

# SPECIFICATION

MODEL : SPHWHTL3D303E6P0H5

[Approved Rank :  $V_F(E6)$ , CCT(P0),  $Im_V(H5)$ ]

## 3535 Ceramic PKG



CUSTOMER :		
DRAWN	CHECKED	APPROVED
PRELIMINARY		

SAMSUNG LED		
DRAWN	CHECKED	APPROVED

**SAMSUNG LED CO.,LTD.**314, MAETAN3-DONG, YEONGTONG-GU,  
SUWON-City, GYEONGGI-DO, KOREA,443-743

**Contents**

1. Product Outline	-----	3
2. Absolute Maximum Rating	-----	3
3. Characteristics	-----	3
4. Typical Characteristics Graph	-----	6
5. Outline Drawing & Dimension	-----	7
6. Reliability Test Items & Conditions	-----	8
7. Solder Conditions	-----	9
8. Taping Dimension	-----	10
9. Label Structure	-----	11
10. Lot Number	-----	11
11. Reel Packing Structure	-----	12
12. Aluminium Packing Bag	-----	13
13. Precaution For Use	-----	14
14. Hazard Substance Analysis	-----	15
15. Revision History	-----	18

## 1. Product Outline

- . Ceramic Package ( 3.5 x 3.5 x 1.89t mm )
- . Wide Viewing Angle (  $\Delta\theta$  : 125° x 125° ) for uniform illuminance
- . InGaN/GaN MQW LED with Long-time Reliability
- . Lead (Pb) free product – RoHS compliant

## 2. Absolute Maximum Rating

- 1) Operation Forward Current (  $T_a = 25^\circ\text{C}$  ) ..... 1500 mA
- 2) Thermal Resistance (  $R_{th,j-c}$  ) ..... 6.1  $^\circ\text{C}/\text{W}$
- 3) LED Junction Temperature (  $T_J$  ) ..... 150 $^\circ\text{C}$
- 4) Operating Temperature Range (  $T_{opr}$  ) ..... -40 $^\circ\text{C}$  ~ 85 $^\circ\text{C}$
- 5) Storage Temperature Range (  $T_{stg}$  ) ..... -40 $^\circ\text{C}$  ~ 100 $^\circ\text{C}$

## 3. Characteristics

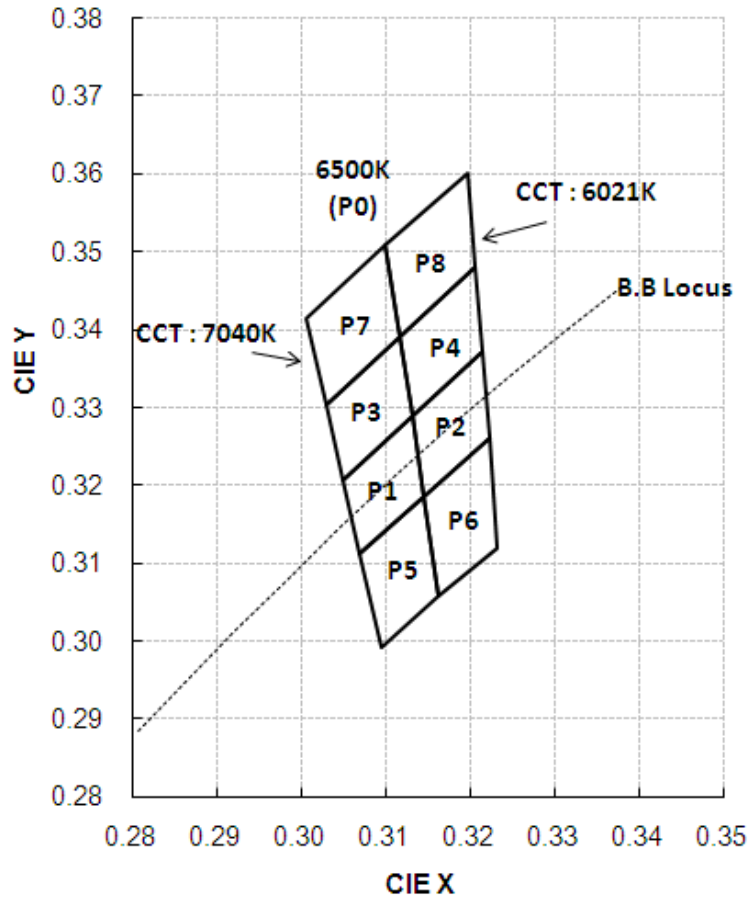
- 1) Electro-Optical characteristics

(  $T_a : 25^\circ\text{C}$  )

