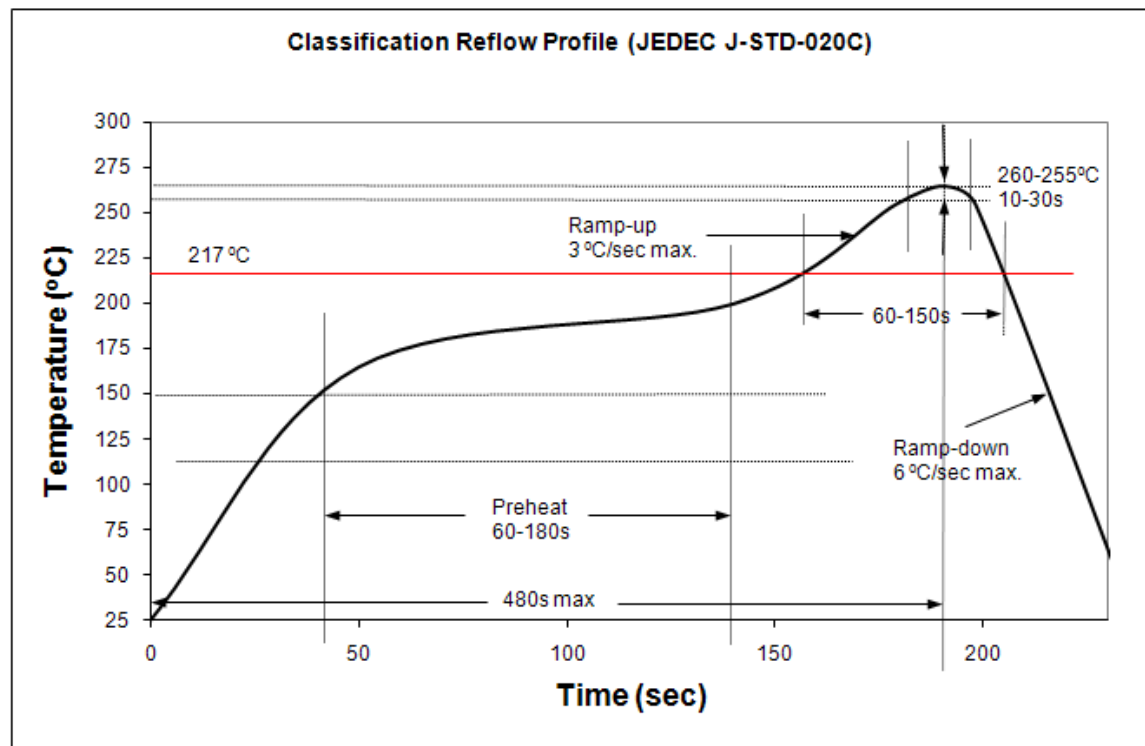
### Soldering Reflow

- 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.

**11) Recommended Pb IR-Reflow Soldering Profile.**

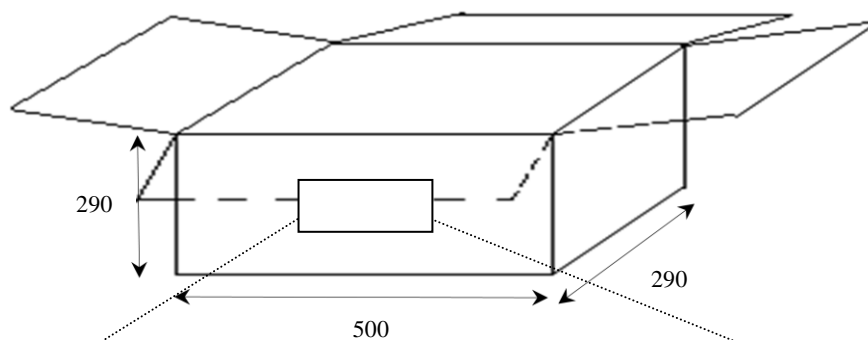
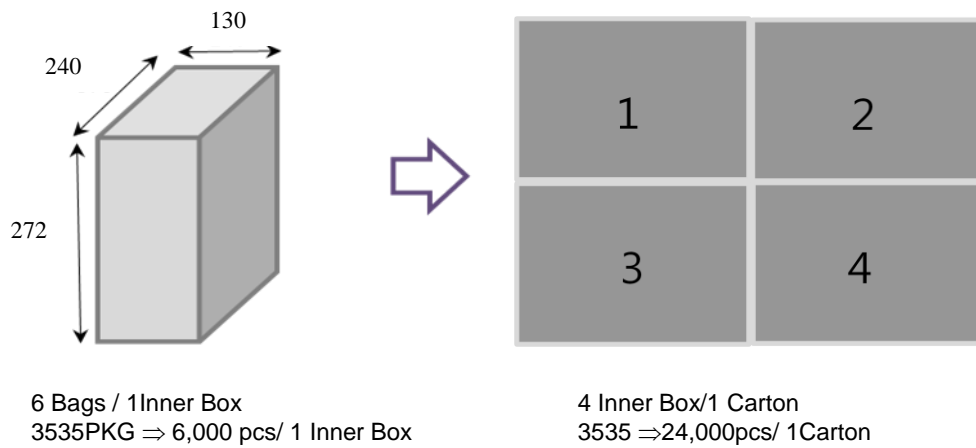
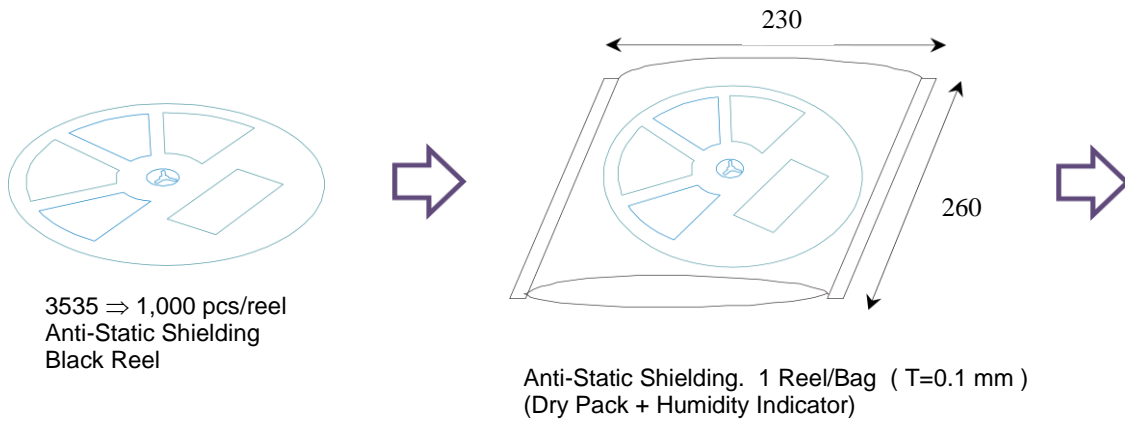


**12) Recommended Pb Free IR-Reflow Soldering Profile.**





#### 14) Packaging Specification



<b>LUMENS</b>	#456, Gonae-Dong, Gihueng-Gu Yongin-Si, Gyeonggi-Do, 449-901, Korea / Tel : +82-31-218-1473
Customer	
Part No	
Quantity	
Date	
Carton No	

## 15) 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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