

## High Power LED FX Series

# 1W Amber SPHAM2A1N1Co



### Features

- Package : Phosphor converted Amber 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°
- Qualifications: The product qualification test based on the guidelines of AEC-Q102.

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## 1. Characteristics

### a) Typical Characteristics

[T<sub>S</sub>=25°C]<sup>[1]</sup>

Item	Symbol	Value	Unit.
Luminous Flux (I <sub>F</sub> = 350 mA)	Φ <sub>V</sub>	Typ. 85	lm
Forward Voltage (I <sub>F</sub> = 350 mA)	V <sub>F</sub>	Typ. 3.0	V
Viewing Angle	Φ	Typ. 120	°
Reverse Current	I <sub>R</sub>	Not designed for reverse operation	
Real Thermal Resistance (Junction to Solder point)	R <sub>th_J-S (Real)</sub>	Typ. 7.6	K/W
		Max. 8.2	
Electrical Thermal Resistance (Junction to Solder point)	R <sub>th_J-S (Elec.)</sub>	Typ. 6.0	K/W
		Max. 6.5	
Radian Surface	A	0.7	mm <sup>2</sup>

**Note:**

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

### b) Absolute Maximum Rating

Item	Symbol	Rating	Unit
Ambient / Operating Temperature	T <sub>a</sub>	-40 ~ +125	°C
Storage Temperature	T <sub>stg</sub>	-40 ~ +125	°C
LED Junction Temperature	T <sub>j</sub>	150	°C
Maximum Forward current <sup>[2]</sup> (T <sub>S</sub> :25°C) <sup>[3]</sup>	I <sub>F</sub>	700	mA
Minimum Forward current <sup>[2]</sup> (T <sub>S</sub> :25°C) <sup>[3]</sup>	I <sub>F</sub>	50	mA
Maximum Reverse current		Do not apply for reverse current	
ESD Sensitivity <sup>[4]</sup>	-	±8 for HBM	kV

**Note:**

[2] Driving the product at forward current (I<sub>F</sub>) below Min. I<sub>F</sub> or above Max. I<sub>F</sub> may result in unpredictable behavior of the product.

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

[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	A	M	2	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 (AM for automotive Amber color)
6	LED PKG version (2 for 2nd version )
7 8	product configuration and type (A1 for automotive 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 <sup>[5]</sup> ( $I_F = 350 \text{ mA}$ ,  $T_S = 25 \text{ °C}$ )**

Symbol	Flux Bin Code	Flux Range (lm)	
		Min	Max
$\Phi_V$	E1	80	90
	F1	90	100

**b) Voltage Bins <sup>[5]</sup> ( $I_F = 350 \text{ mA}$ ,  $T_S = 25 \text{ °C}$ )**

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

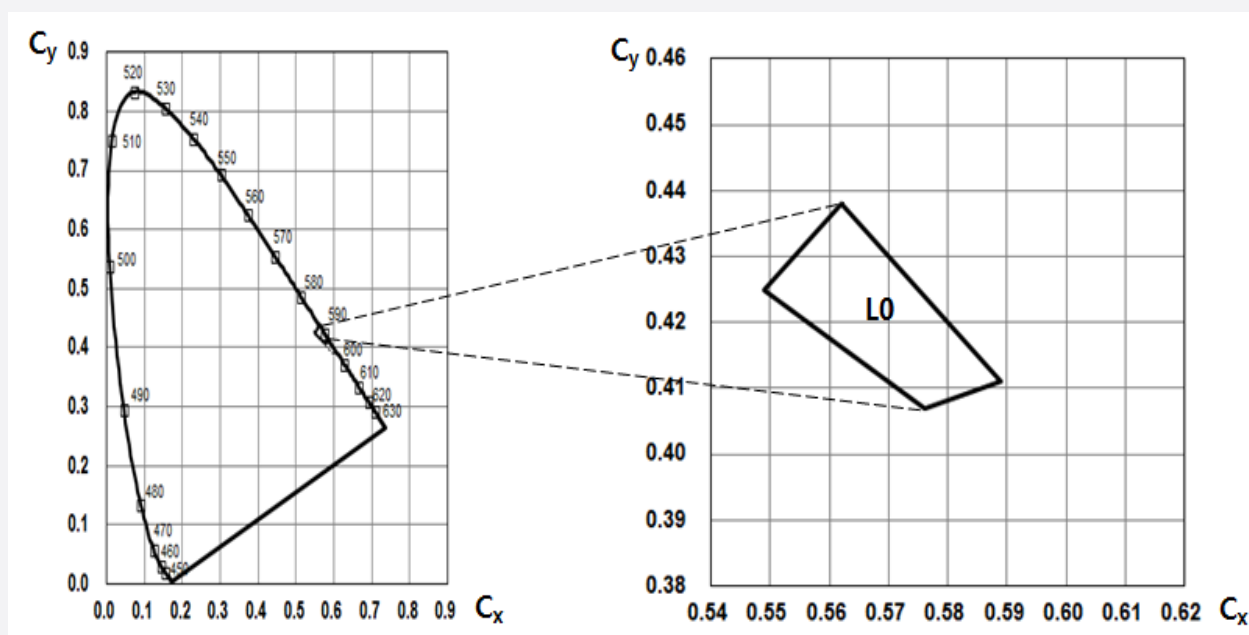
$\Phi_V$  and  $V_F$  tolerances are  $\pm 7\%$  and  $\pm 0.1\text{V}$ , respectively.