CCT(K)	Item	Unit	Condition	Rank	Min	Typ	Max
500K	Luminous Flux	lm	$I_F = 350\text{ mA}$	H5	110	-	160
	Forward Voltage ( $V_F$ )	V		E6	2.7	-	3.3
	CRI			-	70	-	-
	Viewing Angle	$^\circ$		-	-	125 $^\circ$	-
	Size	mm		3.5 x 3.5 x 1.89			

2) Chromaticity Diagram

( T<sub>a</sub> : 25°C )



3) Chromaticity Coordinates

TABLE	Rank	CIE X	CIE Y	Rank	CIE X	CIE Y
6500K (P0)	P1	0.3068	0.3113	P5	0.3093	0.2993
		0.3144	0.3186		0.3161	0.3059
		0.3130	0.3290		0.3144	0.3186
		0.3048	0.3207		0.3068	0.3113
	P2	0.3144	0.3186	P6	0.3161	0.3059
		0.3221	0.3261		0.3231	0.3120
		0.3213	0.3373		0.3221	0.3261
		0.3130	0.3290		0.3144	0.3186
	P3	0.3048	0.3207	P7	0.3028	0.3304
		0.3130	0.3290		0.3115	0.3391
		0.3115	0.3391		0.3099	0.3509
		0.3028	0.3304		0.3005	0.3415
	Q4	0.3130	0.3290	P8	0.3115	0.3391
		0.3213	0.3373		0.3205	0.3481
		0.3205	0.3481		0.3196	0.3602
		0.3115	0.3391		0.3099	0.3509

## 4) VF Rank

Parameter	Symbol	Condition	Rank	Rank	Min.	Typ.	Max.
Forward Voltage	$V_F$	$I_F = 350\text{mA}$	E6	E3	2.7	-	3.0
				H3	3.0	-	3.3

## 5) Luminous flux Rank

Parameter	Symbol	Condition	Rank	Rank	Min.	Typ.	Max.
Luminous Flux	$\Phi_V$	$I_F = 350\text{mA}$	H5	H1	110	-	120
				J1	120	-	130
				K1	130	-	140
				M1	140	-	150
				N1	150	-	160

## Notes:

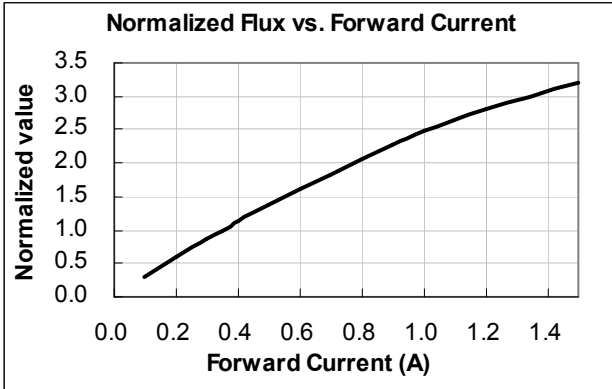
- 1) Samsung LED has  $\pm 7\%$  tolerance of flux measurements
- 2) Samsung LED has  $\pm 0.1\text{V}$  tolerance of forward voltage measurements
- 3) Samsung LED has  $\pm 3.0$  tolerance of CRI measurements
- 4) Samsung LED has  $\pm 0.01$  tolerance of CCx, CCy
- 5) Samsung LED has  $\pm 0.13\text{mm}$  tolerance on device dimensions.

