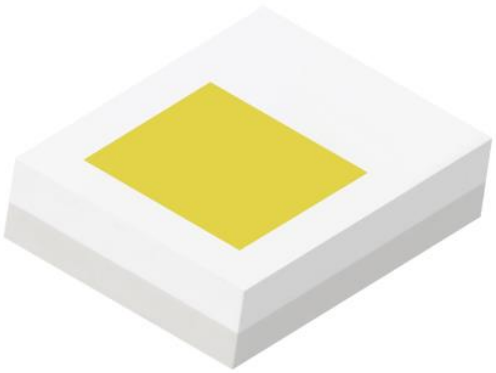
High Power LED FX Series

# 1W White SPHWHTA1N1C0



## Features & Benefits

- Package : Silicone covered White LED package
- Dimension : 1.2 mm x 1.6 mm
- Chip Configuration : 1 chip
- ESD Voltage : Up to 8 kV acc. to ISO 10605-contact
- Viewing Angle: 120 Deg.
- Qualifications: The product qualification test based on the guidelines of AEC-Q102.

SAMSUNG

## Table of Contents

## 1. Characteristics

### a) Typical Characteristics

| Item | Symbol | Value | Unit. |
|---|---|---|---|
| Luminous Flux ($I_F$= 350 mA) | lm | Typ. 120 | lm |
| Forward Voltage ($I_F$= 350 mA) | $V_F$ | Typ. 3.2 | V |
| Viewing Angle | φ | Typ. 120 | Deg |
| Reverse Current | $I_R$ | Not designed for reverse operation | |
| Real Thermal Resistance (Junction to Solder point) | $R_{th\_J\text{-}S\ (Real)}$ | Typ. 7.2<br>Max. 8.0 | K/W |
| Electrical Thermal Resistance (Junction to Solder point) | $R_{th\_J\text{-}S\ (Elec.)}$ | Typ. 4.5<br>Max. 5.0 | K/W |
| Radian Surface | A | 0.70 | $mm^2$ |

**Note:**

[1] Measurement condition: LED ($T_j$) = Ambient temperature ($T_a$), by applying pulse current for under 25ms.

### b) Absolute Maximum Rating

| Item | Symbol | Rating | Unit |
|---|---|---|---|
| Ambient / Operating Temperature | $T_a$ | -40 ~ +125 | ºC |
| Storage Temperature | $T_{stg}$ | -40 ~ +125 | ºC |
| LED Junction Temperature | $T_j$ | 150 | ºC |
| Maximum Forward current[2] ($T_j$: 25℃) [3] | $I_F$ | 700 | mA |
| Minimum Forward current[2] ($T_j$: 25℃) [3] | $I_F$ | 50 | mA |
| Maximum Reverse current | | Do not apply for reverse current | |
| ESD Sensitivity[4] | - | ±8 HBM | kV |

**Note:**

[2] Unpredictable performance may be resulted by driving the product at below Min. $I_F$ or above Max. $I_F$. But there will be no damage to the product.

[3] The measurement condition means that temperature dependence is excluded by applying pulse current for under 25ms.

[4] It is included the device to protect the product from ESD.

## 2. Product Code Information

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | P | H | W | H | T | A | 1 | N | 1 | C | 0 | A | B | C | D | E | F |

| Digit | PKG Information |
|---|---|
| 1 2 | company name and Samsung LED PKG (SP for Samsung PKG) |
| 3 | power variant (H for automotive high power) |
| 4 5 | color variant (WH for automotive White color) |
| 6 | LED PKG version (T for initial version) |
| 7 8 | product configuration and type (A1 for automotive 1612 PKG type) |
| 9 | lens configuration (N for no lens) |
| 10 | Max power (1 for 1±0.5W) |
| 11 12 | specific property (C0 for FX Series) |
| 13 14 | forward voltage property |
| 15 16 | CIE coordination property |
| 17 18 | luminous flux property |

### a) Luminous Flux Bins [5] ($I_F$= 350 mA, $T_j$= 25ºC)

| Symbol | Bin Code | | Flux Range (lm) | |
|---|---|---|---|---|
| | | | Min | Max |
| Φ | G2 | G1 | 100 | 110 |
| | | H1 | 110 | 120 |
| | J2 | J1 | 120 | 130 |
| | | K1 | 130 | 140 |
| | M2 | M1 | 140 | 150 |
| | | N1 | 150 | 160 |

### b) Voltage Bins [5] ($I_F$= 350 mA, $T_j$= 25 ºC)

| Symbol | Bin Code | Voltage Range (V) | |
|---|---|---|---|
| | | Min | Max |
| $V_F$ | C5 | 2.50 | 3.00 |
| | H5 | 3.00 | 3.50 |