**c) Color Bin <sup>[6]</sup> ( $I_F = 350$  mA)**

Symbol	Bin Code	$C_x$				$C_y$			
$C_x, C_y$	L0	0.5760	0.5490	0.5620	0.5890	0.4070	0.4250	0.4380	0.4110

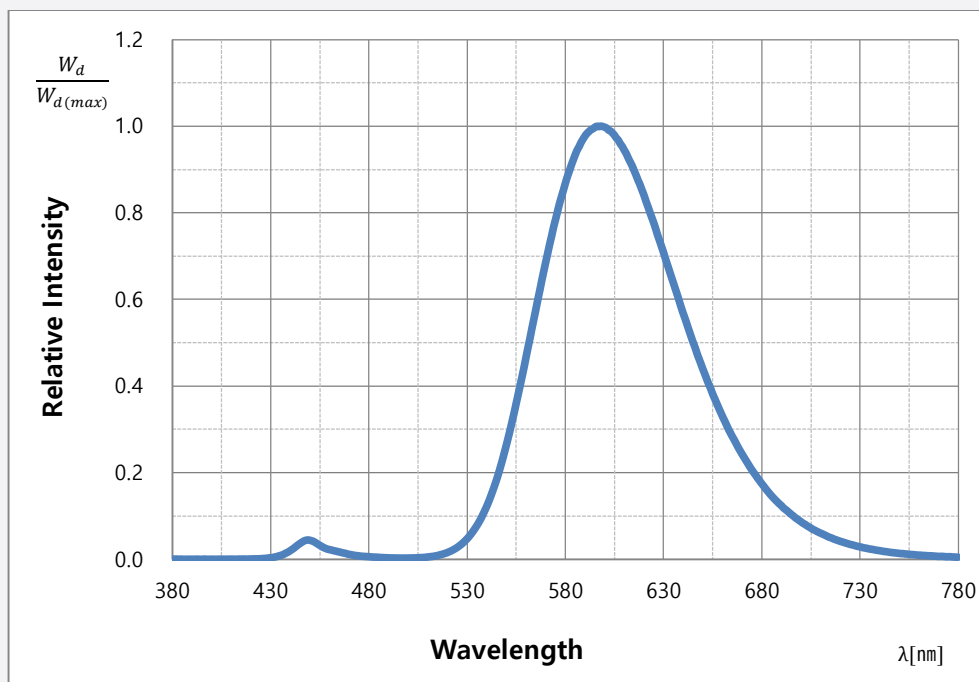
**Note**

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

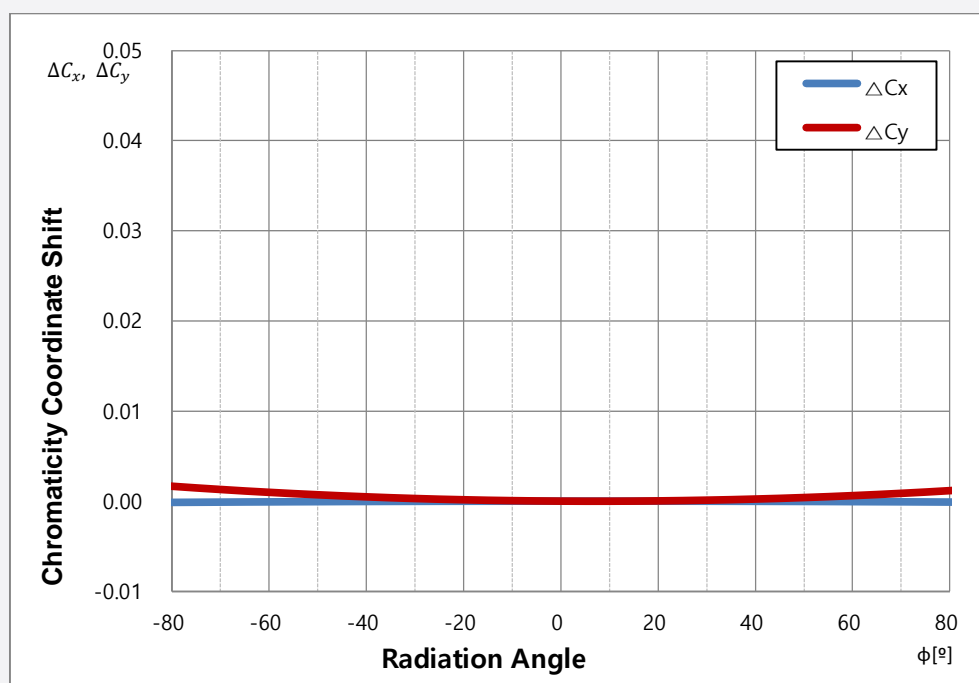


### 3. Typical Characteristics Graphs

a) Spectrum