PRELIMINARY

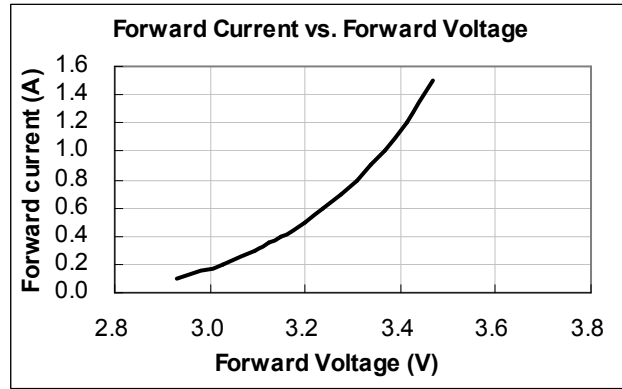
## 4. Typical Characteristics Graph

( $T_a = 25^\circ\text{C}$ )

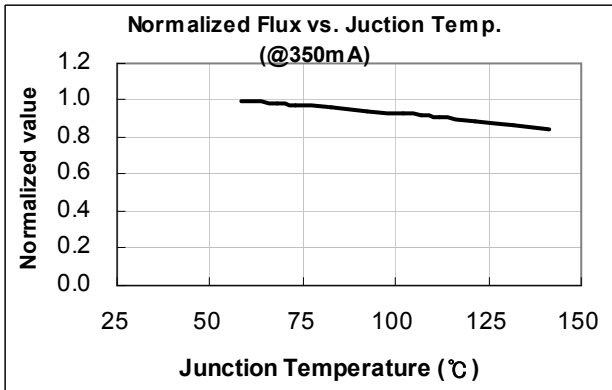
**Normalized Flux vs. Forward Current**



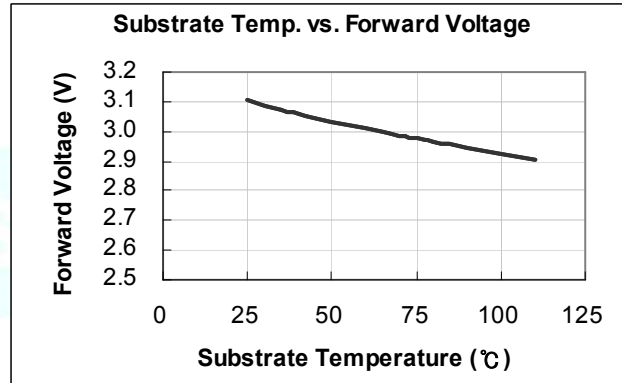
**Forward Current vs. Forward Voltage**



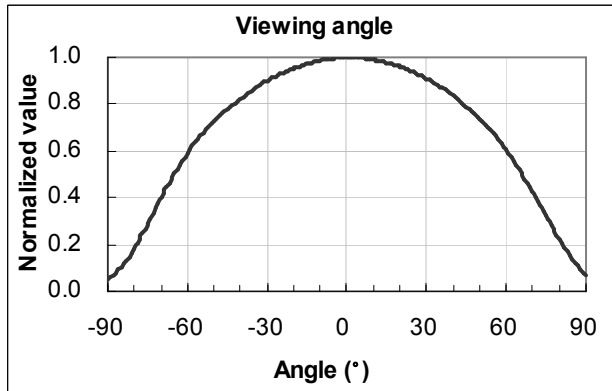
**Normalized Flux vs. Junction Temp.**



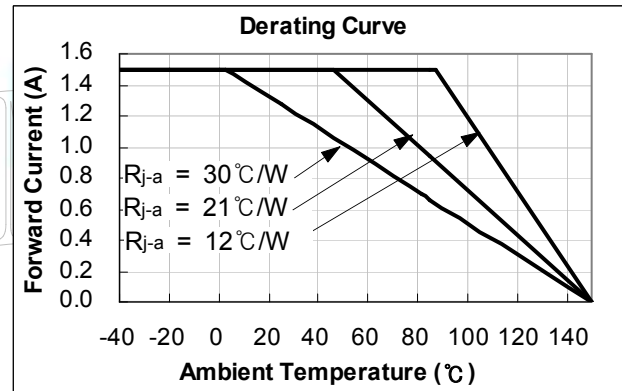
**Substrate Temp. vs. Forward Voltage**



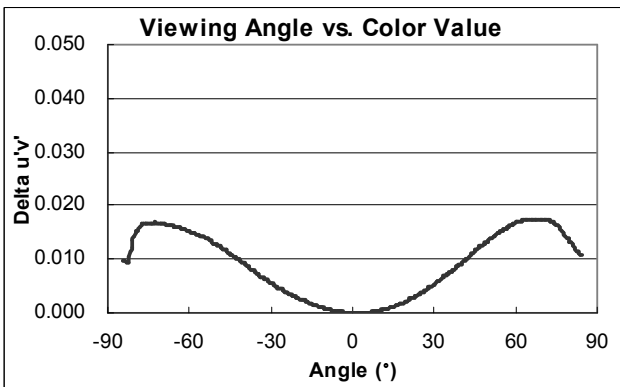