**Note:**

[5] Luminous flux measuring equipment: CAS140CT

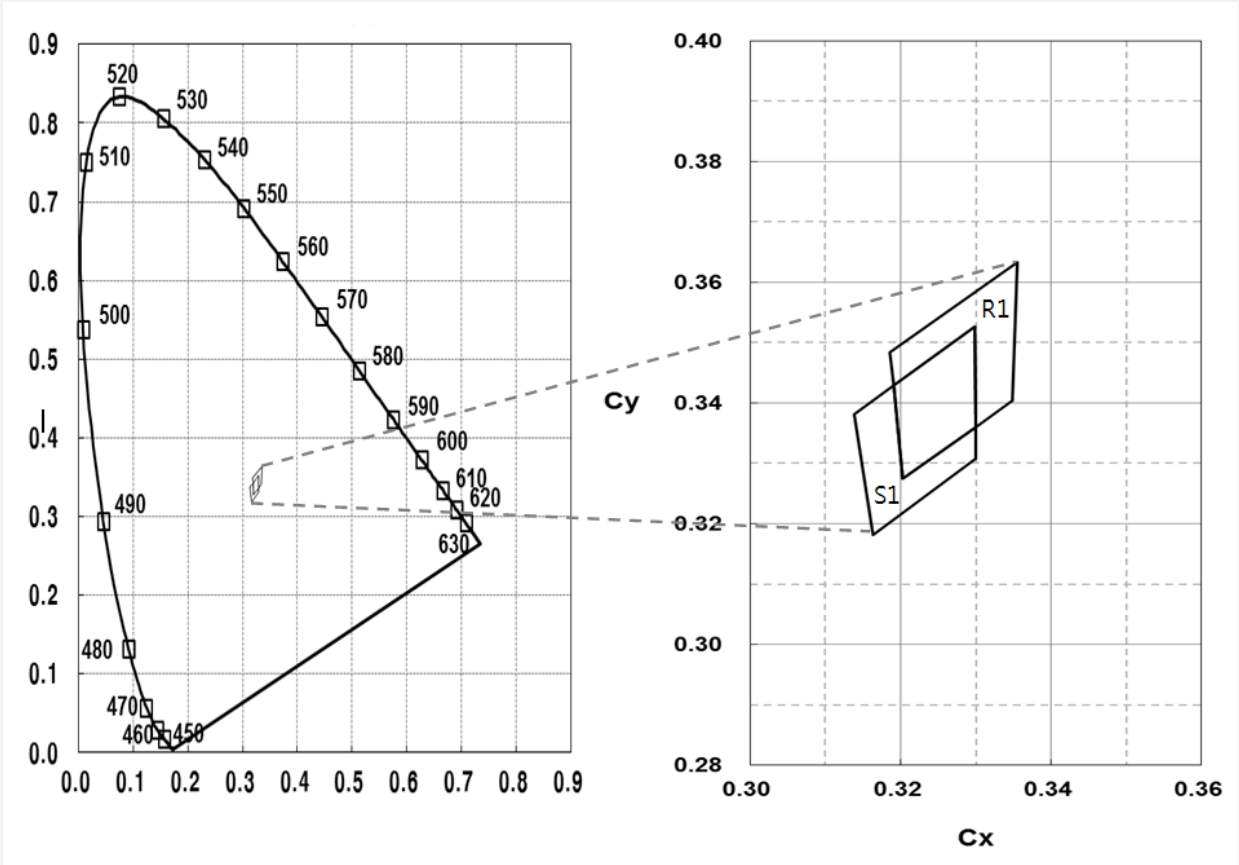
$\Phi_V$ and $V_F$ tolerances are ±7% and ±0.1 V, respectively.

### c) Color Bin [6] ($I_F$= 350 mA)

| Symbol | Bin Code | $C_x$ | | | | $C_y$ | | | |
|---|---|---|---|---|---|---|---|---|---|
| $C_x$, $C_y$ | R1 | 0.3186 | 0.3203 | 0.3349 | 0.3355 | 0.3484 | 0.3274 | 0.3404 | 0.3633 |
| | S1 | 0.3138 | 0.3163 | 0.3300 | 0.3298 | 0.3381 | 0.3181 | 0.3308 | 0.3526 |

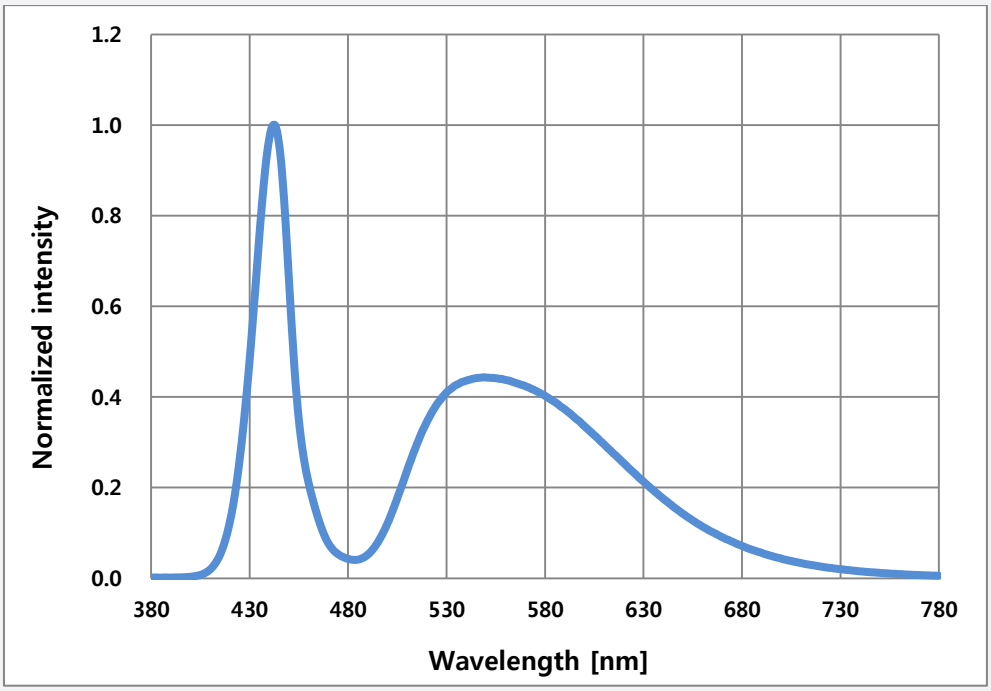
**Note**

[6] Chromaticity coordinates: $C_x$, $C_y$ according to CIE 1931. $C_x$ and $C_y$ tolerances are ±0.005, respectively.

