

SPECIFICATION

MODEL : SPHWHTS6D335



[Rank : $V_F(S1, S2)$, CIE(P4, Q4, R4, S4, T4, U4, V4, W4),
 $\Phi_V(W1, X1, Y1, Z1)$]

HIGH POWER LED - SUNNIX6G

| | | |
|-------------------|---------|----------|
| CUSTOMER : | | |
| CHECKED | CHECKED | APPROVED |
| Preliminary | | |
| | | |

| | | | |
|--------------------|----------------|------------------|----------|
| SAMSUNG LED | | | |
| DRAWN | CHECKED(Sales) | CHECKED(Quality) | APPROVED |
| | | | |
| | | | |

SAMSUNG LED CO.,LTD.
314, MAETAN3-DONG, YEONGTONG-GU,
SUWON-SI, GYUNGGI-DO, KOREA, 443-743

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1. Product Outline

1) Features

- Plastic Molded Lead Frame Type : 8.0 mm, 8.0 mm, 3.9 mm
- Built In 6 LED Chips
- Beam View Angle($\Delta\theta$) : 120 °
- Lead(Pb) Free Product : RoHS Compliant

2) Applications

- General Illumination
- Down Lighting
- Decorative Lighting

2. Absolute Maximum Rating

- Operation Forward Current 250 mA
- Peak Pulsed Forward Current 350 mA
(Duty 1/10 and Pulse Width 10 msec)
- Reverse Voltage 16.5 V
- Thermal Resistance ($R_{th\ J-S}$) \cong 5 °C/W
- Operating Temperature Range (T_{OPR}) -40 °C ~ 85 °C
- Storage Temperature Range (T_{STG}) -40 °C ~ 110 °C
- LED Junction Temperature (T_J) 120 °C

3. Characteristics

1) Electrical properties ($T_a = 25\text{ °C}$)

| Parameter | Symbol | Condition | Rank | Min. | Typ. | Max. | Unit | |
|-----------------|--------|-----------------------|------|------|------|------|------|---|
| Reverse Voltage | V_R | $I_R = 5\text{ mA}$ | - | 12.0 | - | 16.5 | V | |
| Forward Voltage | V_F | $I_F = 250\text{ mA}$ | S0 | S1 | 8.9 | - | 9.7 | V |
| | | | | S2 | 9.7 | - | 10.5 | |

2) Luminous Flux ($T_a = 25\text{ °C}$)

| Rank | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------|--------|-----------------------|------|------|------|------|
| W4 | W1 | $I_F = 250\text{ mA}$ | 170 | - | 190 | lm |
| | X1 | | 190 | - | 210 | |
| | Y1 | | 210 | - | 230 | |
| | Z1 | | 230 | - | 250 | |

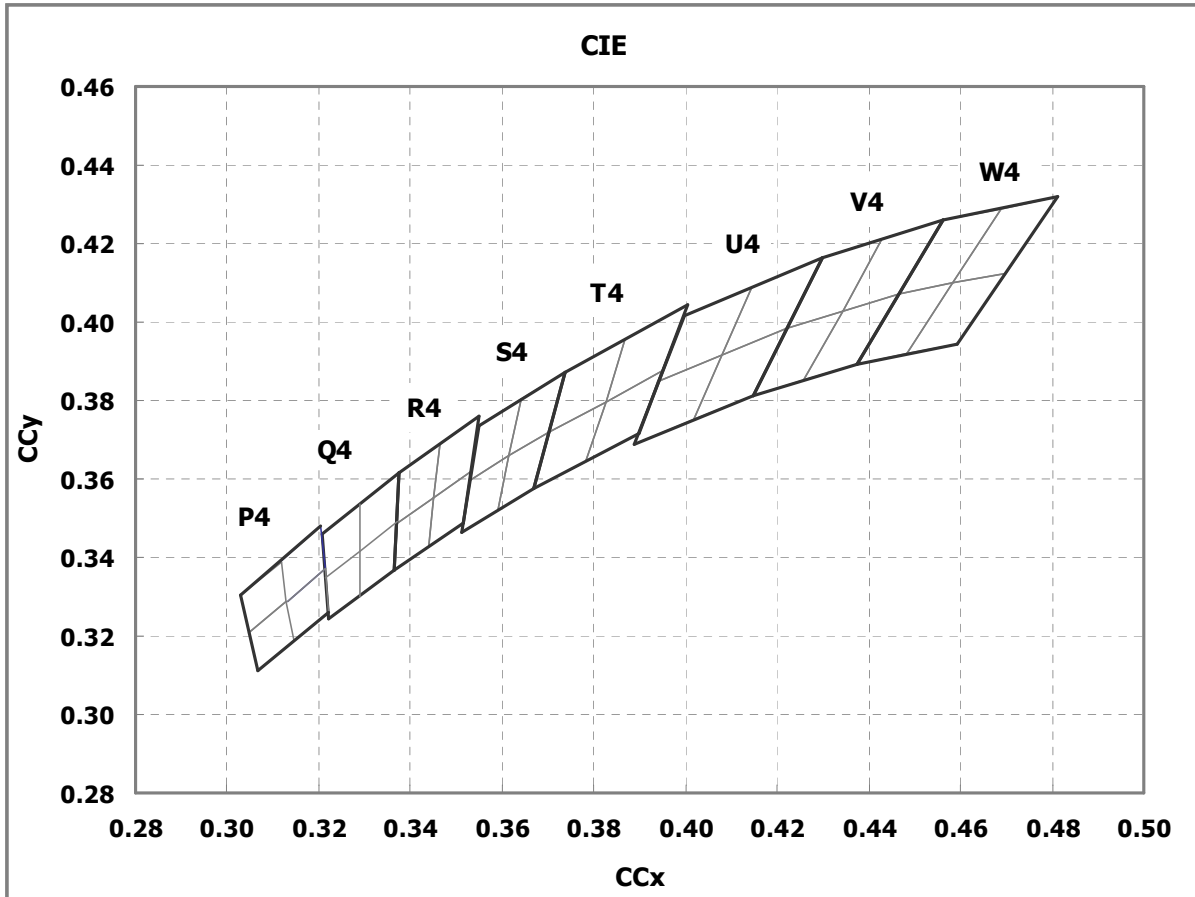
3) Chromaticity Coordinates ($T_a = 25 \text{ }^\circ\text{C}$)