**Viewing Angle**



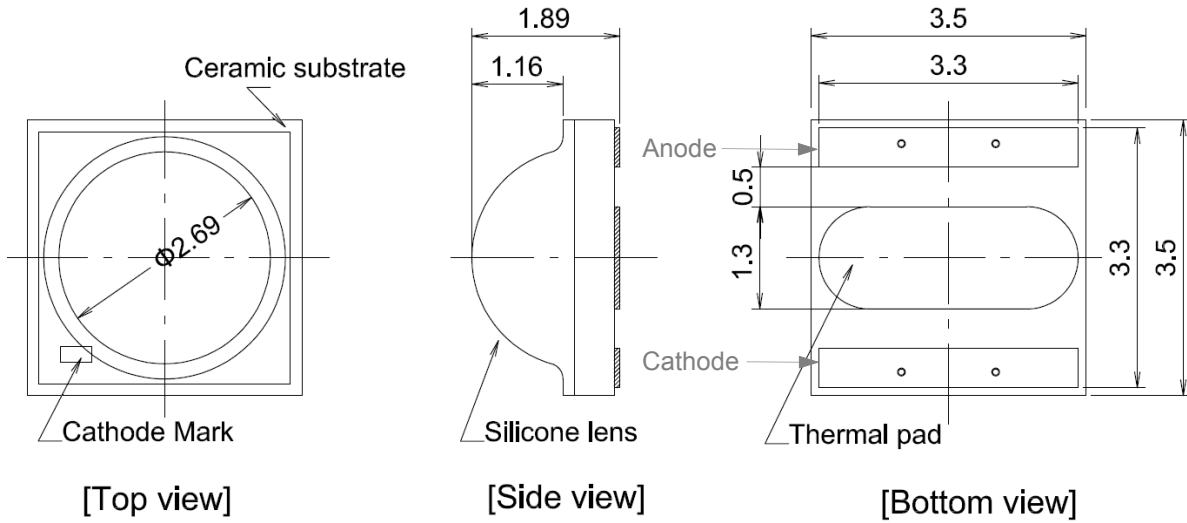
**Derating Curve**



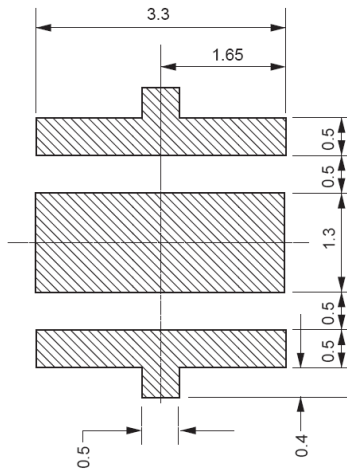
**Viewing angle vs. Color Value**



### 5. Outline Drawing & Dimension



#### Recommended Land Pattern

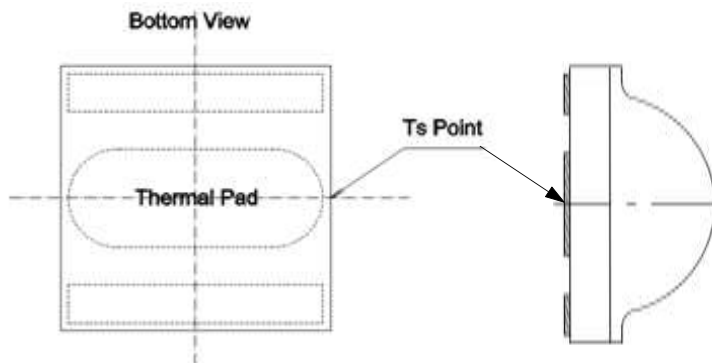


unit : mm  
Tolerance : ± 0.13

- \* This LED has built-in ESD protection device(s) connected in parallel to LED Chip(s).
- \* The thermal pad is electrically isolated from the anode and cathode contact pads.