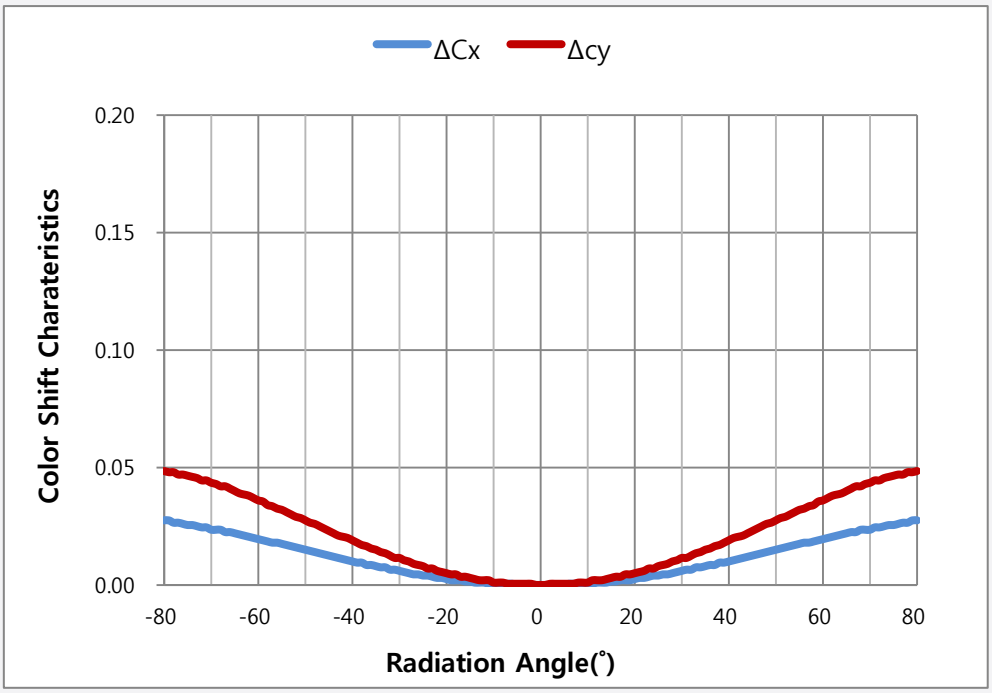


## 3. Typical Characteristics Graphs

**a) Spectrum Distribution ($I_F$= 350 mA, $T_s$= 25 ºC) [7]**



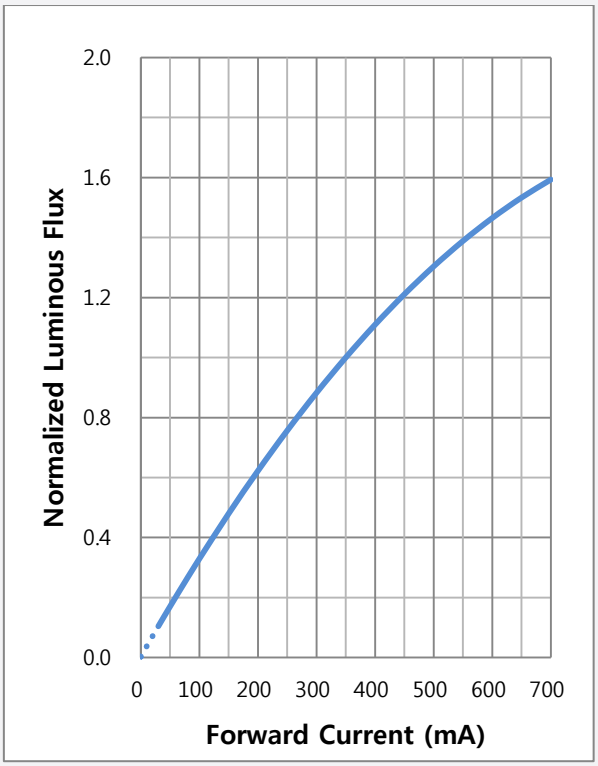

**b) Typical Chromaticity Coordinate Shift vs Radiation Angle ($I_F$= 350 mA, $T_s$= 25 ºC) [7]**

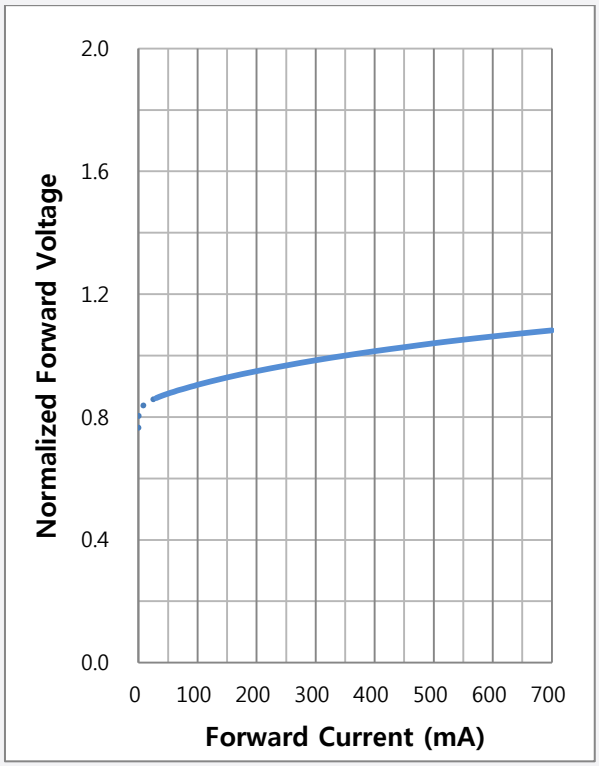


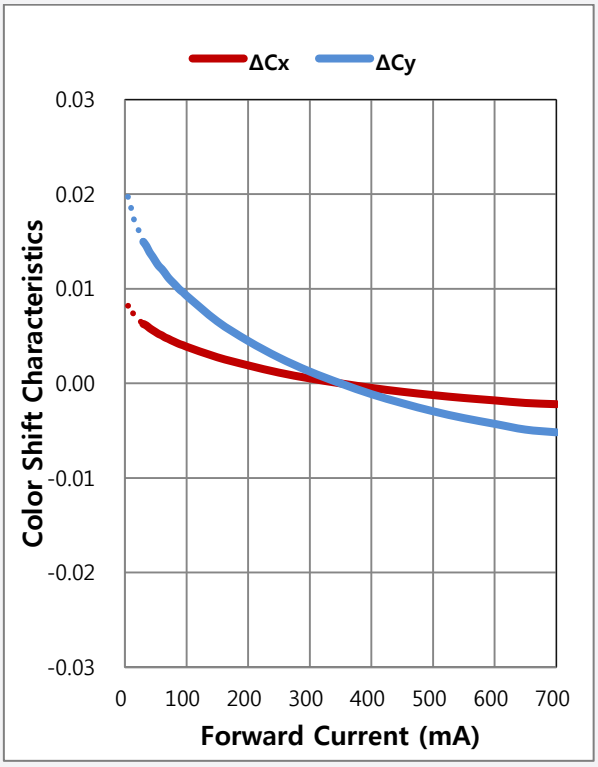

**Note:**

[7] The measurement condition means that temperature dependence is excluded by applying pulse current for under 25ms.