| Rank | | CCT(K) | Condition | CCx | | | | CCy | | | |
|-----------|----|-------------|-------------|--------|--------|--------|--------|--------|--------|--------|--------|
| P4 | PW | 6,020~7,040 | IF = 250 mA | 0.3028 | 0.3117 | 0.3130 | 0.3048 | 0.3304 | 0.3390 | 0.3290 | 0.3209 |
| | PX | | | 0.3048 | 0.3130 | 0.3145 | 0.3068 | 0.3209 | 0.3290 | 0.3187 | 0.3113 |
| | PY | | | 0.3117 | 0.3205 | 0.3213 | 0.3131 | 0.3393 | 0.3481 | 0.3371 | 0.3290 |
| | PZ | | | 0.3131 | 0.3213 | 0.3221 | 0.3145 | 0.3290 | 0.3371 | 0.3261 | 0.3187 |
| Q4 | QW | 5,310~6,020 | IF = 250 mA | 0.3207 | 0.3290 | 0.3290 | 0.3215 | 0.3467 | 0.3538 | 0.3417 | 0.3350 |
| | QX | | | 0.3215 | 0.3290 | 0.3290 | 0.3222 | 0.3350 | 0.3417 | 0.3300 | 0.3243 |
| | QY | | | 0.3290 | 0.3376 | 0.3371 | 0.3290 | 0.3538 | 0.3616 | 0.3490 | 0.3417 |
| | QZ | | | 0.3290 | 0.3371 | 0.3366 | 0.3290 | 0.3417 | 0.3490 | 0.3369 | 0.3300 |
| R4 | RW | 4,745~5,310 | IF = 250 mA | 0.3376 | 0.3463 | 0.3451 | 0.3371 | 0.3616 | 0.3687 | 0.3554 | 0.3490 |
| | RX | | | 0.3371 | 0.3451 | 0.3440 | 0.3366 | 0.3490 | 0.3554 | 0.3428 | 0.3369 |
| | RY | | | 0.3463 | 0.3551 | 0.3533 | 0.3451 | 0.3687 | 0.3760 | 0.3620 | 0.3554 |
| | RZ | | | 0.3451 | 0.3533 | 0.3515 | 0.3440 | 0.3554 | 0.3620 | 0.3487 | 0.3428 |
| S4 | SW | 4,260~4,745 | IF = 250 mA | 0.3529 | 0.3548 | 0.3641 | 0.3615 | 0.3597 | 0.3736 | 0.3804 | 0.3659 |
| | SX | | | 0.3512 | 0.3529 | 0.3615 | 0.3590 | 0.3465 | 0.3597 | 0.3659 | 0.3521 |
| | SY | | | 0.3615 | 0.3641 | 0.3736 | 0.3702 | 0.3659 | 0.3804 | 0.3874 | 0.3722 |
| | SZ | | | 0.3590 | 0.3615 | 0.3702 | 0.3670 | 0.3521 | 0.3659 | 0.3722 | 0.3578 |
| T4 | TW | 3,710~4,260 | IF = 250 mA | 0.3702 | 0.3736 | 0.3869 | 0.3825 | 0.3722 | 0.3874 | 0.3958 | 0.3798 |
| | TX | | | 0.3670 | 0.3702 | 0.3825 | 0.3783 | 0.3578 | 0.3722 | 0.3798 | 0.3646 |
| | TY | | | 0.3825 | 0.3869 | 0.4006 | 0.3950 | 0.3798 | 0.3958 | 0.4044 | 0.3875 |
| | TZ | | | 0.3783 | 0.3825 | 0.3950 | 0.3898 | 0.3646 | 0.3798 | 0.3875 | 0.3716 |
| U4 | UW | 3,220~3,710 | IF = 250 mA | 0.3941 | 0.3996 | 0.4146 | 0.4080 | 0.3848 | 0.4015 | 0.4089 | 0.3916 |
| | UX | | | 0.3889 | 0.3941 | 0.4080 | 0.4017 | 0.3690 | 0.3848 | 0.3916 | 0.3751 |
| | UY | | | 0.4080 | 0.4146 | 0.4299 | 0.4221 | 0.3916 | 0.4089 | 0.4165 | 0.3984 |
| | UZ | | | 0.4017 | 0.4080 | 0.4221 | 0.4147 | 0.3751 | 0.3916 | 0.3984 | 0.3814 |
| V4 | VW | 2,870~3,220 | IF = 250 mA | 0.4221 | 0.4299 | 0.4430 | 0.4342 | 0.3984 | 0.4165 | 0.4212 | 0.4028 |
| | VX | | | 0.4147 | 0.4221 | 0.4342 | 0.4259 | 0.3814 | 0.3984 | 0.4028 | 0.3853 |
| | VY | | | 0.4342 | 0.4430 | 0.4562 | 0.4465 | 0.4028 | 0.4212 | 0.4260 | 0.4071 |
| | VZ | | | 0.4259 | 0.4342 | 0.4465 | 0.4373 | 0.3853 | 0.4028 | 0.4071 | 0.3893 |
| W4 | WW | 2,580~2,870 | IF = 250 mA | 0.4465 | 0.4562 | 0.4687 | 0.4582 | 0.4071 | 0.4260 | 0.4289 | 0.4099 |
| | WX | | | 0.4373 | 0.4465 | 0.4582 | 0.4483 | 0.3893 | 0.4071 | 0.4099 | 0.3919 |
| | WY | | | 0.4582 | 0.4687 | 0.4813 | 0.4700 | 0.4099 | 0.4289 | 0.4319 | 0.4126 |
| | WZ | | | 0.4483 | 0.4582 | 0.4700 | 0.4593 | 0.3919 | 0.4099 | 0.4126 | 0.3944 |

※ Tolerance : $V_F : \pm 0.1$, $\Phi_V : \pm 10 \%$, CCx CCy : ± 0.02

※ Color Rendering Index (Ra) : Typ.82

4. Chromaticity Diagram



※ Correspondence Table of CIE - Luminous Flux Rank

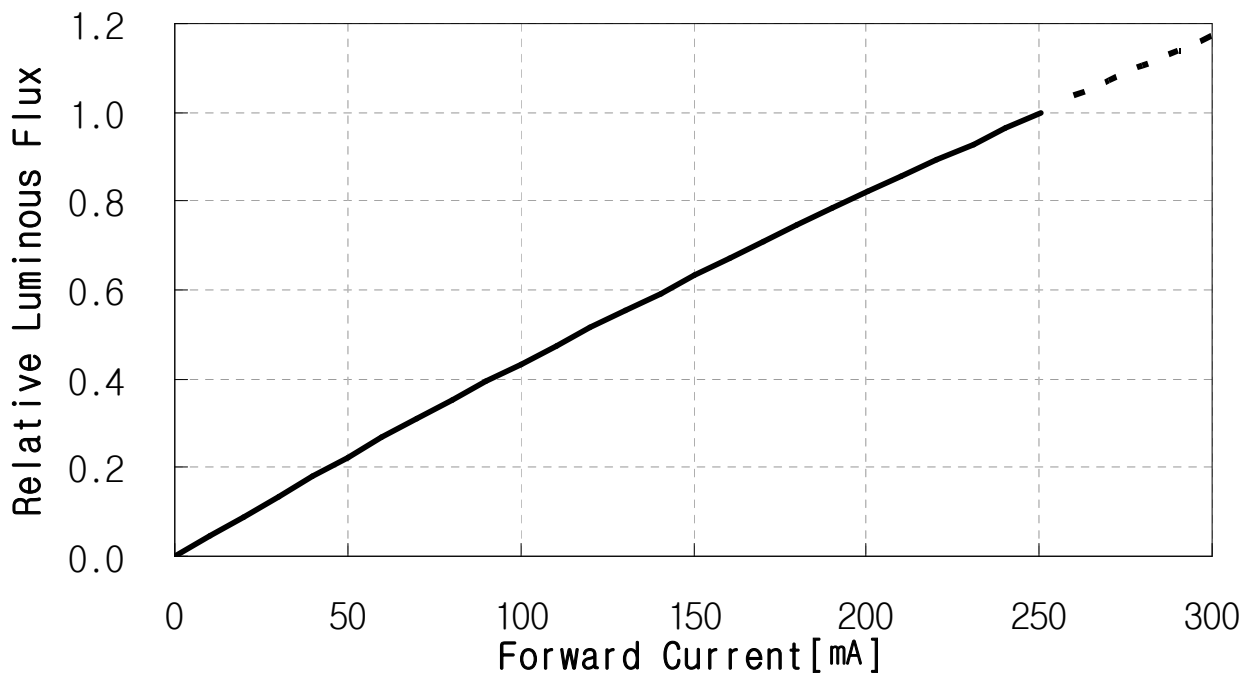
| CIE Rank | Luminous Rank | | | |
|----------|---------------|----|----|----|
| | W1 | X1 | Y1 | Z1 |
| P4 | | | | |
| Q4 | | | | |
| R4 | | | | |
| S4 | | | | |
| T4 | | | | |
| U4 | | | | |
| V4 | | | | |
| W4 | | | | |