Distribution ( $I_F = 350 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )<sup>[7]</sup>



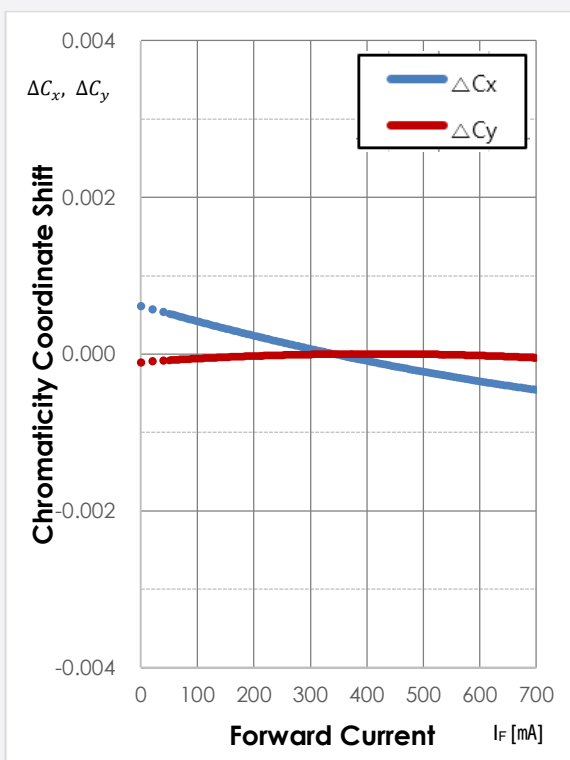
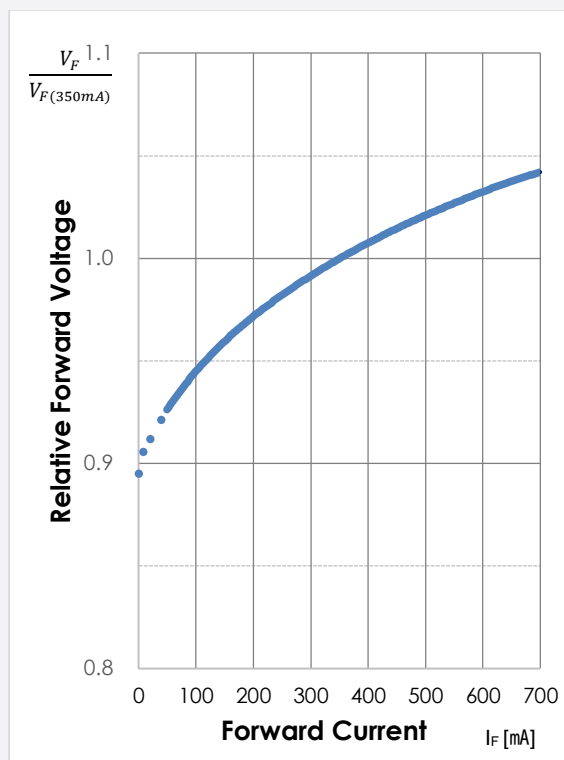
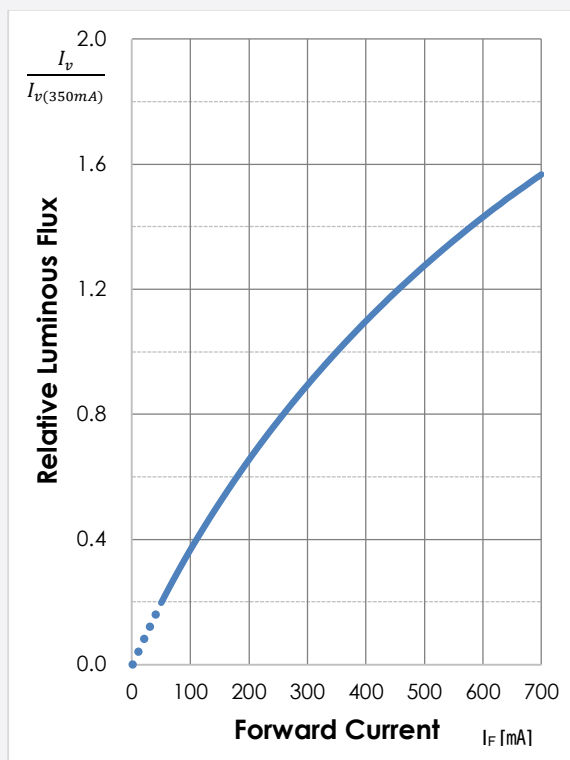
b) Typical Chromaticity Coordinate Shift vs Radiation Angle ( $I_F = 350 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )<sup>[7]</sup>