### c) Forward Current Characteristics ($T_s$= 25 ºC) [8]



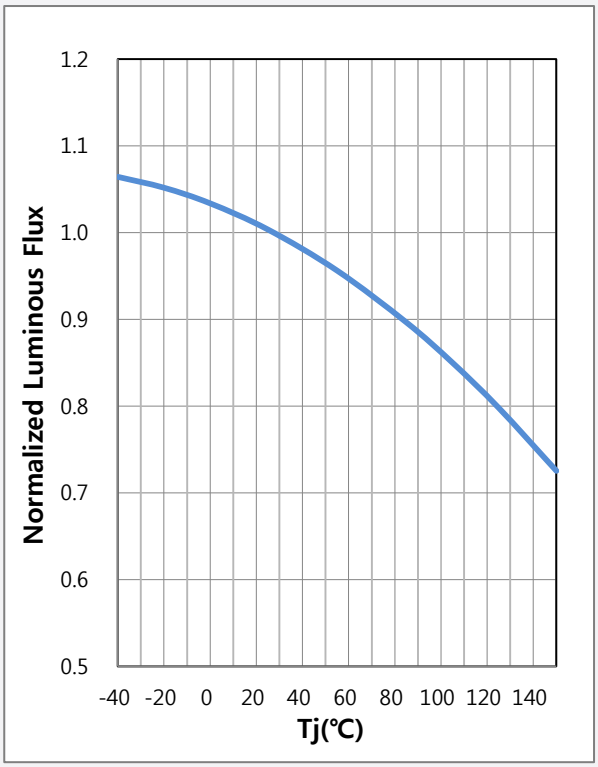



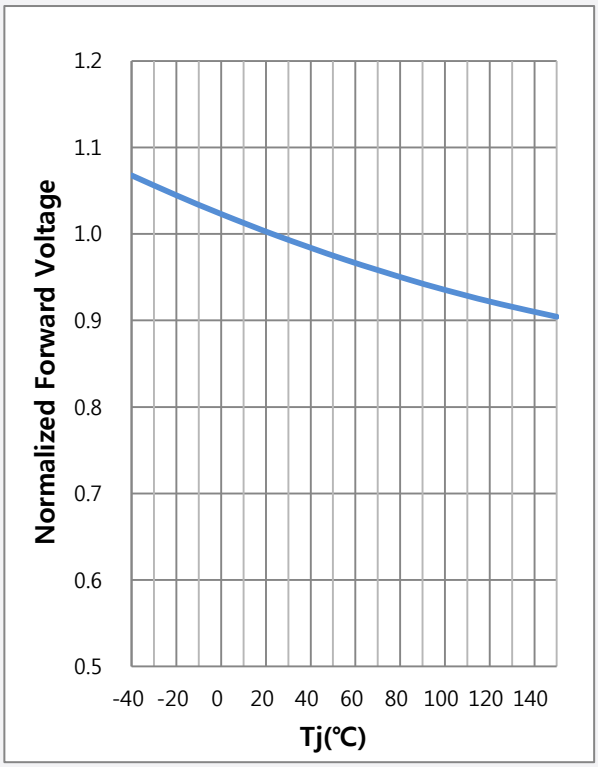



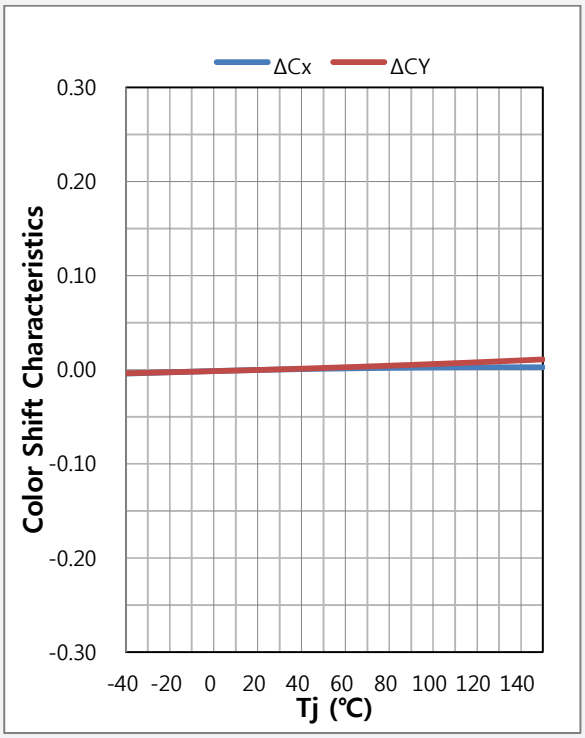

**Note:**

[8] The measurement condition means that temperature dependence is excluded by applying pulse current for under 25ms.

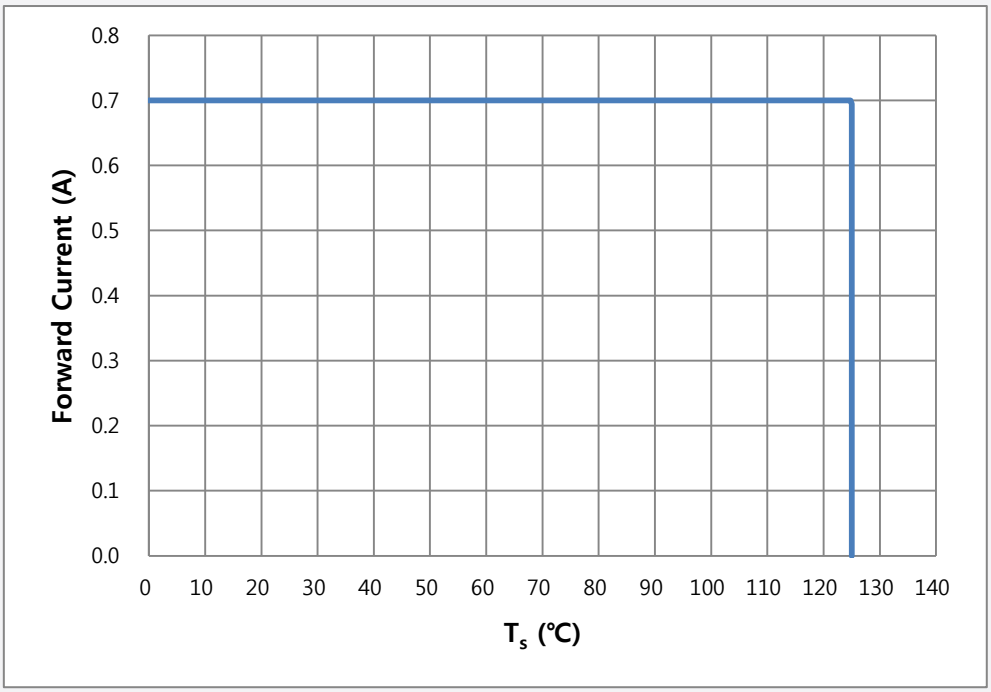
### d) Temperature Characteristics ($I_F$= 350 mA)