Approved Rank

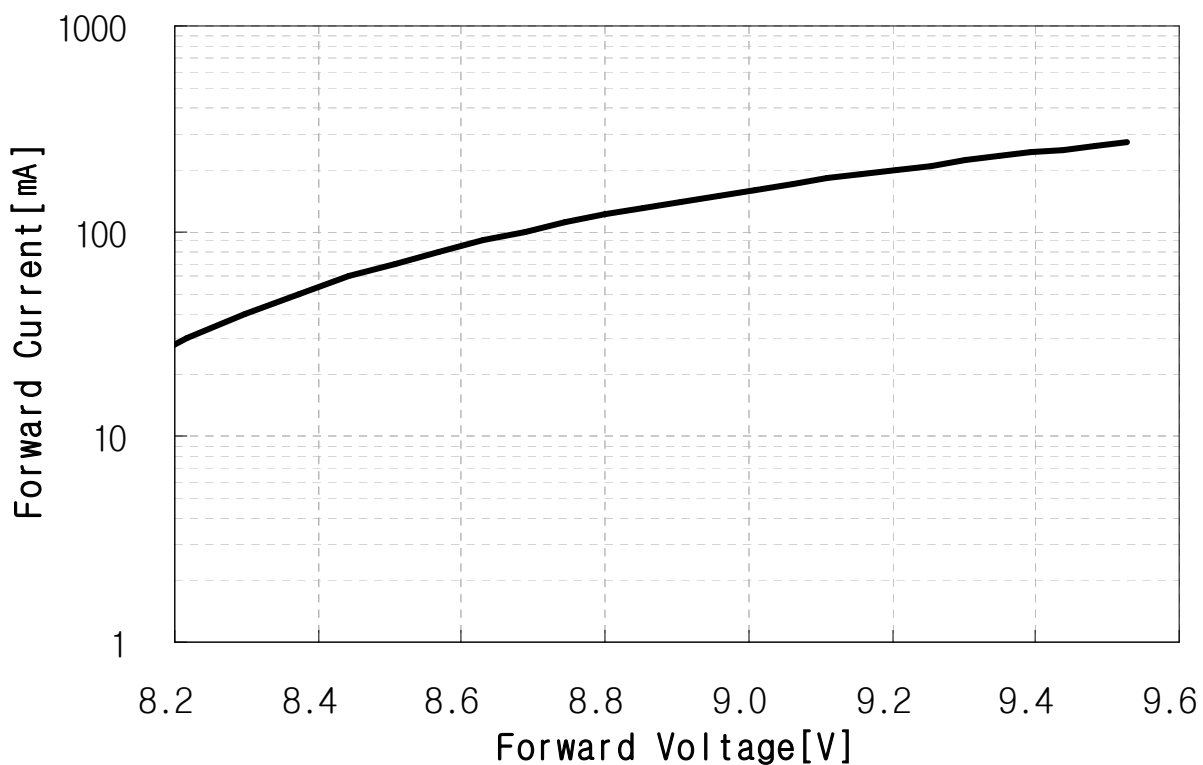
| Symbol | V _F | CIE | Φ _v |
|--------|----------------|--------------------------------|----------------|
| Rank | S1, S2 | P4, Q4, R4, S4, T4, U4, V4, W4 | W1, X1, Y1, Z1 |

5. Typical Characteristic Graphs

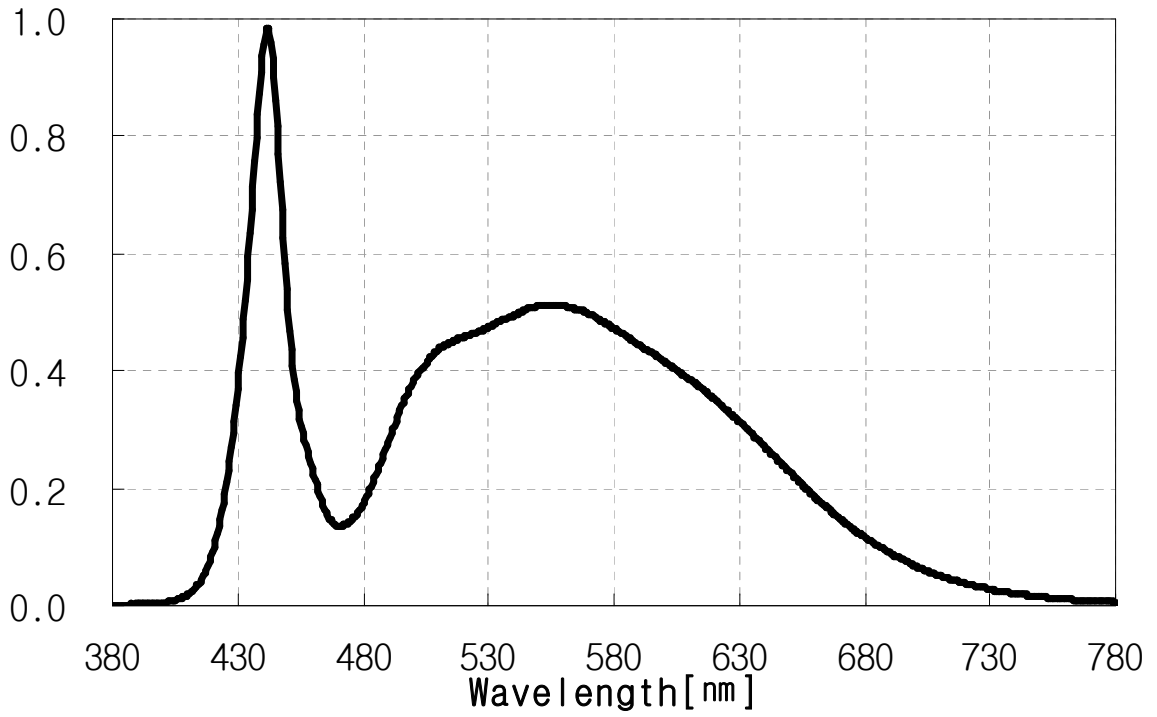
Relative Luminous Flux vs. Forward Current