**Note:**

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

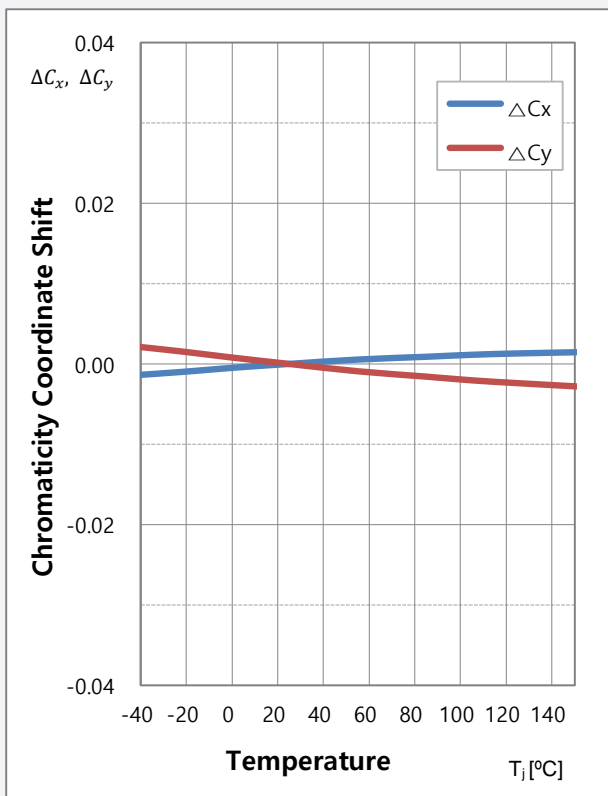
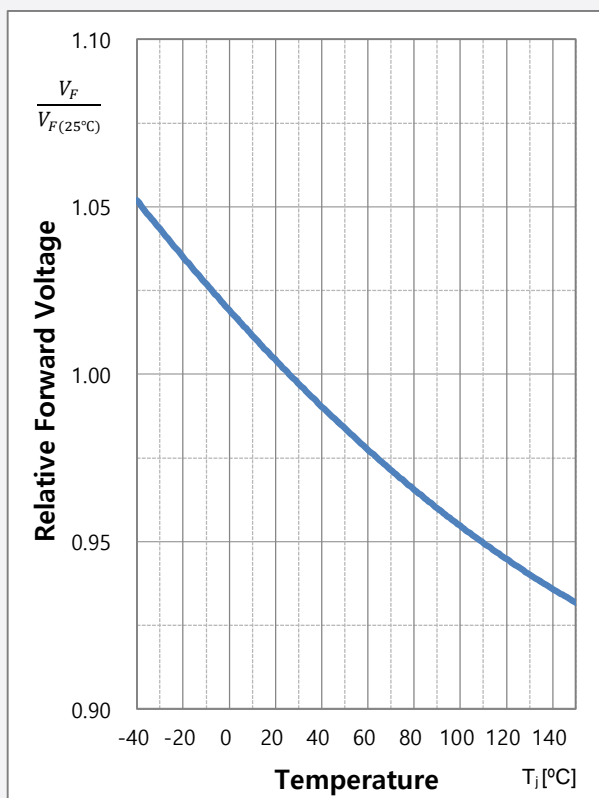
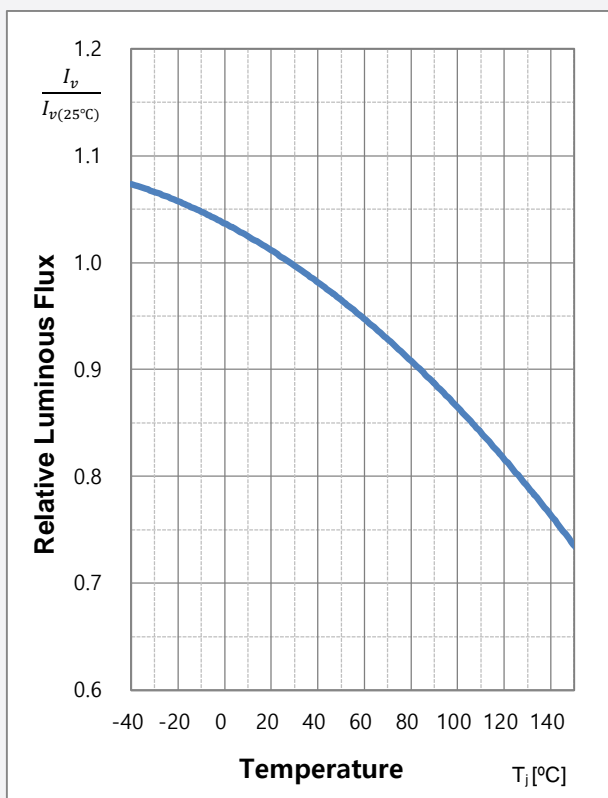
### c) Forward Current Characteristics ( $T_s = 25\text{ }^{\circ}\text{C}$ )<sup>[8]</sup>