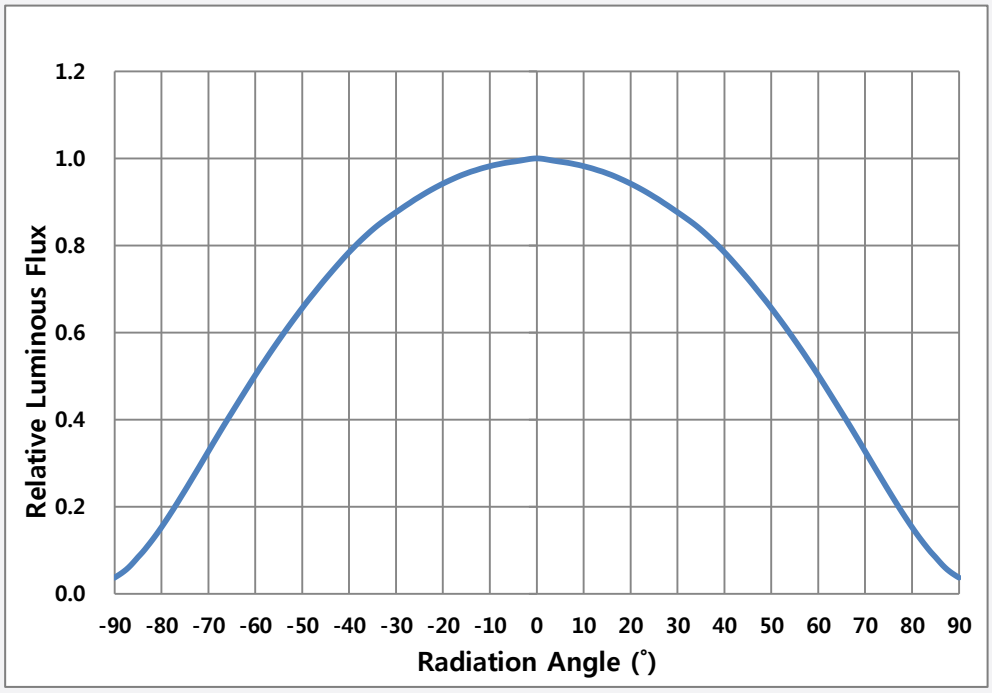
### e) Derating Curve [9]



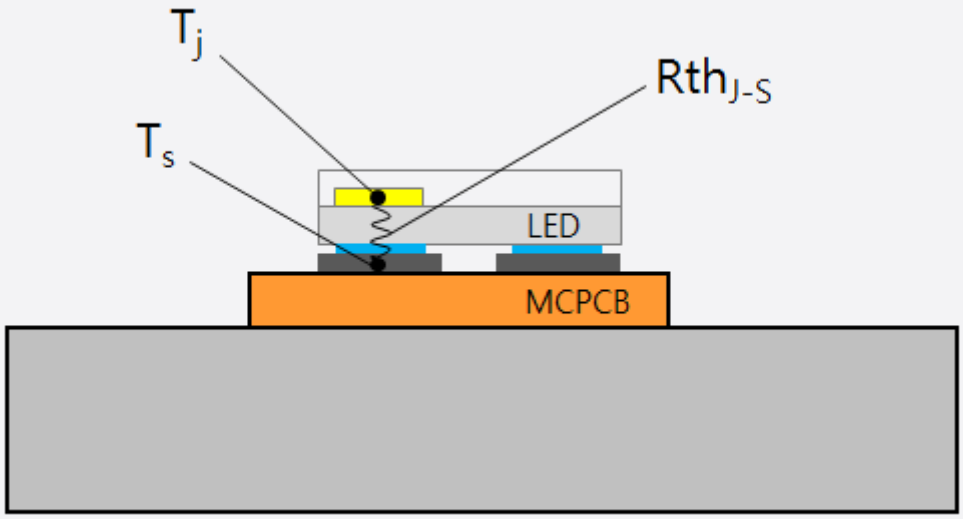

**Note:**

[9] The measurement condition means that temperature dependence is excluded by applying pulse current for under 25ms.