#### Ts Point & Measurement Method

- \* Measure the nearest point to the thermal pad as shown below. If necessary, remove PSR of PCB to reach Ts point.
- \* Thermal pad must be soldered to the PCB to dissipate heat properly. Otherwise, LED can be damaged.



## 6. Reliability Test Items and Conditions

### 1) Test Items and Results

Test Items	Test Conditions	Test Hours/Cycles
Room Temperature Life Test	25℃, DC 700 mA	1000 Hr
High Temperature humidity Life Test	85℃, 85%, DC 600 mA	1000 Hr
High Temperature Life Test	85℃, DC 600 mA	1000 Hr
Low Temperature Life Test	-40℃, DC 700 mA	1000 Hr
Temperature Humidity Cycle	-10℃ ↔ 25℃ 95%RH ↔ 85℃ 95%RH 350mA, 95%RH, 24hrs/1cycle	10 Cycles
Thermal Shock	-45 ℃/15 min ↔ 125 ℃/ 15 min. Temp.change within 5min.	200 Cycles
High Temperature Storage	Ta=120℃	1000 Hr
Low Temperature Storage	Ta=-40℃	1000 Hr
ESD(HBM)	R1=10MΩ, R2=1.5KΩ, C=100pF, V=±5KV, 5Times	5 Times (±5kV)

### 2) Criteria for Judging the Damage

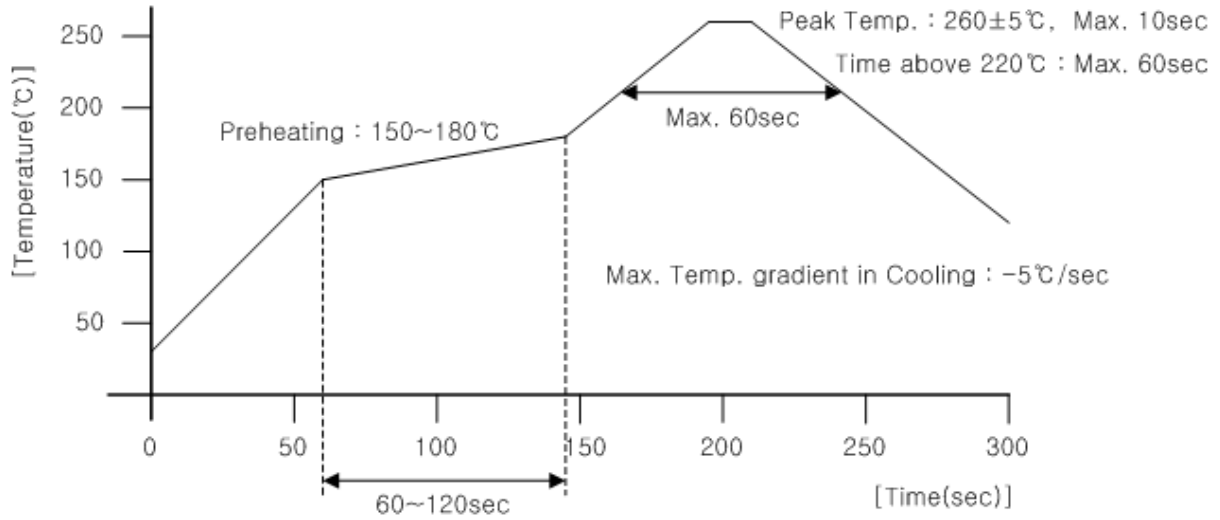
Item	Symbol	Test Condition [T <sub>a</sub> = 25℃]	Limit	
			Min.	Max.
Forward Voltage	V <sub>F</sub>	350 mA	-	U.S.L. * 1.2
Luminous flux	Im	350 mA	L.S.L. * 0.7	-

\* U.S.L. : Upper Standard Level    L.S.L. : Lower Standard Level

## 7. Solder Conditions

### 1) Reflow Conditions ( Pb Free )

Reflow Frequency : 2 times max.