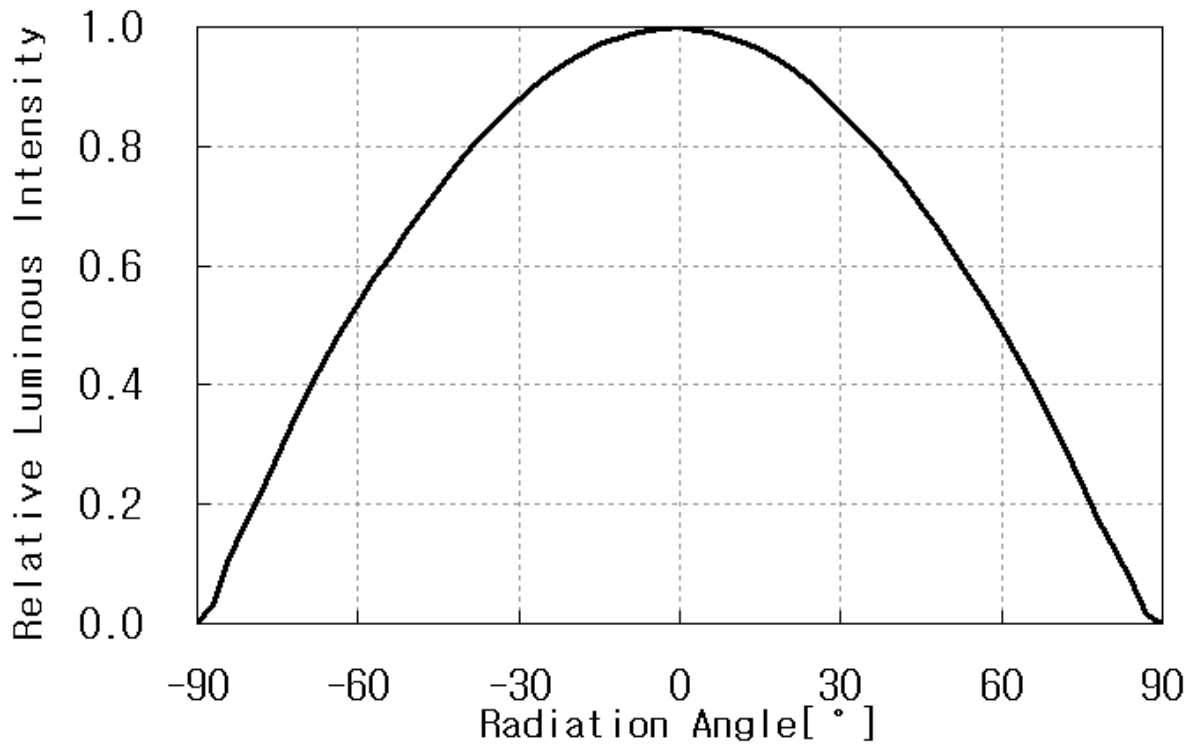
Forward Current vs. Forward Voltage



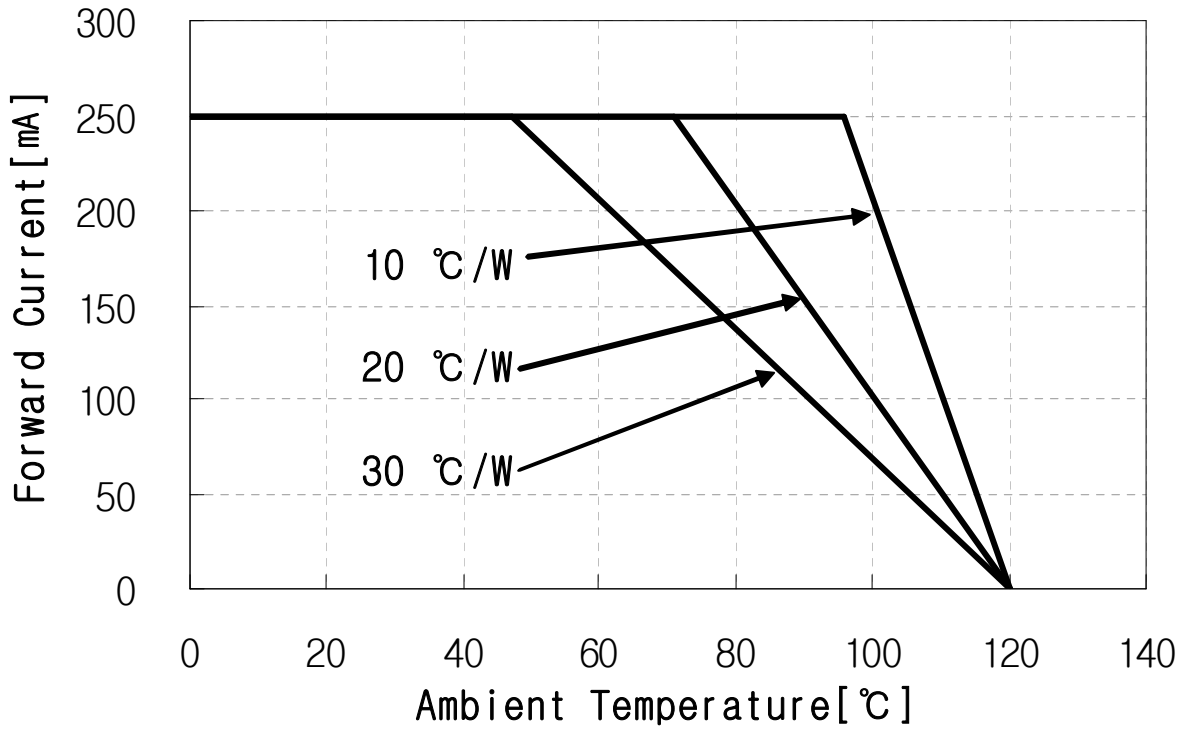
Spectrum Distribution



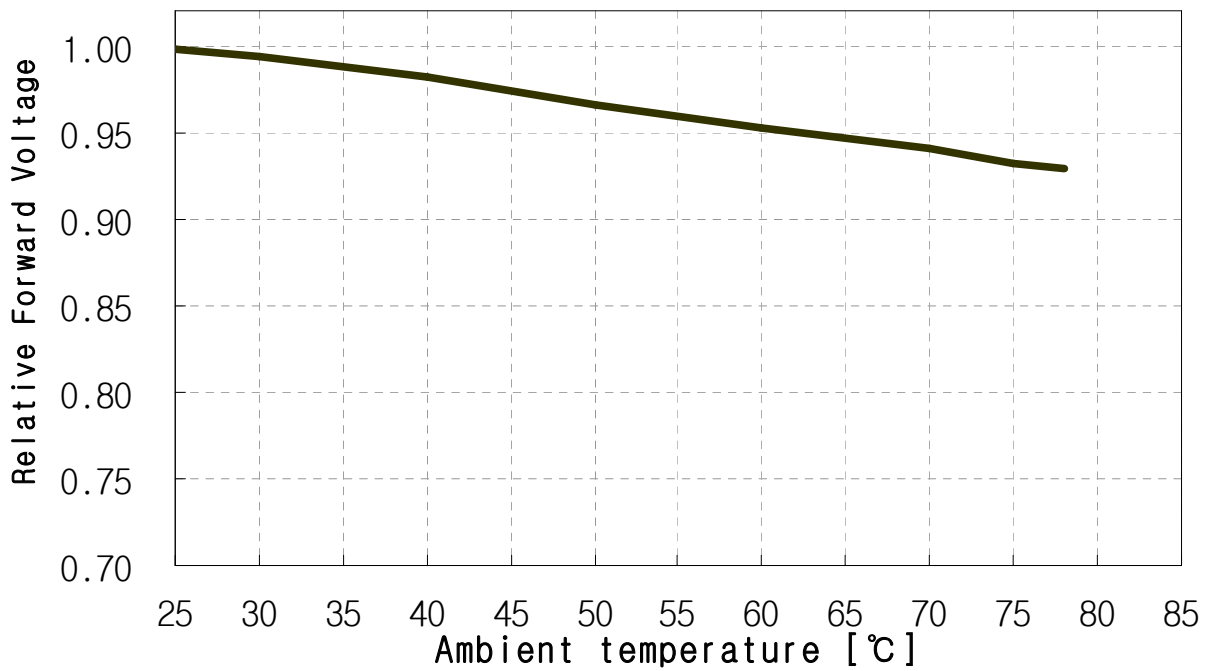
Radiation Diagram



Derating Curve for 250mA ※



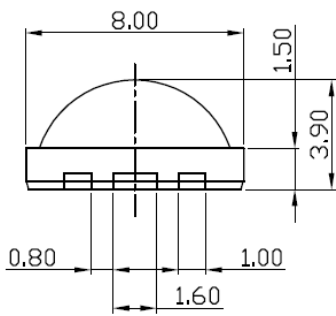
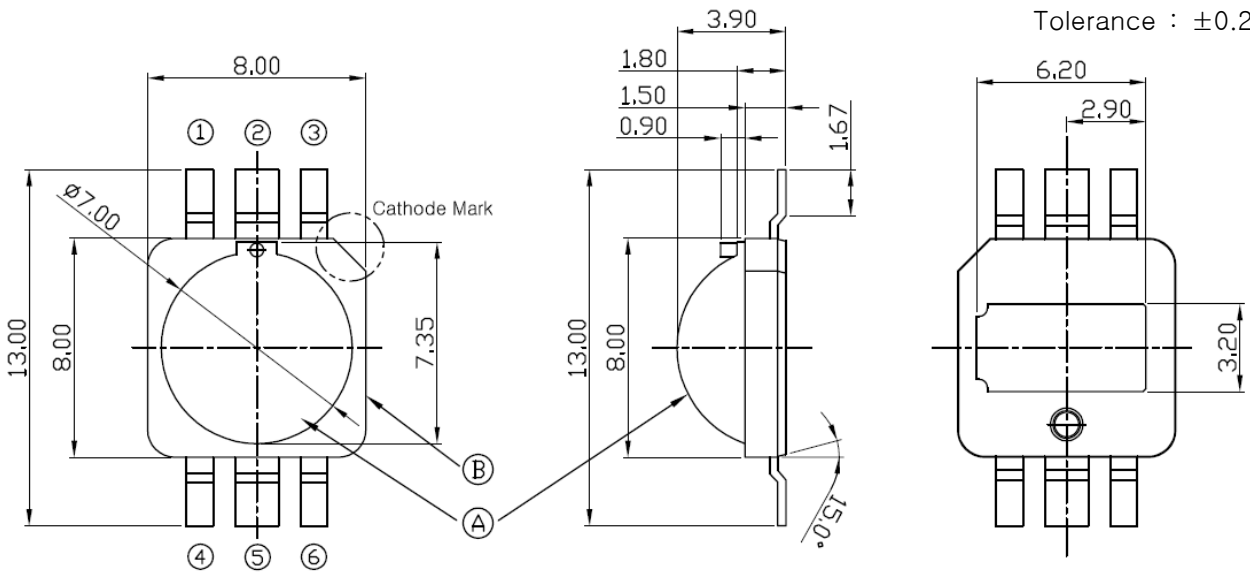
Relative Forward Voltage vs Ambient temperature



6. Outline Drawing and Dimension

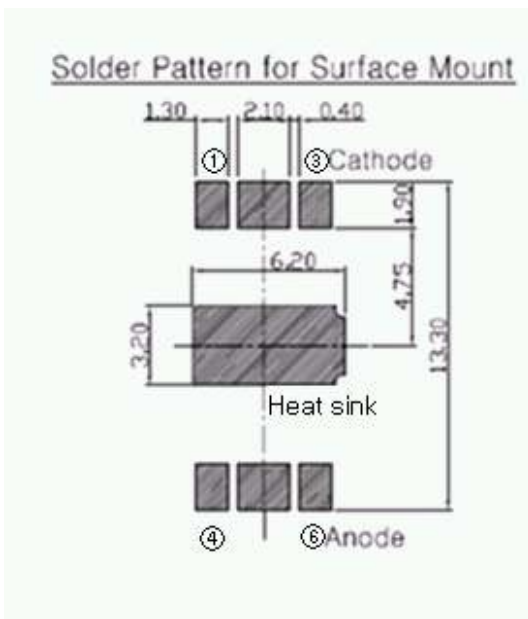
Unit : mm