### f) Beam Angle Characteristics ($I_F$= 350 mA, $T_s$= 25 ºC)



## 4. Soldering Temperature Location

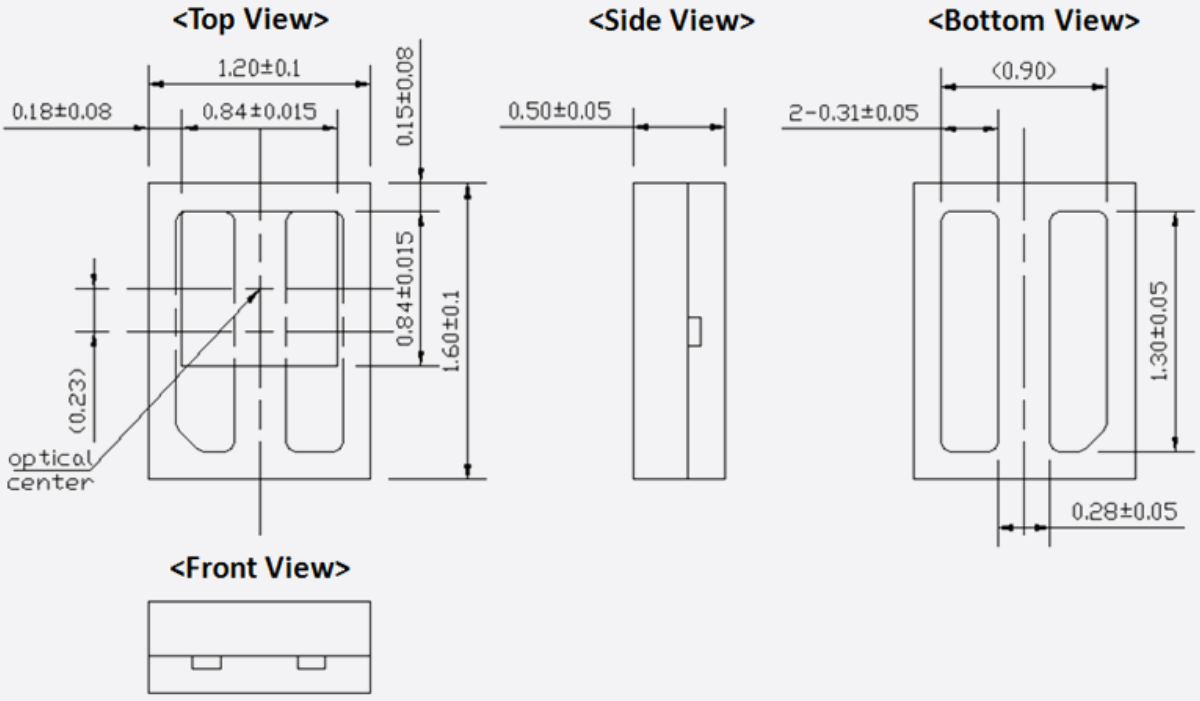



$T_j$: Temperature of Junction

$T_s$: Temperature of Solder Pad

$R_{th\_J\text{-}S}$: Thermal Resistance from Junction to Solder Pad

## 5. Mechanical Dimension




**Note:**

The dimensions in parentheses are for reference purposes.

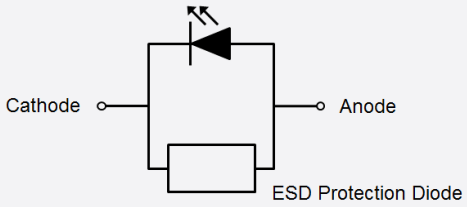
Unit: mm

### a) Pick and Place

Do not place pressure on the resin molded part

It is recommended to use a pick & place nozzle AM03-024820A(Hanhwa Techwin), etc.

### b) Electric Schematic Diagram

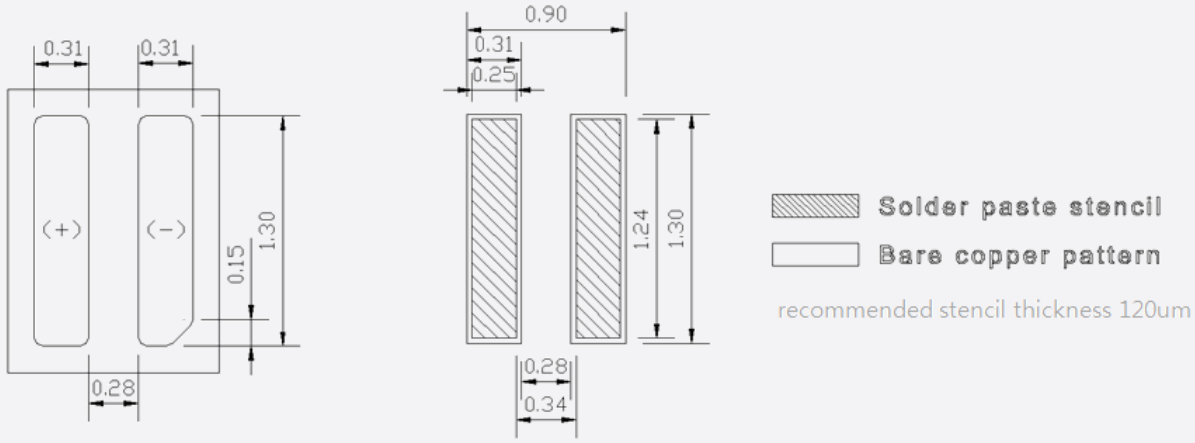



### c) Material Information

| Description | Material |
|---|---|
| FX Substrate | White SMC |
| LED Die | Thin GaN |
| Phosphor | Phosphor |
| Zener Diode | Silicone |
| Resin Mold | Silicone |