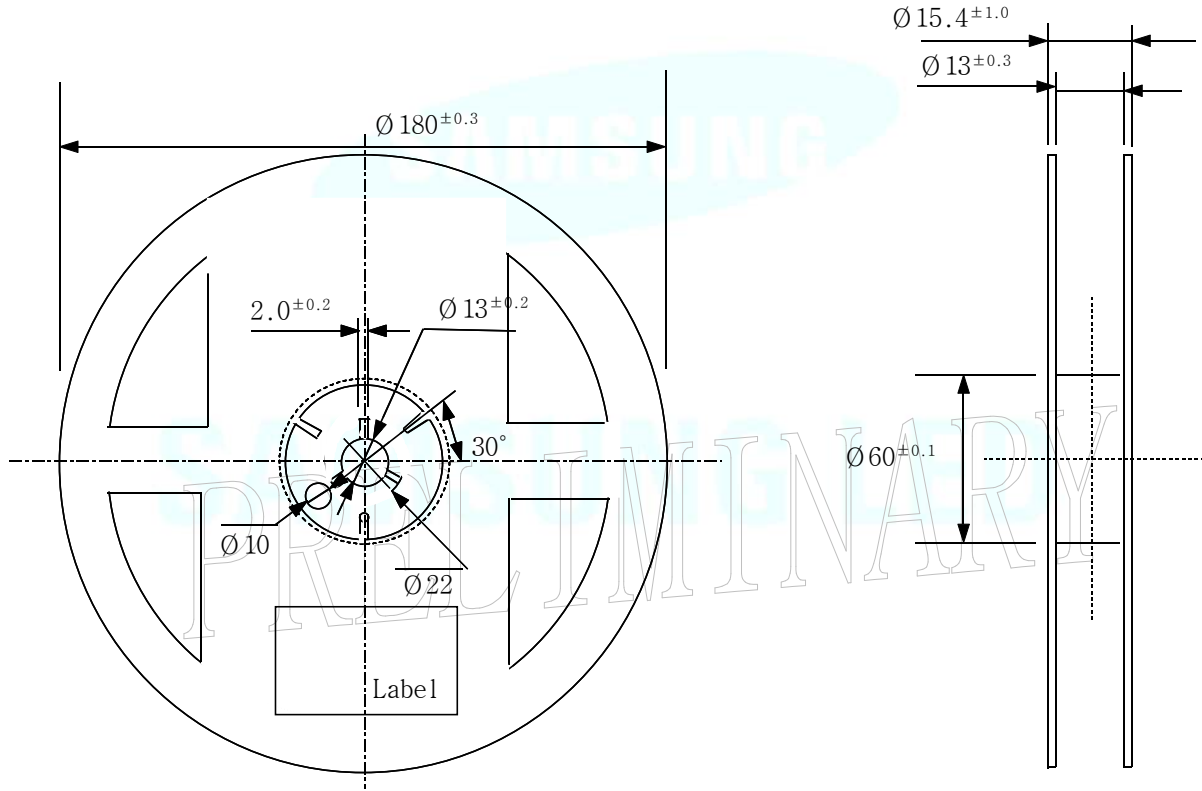
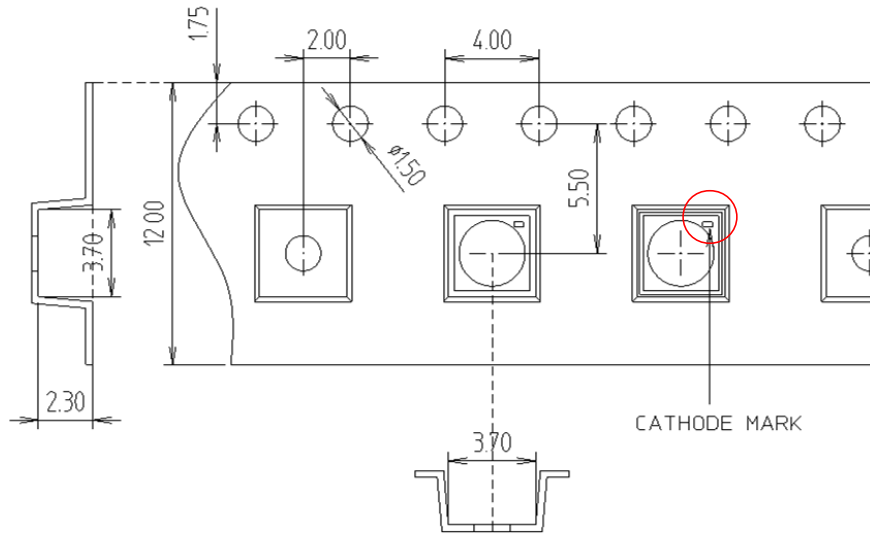