Tolerance : ± 0.2



Pick and Place

1. Do not place pressure on the encapsulating resin ("A")
2. The maximum compressing force is 15N on the polymer ("B")



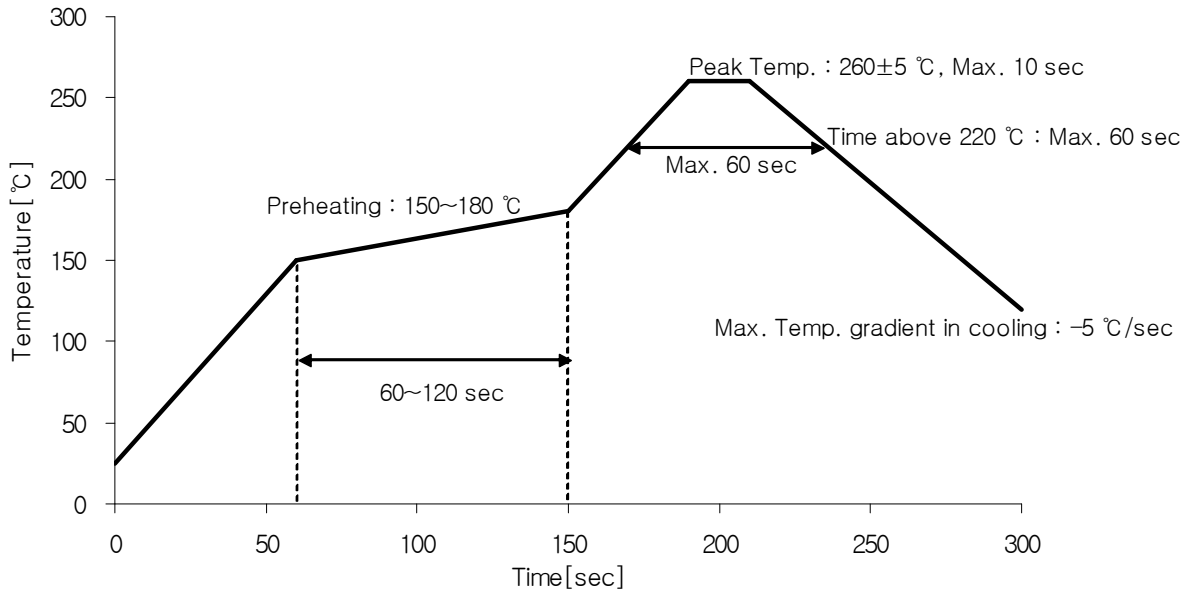
Remarks

- * Heat sink is to be soldered, If not, use the heat conductive adhesive.
- * This LED has built-in ESD protection device(s) connected in parallel to LED chip(s).

7. Solder Conditions

1) Reflow Conditions (Pb-Free)

Reflow Frequency : 2 time max.