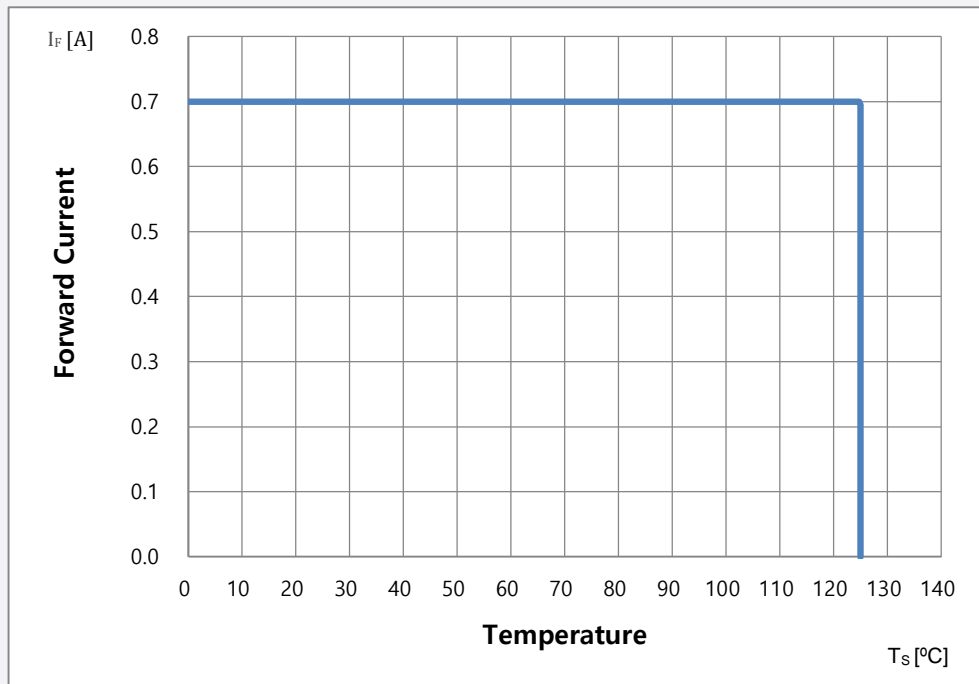
**Note:**

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

#### d) Temperature Characteristics ( $I_F = 350 \text{ mA}$ )



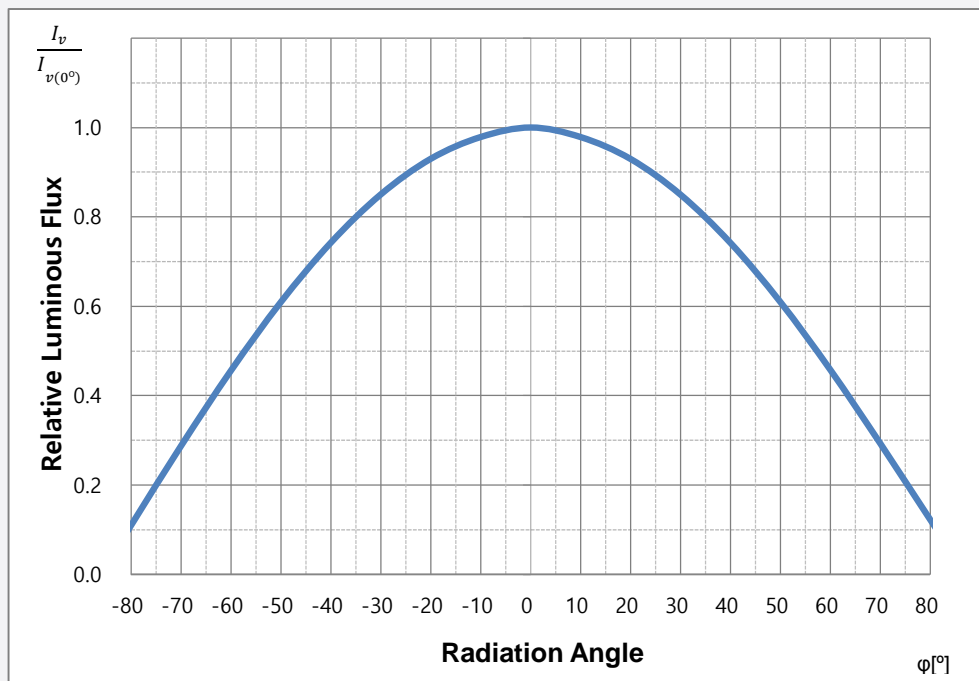
### e) Derating Curve <sup>[9]</sup>



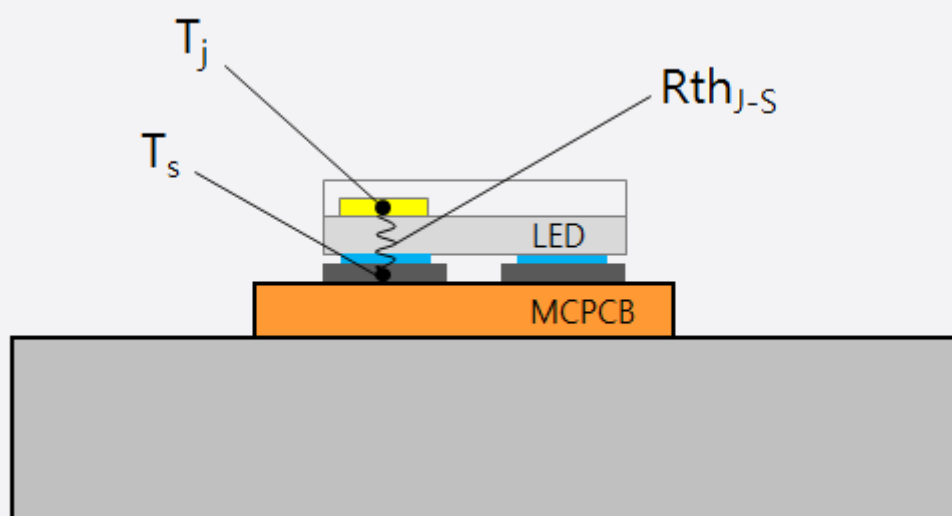
**Note:**

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