## 6. Soldering Conditions

### a) Pad Configuration & Solder Pad Layout

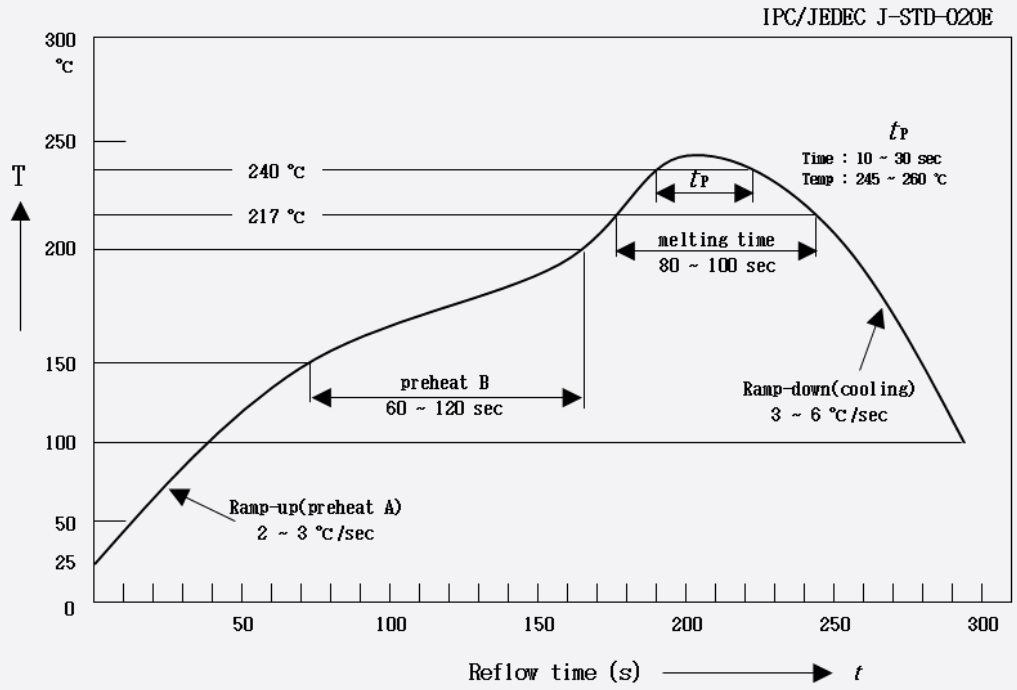



<PKG Pad> <Recommended PCB Land>

**Notes:** Unit: mm

### b) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



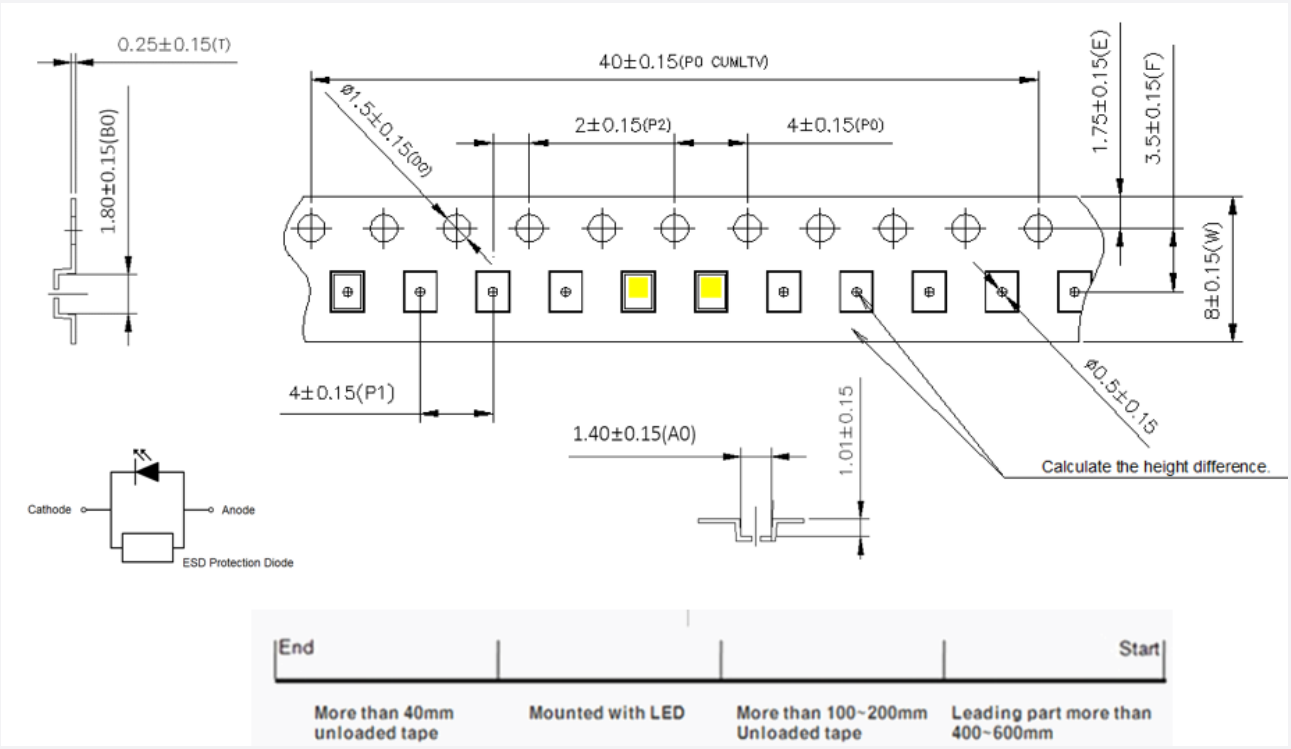

### c) Manual Soldering Conditions

Not more than 5 seconds @ max 300 ºC, under soldering iron. (One time only)

## 7. Tape & Reel

### a) Taping Dimension

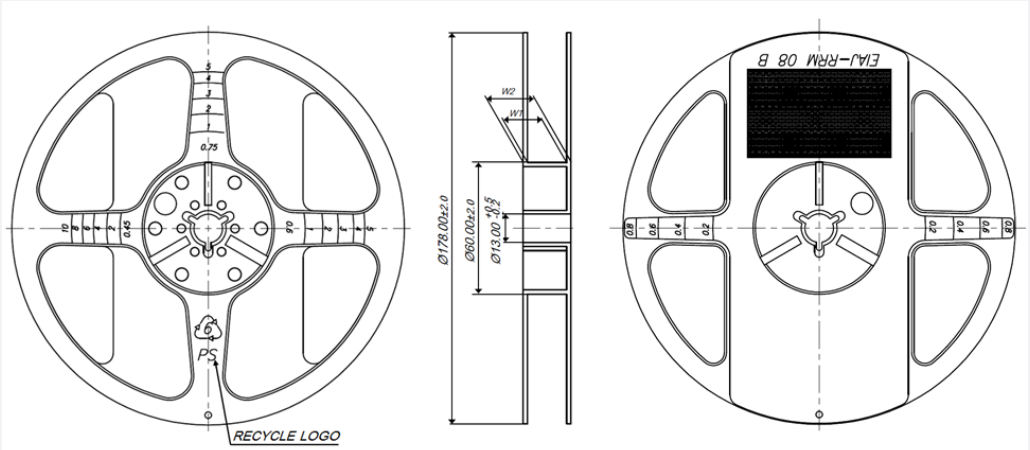
**User feed direction →**




**Note:**

Unit: mm, LED taping quantity: 3,000EA / Reel

### b) Reel Dimension



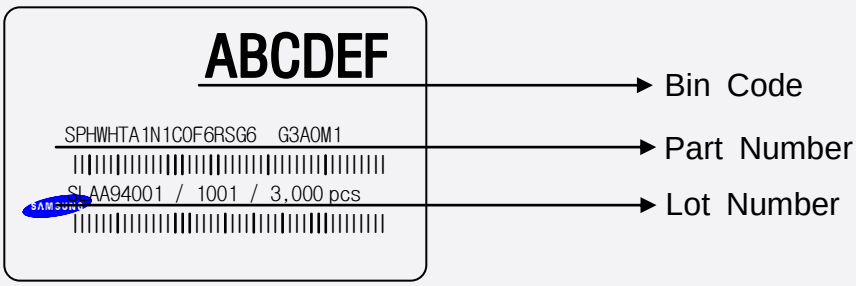

| Width | W1 | W2 |
|---|---|---|
| 8mm | 9 ±0.3 | 11.9 ±1.0 |

**Notes:**

Unit: mm, Tolerance: ±0.2mm

## 8. Label Structure

### a) Product Labeling Information




N.B) Denoted rank is the only example.