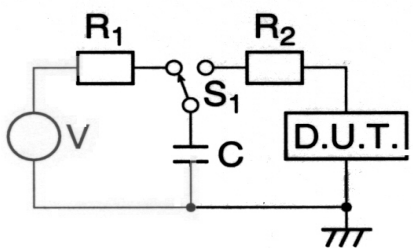


2) For Manual Soldering

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

8. Reliability Test Items and Conditions

1) Test Items

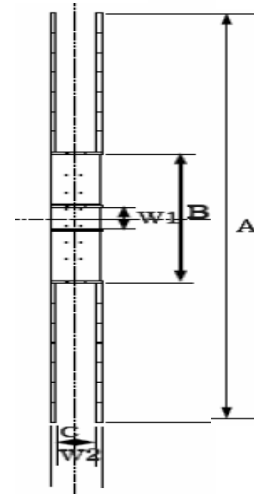
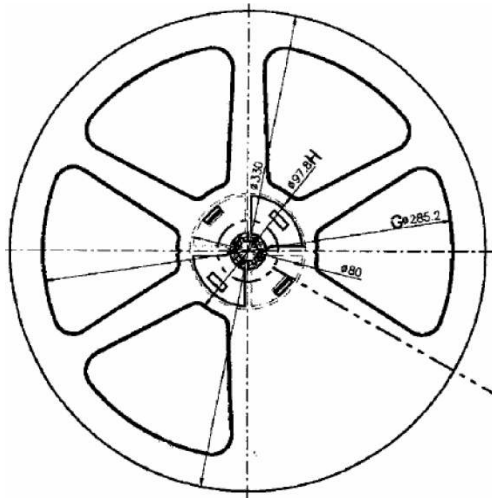
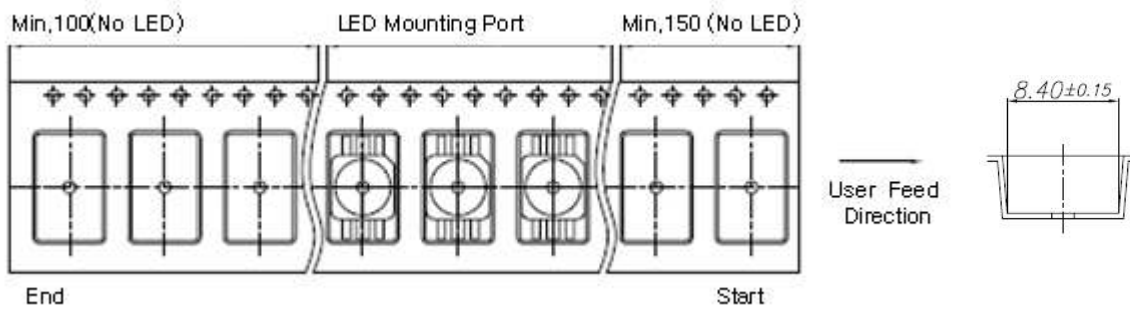
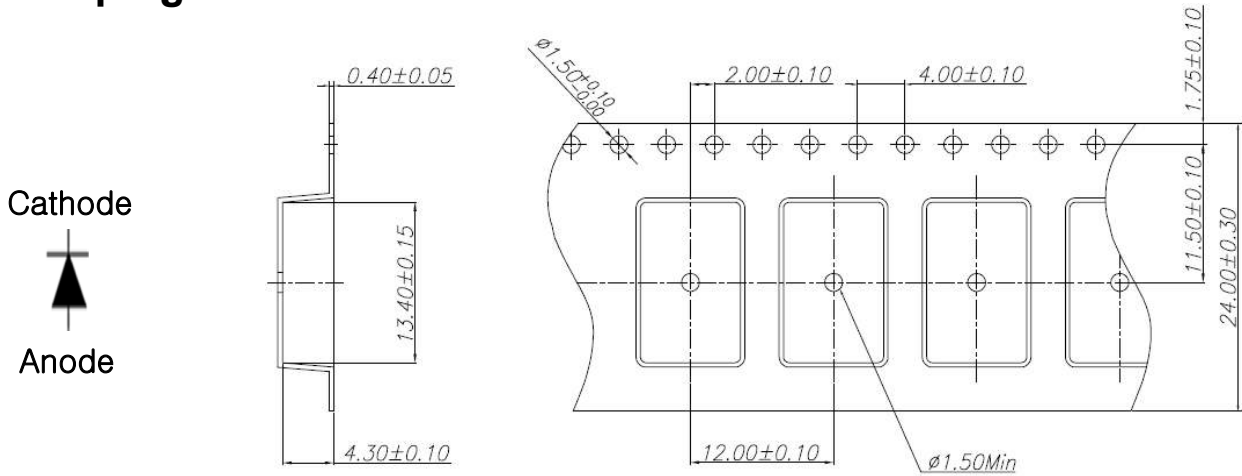
| Test Items | Test Conditions | Test Hours/Cycles |
|--|---|-------------------|
| Room Temperature life test | 25 °C, I _F = Max DC* | 1,000 h |
| High Temperature humidity life test | 85 °C, 85 % RH, I _F = Max DC* | 1,000 h |
| High Temperature life test | 85 °C, I _F = Max DC* | 1,000 h |
| Low Temperature life test | -40 °C, I _F = Max DC* | 1,000 h |
| High Temperature Storage | 110 °C | 1,000 h |
| Low Temperature Storage | -40 °C | 1,000 h |
| Thermal Shock | -40 / 120 °C, each 30 min | 200 cycles |
| Temperature humidity Cycle On/Off test | -40 / 85 °C, each 20 min, 100 min transfer Power On/off each 5 min, Max DC* | 100 cycles |
| Reflow (Pb-Free) | Peak 260±5 °C for 10 sec | 3 times |
| ESD(HBM) |  <p>R1 : 10 MΩ , R2 : 1.5 kΩ , C : 100 pF</p> | 3 times (± 5 kV) |

2) Criteria for Judging the Damage

| Item | Symbol | Test Condition | Limit | |
|-----------------|----------------|-------------------------|------------|------------|
| | | | Min | Max |
| Forward Voltage | V _F | I _F = 250 mA | - | U.S.L.*1.1 |
| Luminous Flux | Φ _V | I _F = 250 mA | L.S.L.*0.3 | - |
| Reverse Voltage | V _R | I _R = 5 mA | - | U.S.L.*2.0 |

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

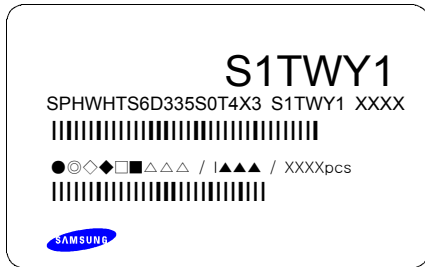
9. Taping Dimension



| Symbol | A | B | C | W1 | W2 |
|---------------|---------|--------|----------|----------|----------|
| Dimension(mm) | 330 ± 1 | 80 ± 1 | 25 ± 0.5 | 13 ± 0.3 | 29.5 ± 1 |

- (1) Quantity : 1,000 Pcs / 13" Reel.
- (2) Cumulative Tolerance : Cumulative Tolerance/10 pitches is less than ±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 °C angle to be the carrier tape.
- (4) Packaging : P/N, Manufacturing data Code No. and quantity to be indicated on a damp proof Package

10. Label Structure



Rank Code

/S1/ : VF Rank (refer to page 3)

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

/Y1/ : Luminous Flux (refer to page 3)

11. Lot Number

The Lot number is composed of the following characters

●◎◇◆□■△△△ / |▲▲▲ / xxxx PCS

● : Production Site (S:SAMSUNG LED, G:Gosin China, L:SOLLEDS)

◎ : L (LED)

◇ : Product State (A:Normality, B:Bulk, C:First Production, R:Reproduction, S:Sample)

◆ : Year (T:2009, U:2010, V:2011...)