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



#### 4. Soldering Temperature Location

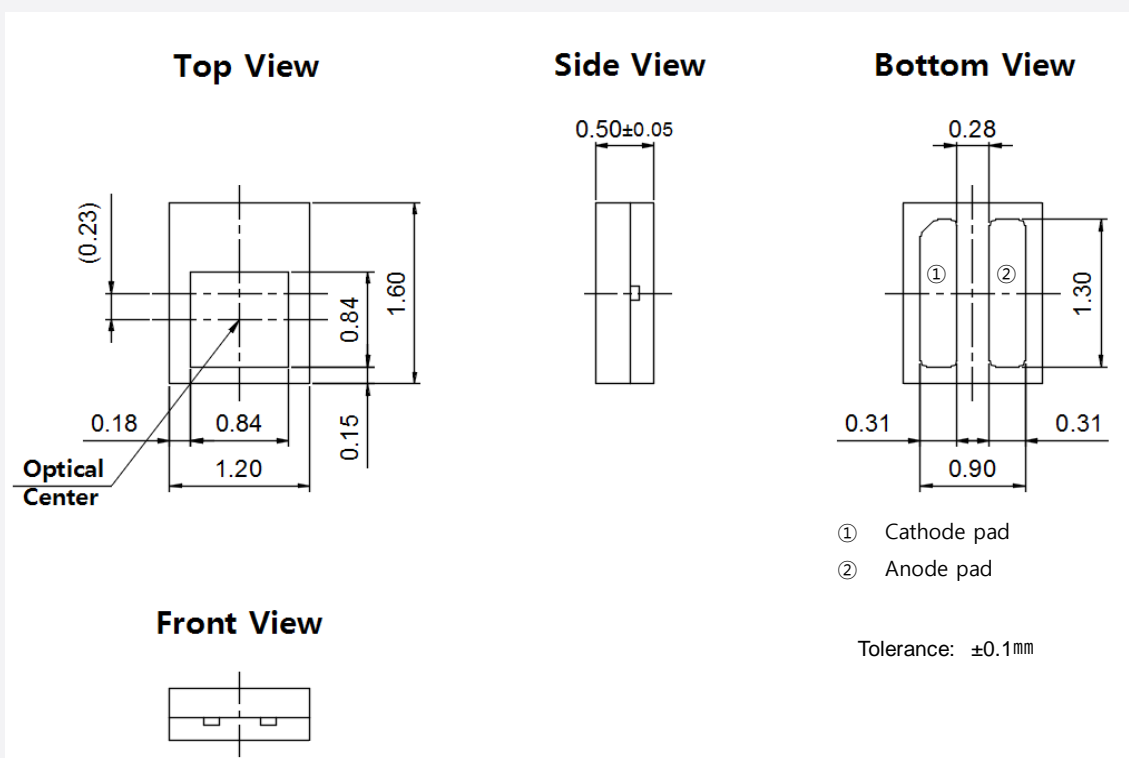


$T_j$ : Temperature of Junction

$T_s$ : Temperature of Solder Pad

$R_{th_{J-S}}$ : Thermal Resistance from Junction to Solder Pad

## 5. Mechanical Dimension



### Note:

The dimensions in parentheses are for reference purposes.