### b) Bin Code Structure

AB: Forward Voltage ($V_F$) Bin (refer to page. 5)

CD: Color bin ($C_x$, $C_y$) (refer to page. 6)

EF: Luminous Flux ($I_V$) Bin (refer to page. 5)

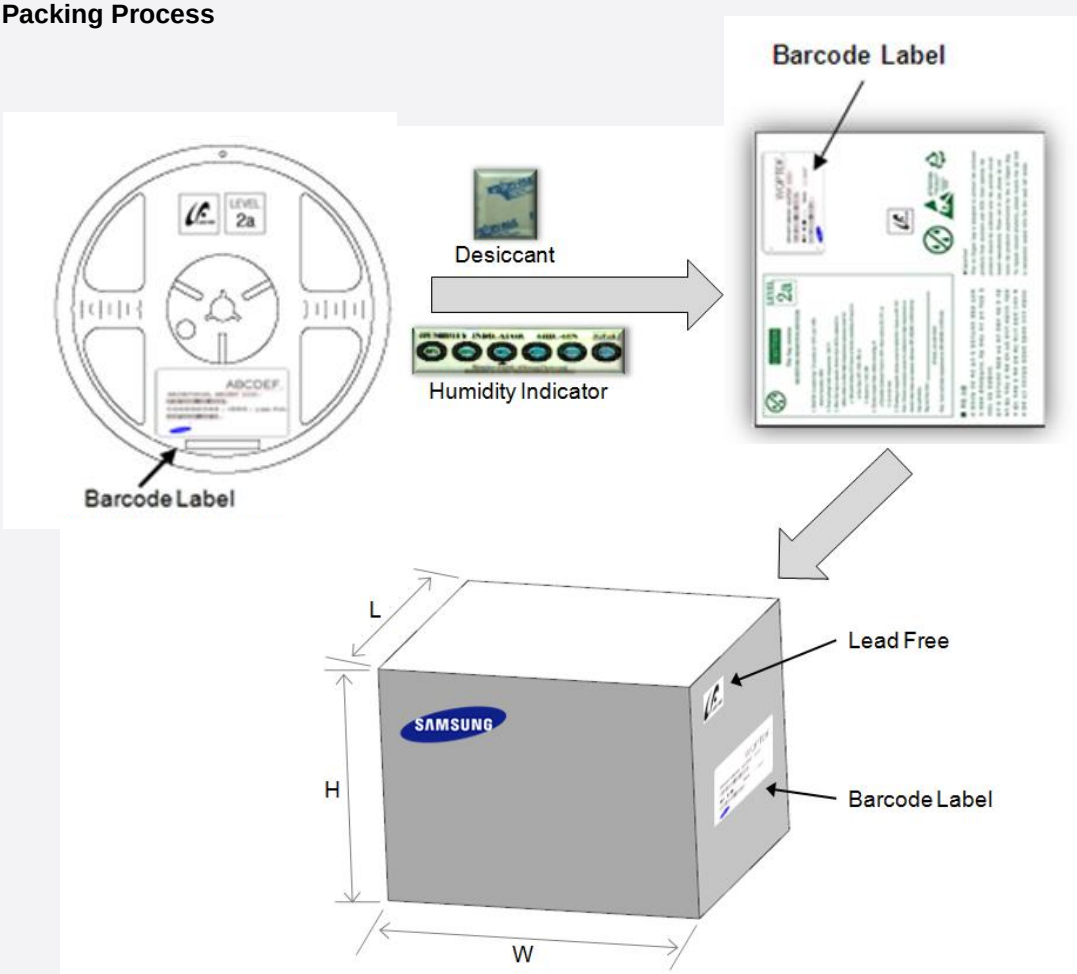
### c) Lot Number Structure

The lot number is composed of the following characters:

| No. | Information |
|---|---|
| 1 | Production Site : S - SAMSUNG LED |
| 2 | Production Site : L – Giheung Korea |
| 3 | Product State<br>A :Normality, B :Bulk, C :First Production, R :Reproduction, S :Sample |
| 4 | Year : Y:2014, Z:2015, A:2016, B:2017, C:2018 ... |
| 5 | Month : 1 ~ 9, A, B, C |
| 6 | Day : 1 ~ 9, A, B ~ V |
| 789 | Product number : 1 ~ 999 |
| abc | Reel Number : 1 ~ 999 |

## 9. Packing Structure

### a) Packing Process




Dimension of Transportation Box in mm

| Width | Length | Height |
|---|---|---|
| 220 | 245 | 182 |

**Notes:**

Will be changed oval mark to letter mark


Oval Mark

Letter Mark

## 10. Precautions in Handling & Use

1) Absolute maximum ratings are set to prevent LED products from breaking due to extreme stress (temperature, current, voltage, etc.). Usage conditions must never go above the ratings, nor do any of two of the factors reach the rating level simultaneously.
2) Please avoid touch or pressure on resin molded part in the products. To handle the products directly, it is recommended to use nonmetallic tweezers
3) 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.
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 ELECTRONICS, they should be packed by a sealed container with nitrogen gas injected.
5) After bag is opened, device subjected to soldering, solder reflow, or other high temperature processes must be:
   a. Mounted within 672hours 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±℃
8) Devices must be baked for 1 day at 60±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.
10) Prepare a ESD protective area by placing conductive mattress (106Ω) and ionizer to remove any static electricity.
11) VOCs (volatile organic compounds) may be occurred by adhesives, flux, hardener or organic additives which are used in luminaires (fixture) and LED silicone bags are permeable to it. It may lead a discoloration when LED expose to heat or light. This phenomenon can give a significant loss of light emitted (output) from the luminaires (fixtures). In order to prevent these problems, we recommend you to know the physical properties for the materials used in luminaires, it requires selecting carefully.

## 11. Company Information

SAMSUNG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# Legal and additional information.

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