□ : Month (1 ~ 9, A, B)

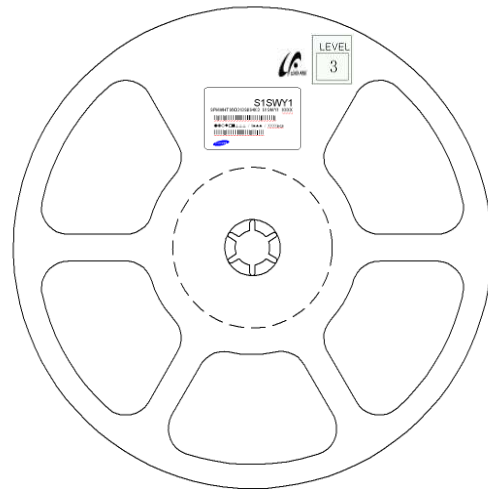
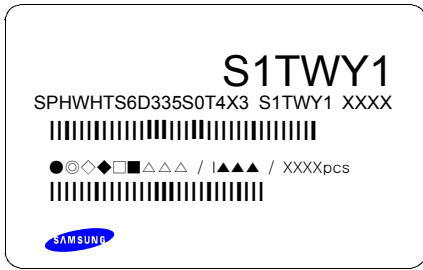
■ : Day (1 ~ 9, A, B ~ V)

△ : SAMSUNG LED Product Number (1 ~ 999)

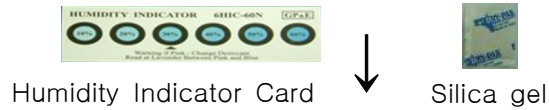
▲ : Reel Number (1 ~ 999)

12. Reel Packing Structure

1) Reel



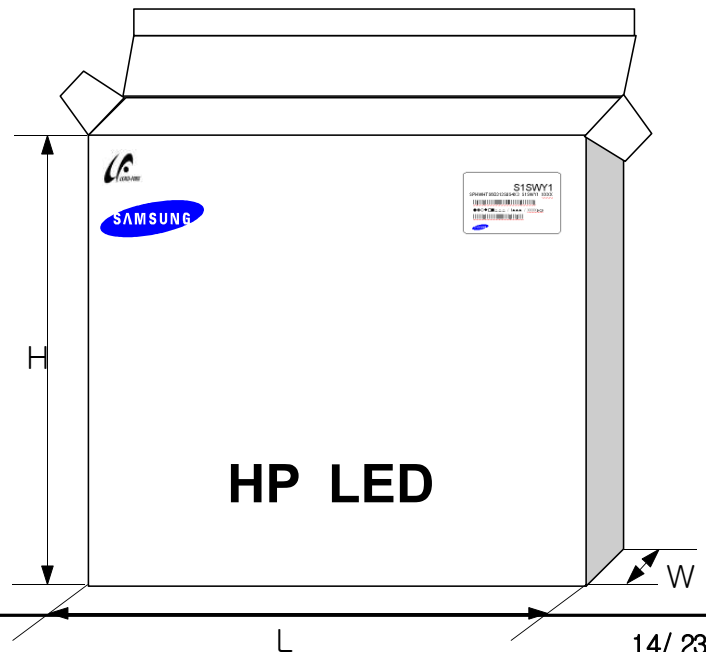
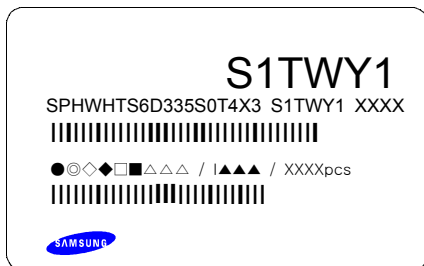
2) Aluminum Bag



3) Inner Box

Material : Paper(SW3B(B))

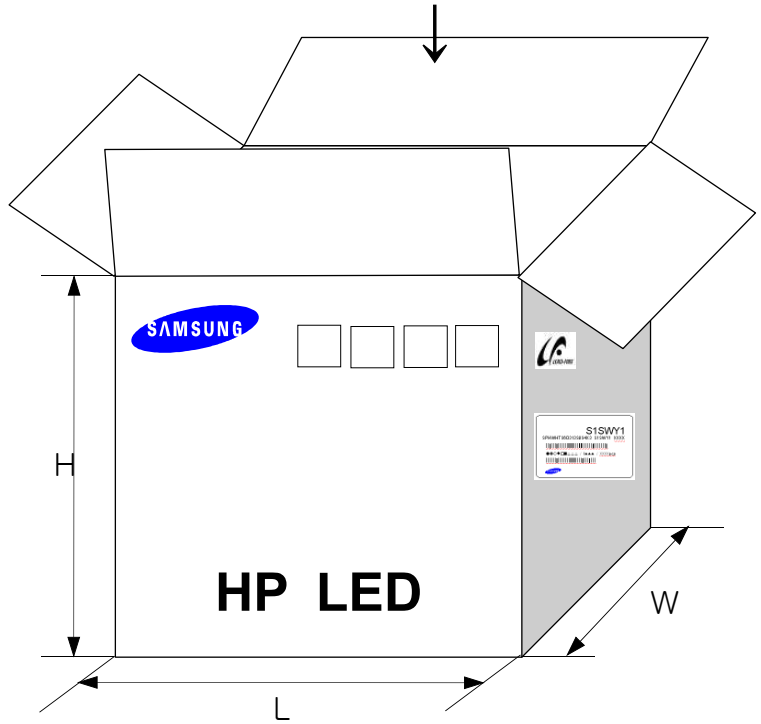
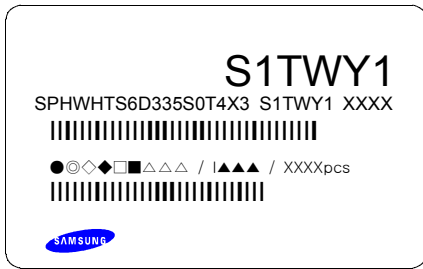
| TYPE | SIZE(mm) | | |
|--------|----------|----|-----|
| | L | W | H |
| 13inch | 335 | 45 | 335 |



4) Carton Box

Material : Paper(SW3B(B))

| TYPE | SIZE(mm) | | |
|--------|----------|-----|-----|
| | L | W | H |
| 13inch | 350 | 350 | 350 |



13. Precaution for Use

- 1) For over-current-proof function, customers are recommended to apply resistors to prevent sudden change of the current caused by slight shift of the voltage.
- 2) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. When washing is required, IPA is recommended to use.
- 3) When the LEDs illuminate, operating current should be decided after considering the ambient maximum 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 by a sealed container with nitrogen gas injected. (Shelf life of sealed bags : 12 months, temp. 0~40℃, 20~70%RH)
- 5) After storage bag is open, device subjected to soldering, solder reflow, or other high temperature processes must be:
 - a. Mounted within 72 hours (3days) at an assembly line with a condition of no more than 30℃/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 is >60% at 23±5℃.
- 8) Devices must be baked for 24hours at 65±5℃, if baking is required.
- 9) The LEDs are sensitive to the static electricity and surge. 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 leak current, lowered turn-on voltage, or abnormal lighting of LEDs at low current.

14. Hazard Substance Analysis



Test Report No. F690501/LF-CTSAYAA11-02853

Issued Date: January 27, 2011

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To: SAMSUNG LED CO., LTD.
314, Maetan-dong
Yeongtong-gu
Suwon-city
GYEONGGI-DO 443-743
Korea

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

SGS File No. : AYAA11-02853
Product Name : LED
Item No./Part No. : Sunnix8G
Received Date : Jan 21, 2011
Test Period : Jan 24, 2011 to Jan 27, 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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Unless otherwise stated, the results shown in this test report refer only to the samples tested and such samples are retained for 90 days only.