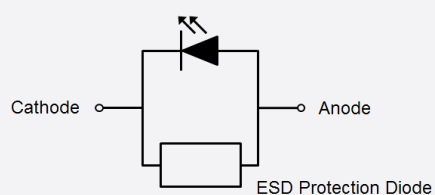
Notes: Unit: mm, Tolerance:  $\pm 0.1\text{mm}$ , Approximate Weight : 3.2mg

### 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

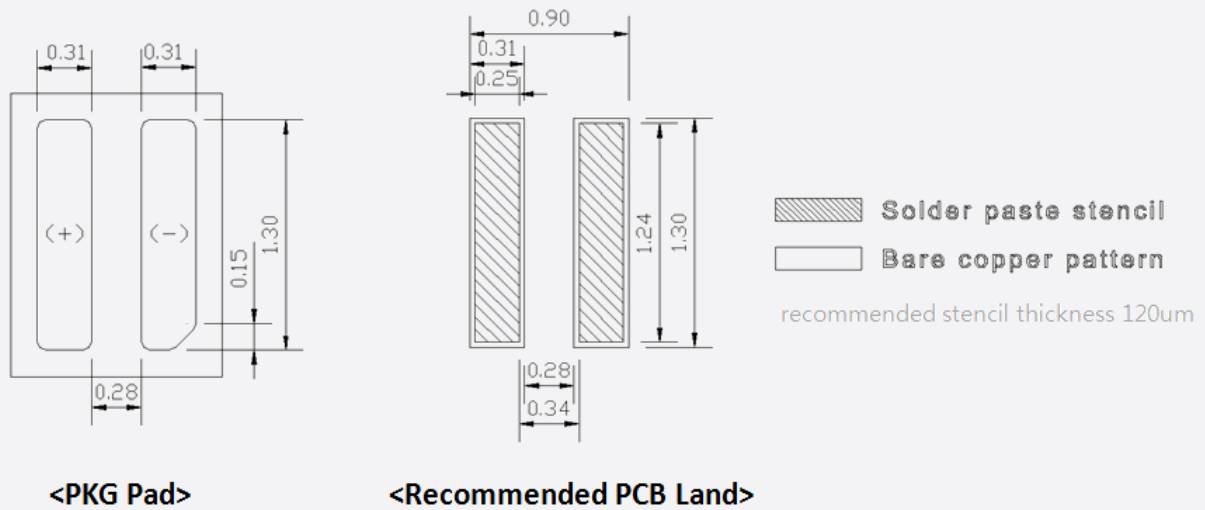


### c) Material Information

Description	Material
Substrate	Cu Lead Frame
LED Die	Flip Chip
Phosphor	Phosphor
Zener Diode	Silicon
Wire	Au
Resin Mold	Silicone