### 2) For Manual Soldering

Not more than 5 seconds @Max. 300°C, under soldering iron.

PRELIMINARY

## 8. Taping Dimension



- (1) Quantity : The quantity/reel to be 1,000 pcs.
- (2) Cumulative Tolerance : Cumulative tolerance/10 pitches to be  $\pm 0.2$  mm
- (3) Adhesion Strength of Cover Tape : Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at  $10^\circ$  angle to be the carrier tape.
- (4) Packaging : P/N, Manufacturing data code no. and quantity to be indicated on a damp proof package.

## 9. Label Structure



### Rank Code

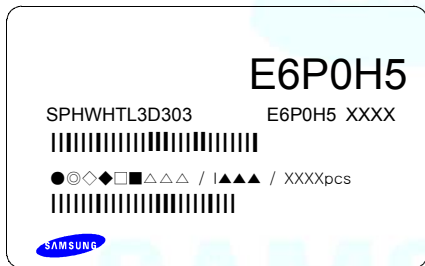
/E6/ : VF Rank (refer to page 5)

/R0/ : Chromaticity Coordinate Rank, CIE (refer to page 4)

/K3/ : Luminous Flux (refer to page 5)

## 10. Lot Number

The Lot number is composed of the following characters



●◎◇◆□▲▲▲ / ▲▲▲ / 1000PCS

- : Production Site (S:SAMSUNG LED, G:Gosin China)
- ◎ : L (LED)
- ◇ : Product State (A:Normality, B:Bulk, C:First Production, R:Reproduction, S:Sample)
- ◆ : Year (S:2008, T:2009, U:2010...)
- : Month (1 ~ 9, A, B)
- : Day (1 ~ 9, A, B ~ V)
- △ : SAMSUNG LED Product Number (1 ~ 999)
- ▲ : Reel Number (1 ~ 999)





### 13. Precaution for use

- 1) For overcurrent-protection, customers are recommended to apply resistors connected in series with the LEDs to mitigate sudden change of the forward current caused by shift of the forward voltage.
- 2) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. When cleaning is required, IPA is recommended as cleaning agent. Solvent-based cleaning agent such as Zestron<sup>(R)</sup> may damage the silicone resins used in the device.
- 3) When the device is in operation, the forward current should be carefully determined considering the maximum ambient temperature and the corresponding junction temperature.
- 4) LEDs must be stored in a clean environment. If the LEDs are to be stored for 3 months or more after being shipped from Samsung LED, they should be packed with a nitrogen-filled container.  
(Shelf life of sealed bags: 12 months, temp. 0~40°C, 0~90%RH)
- 5) After storage bag is open, device subject to soldering, solder reflow, or other high temperature processes must be:
  - a. Mounted within 672 hours (28 days) at an assembly line with a condition of no more than 30°C/60%RH.
  - b. Stored at <10% RH.
- 6) Repack unused Products with anti-moisture packing, fold to close any opening and then store in a dry place.
- 7) Devices require baking before mounting, if humidity card reading reaches 60% at 23±5°C.
- 8) Devices must be baked for 1hours at 60±5°C, if baking is required.
- 9) The LEDs are sensitive to the static electricity and surge current. It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs.  
If voltage exceeding the absolute maximum rating is applied to LEDs, it may cause damage or even destruction to LED devices.  
Damaged LEDs may show some unusual characteristics such as increase in leakage current, lowered turn-on voltage, or abnormal lighting of LEDs at low current.