Test Report No. F690501/LF-CTSAYAA11-02853

Issued Date: January 27, 2011

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Sample No. : AYAA11-02853.001

Sample Description : LED

Item No./Part No. : Sunnix8G

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. |

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 (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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Sample No. : AYAA11-02853.001
Sample Description : LED
Item No./Part No. : Sunnix6G

Halogen Contents

| Test Items | Unit | Test Method | MDL | Results |
|--------------|-------|-----------------------|-----|---------|
| Fluorine(F) | mg/kg | BS EN 14582:2007 , IC | 30 | 105 |
| Bromine(Br) | mg/kg | BS EN 14582:2007 , IC | 30 | N.D. |
| Chlorine(Cl) | mg/kg | BS EN 14582:2007 , IC | 30 | N.D. |
| Iodine(I) | mg/kg | BS EN 14582:2007 , IC | 50 | N.D. |

Other(s)

| Test Items | Unit | Test Method | MDL | Results |
|--|-------|---------------------------|-----|---------|
| PFOS(Perfluorooctane Sulfonates-Acid/Metal Salt/Amide) | mg/kg | US EPA 3540C/3550C, LC/MS | 1 | N.D. |

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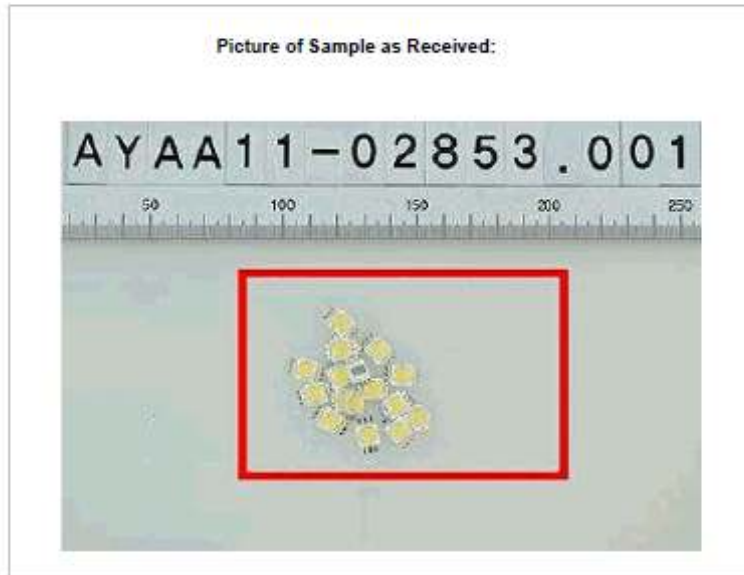
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- NOTE:
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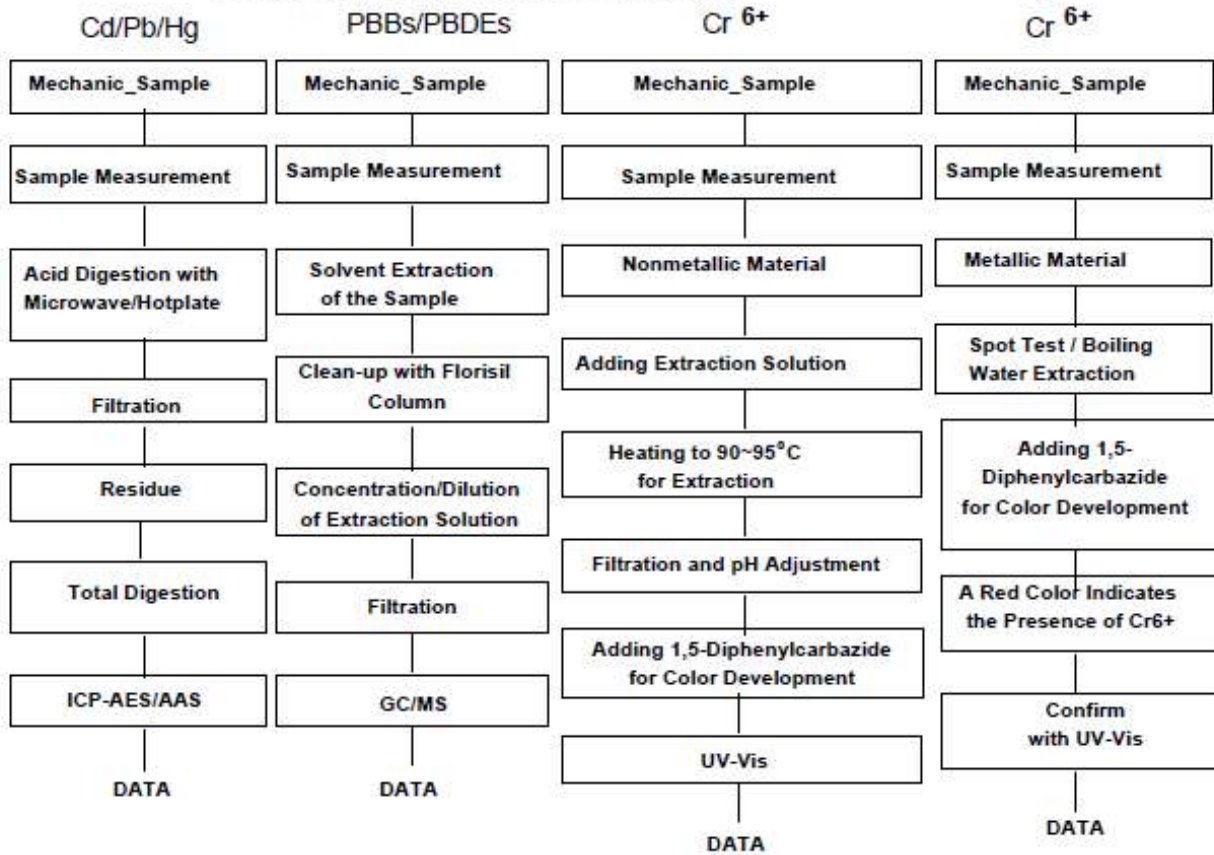


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Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr⁶⁺/PBBs&PBDEs Testing



The samples were dissolved totally by pre-conditioning method according to above flow chart for Cd,Pb,Hg.

Section Chief : Gilsae Yi

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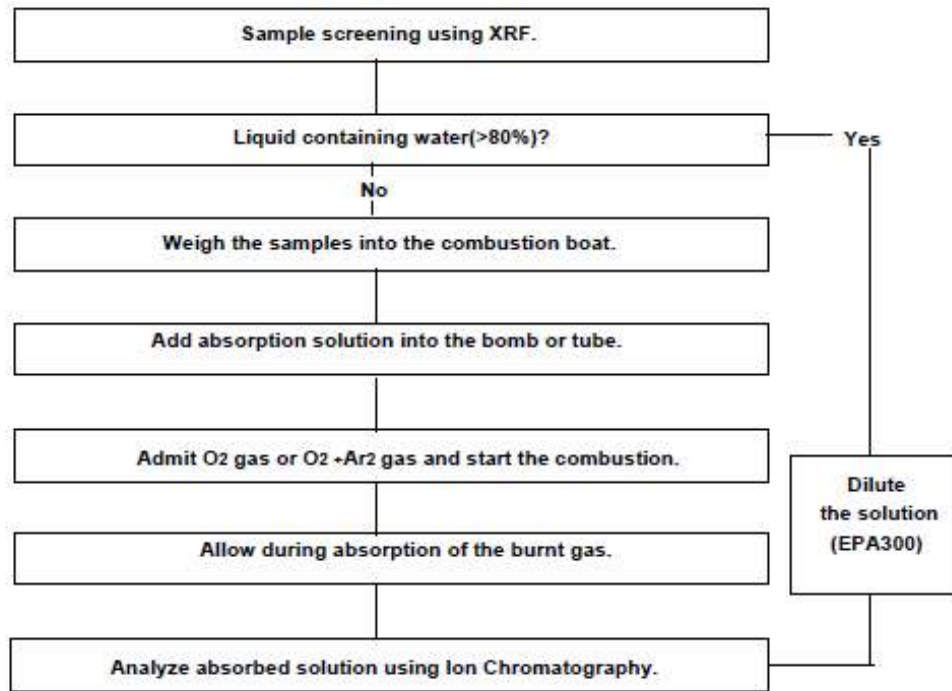


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Flow Chart for Halogen Test



*** End ***

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