# 14. Hazard Substance Analysis

**Test Report No.** F690501/LF-CTSAYAA11-02162**Issued Date:** January 21, 2011

Page 1 of 5

**To:** SAMSUNG LED CO., LTD.  
 314, Maetan-dong  
 Yeongtong-gu  
 Suwon-city  
 GYEONGGI-DO 443-370  
 Korea

The following merchandise was submitted and identified by the client as :

**SGS File No.** : AYAA11-02162  
**Product Name** : 3535 Ceramic PKG  
**Item No./Part No.** : N/A  
**Received Date** : Jan 18, 2011  
**Test Period** : Jan 19, 2011 to Jan 20, 2011  
**Test Performed** : SGS Testing Korea tested the sample(s) selected by applicant with following results  
**Test Results** : For further details, please refer to following page(s)  
**Comments** : By the applicant's specific request, the sampling and testing was performed only for the part indicated in the photo without disassembly.

Timothy Jeon  
 Jinhee Kim  
 Cindy Park  
 Jerry Jung/ Testing Person

SGS Testing Korea Co. Ltd.

Jeff Jang / Chemical Lab Mgr

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**Test Report No.** F690501/LF-CTSAYAA11-02162

**Issued Date:** January 21, 2011

**Page 2 of 5**

**Sample No. :** AYAA11-02162.001  
**Sample Description :** 3535 Ceramic PKG  
**Item No./Part No. :** N/A  
**Comments :** Materials are Ceramic, Silicone.

**Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321:2008, ICP	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321:2008, ICP	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321:2008, ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to IEC 62321:2008, UV-VIS	1	N.D.

**Flame Retardants-PBBs/PBDEs**

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.

**NOTE:** (1) N.D. = Not detected.(<MDL)  
 (2) mg/kg = ppm  
 (3) MDL = Method Detection Limit  
 (4) - = No regulation  
 (5) \*\* = Qualitative analysis (No Unit)  
 (6) \* = Boiling-water-extraction:  
 Negative = Absence of CrVI coating  
 Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm2 sample surface area.

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**Test Report No.** F690501/LF-CTSAYAA11-02162

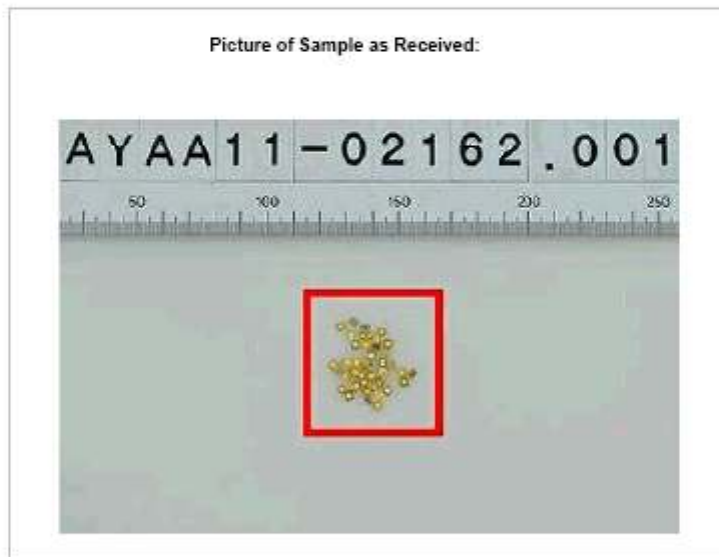
**Issued Date:** January 21, 2011

Page 3 of 5

**Sample No.** : AYAA11-02162.001  
**Sample Description** : 3535 Ceramic PKG  
**Item No./Part No.** : N/A  
**Comments** : Materials are Ceramic, Silicone.

**Halogen Contents**

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	BS EN 14582:2007 , IC	30	N.D.
Chlorine(Cl)	mg/kg	BS EN 14582:2007 , IC	30	N.D.
Fluorine(F)	mg/kg	BS EN 14582:2007 , IC	30	N.D.
Iodine(I)	mg/kg	BS EN 14582:2007 , IC	50	N.D.



**NOTE:** (1) N.D. = Not detected.(<MDL)  
 (2) mg/kg = ppm  
 (3) MDL = Method Detection Limit  
 (4) - = No regulation  
 (5) \*\* = Qualitative analysis (No Unit)  
 (6) \* = Boiling-water-extraction:  
 Negative = Absence of CrVI coating  
 Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.

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