## 6. Soldering Conditions

### a) Pad Configuration & Solder Pad Layout

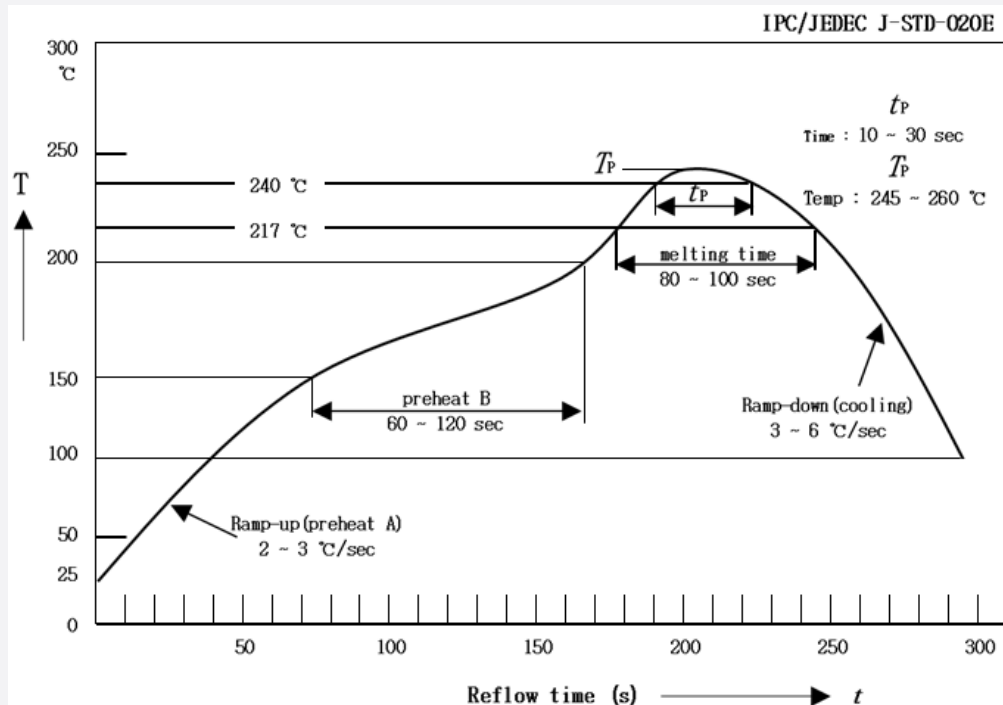


**Notes:** Tolerance :  $\pm 0.10$  mm, recommended stencil thickness 120  $\mu$ m

Unit: mm

### b) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



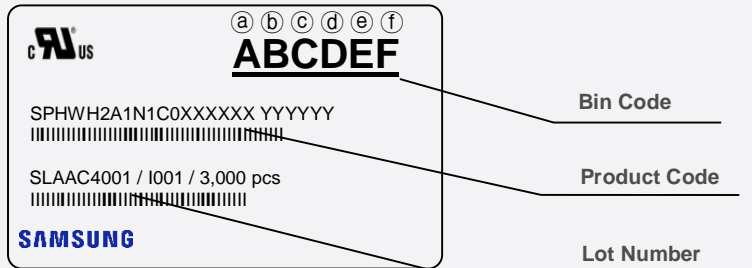
### c) Manual Soldering Conditions

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



## 8. Label Structure

### a) Label Structure



Note: Denoted bin code and product code above is only an example (see description on page 5)

Bin Code:

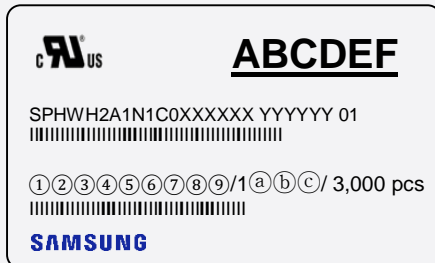
ⒶⒷ: Forward Voltage bin (refer to page 5)

ⒸⒹ: Chromaticity bin (refer to page 6)

ⒺⒻ: Luminous Flux bin (refer to page 5)

### b) Lot Number

The lot number is composed of the following characters:

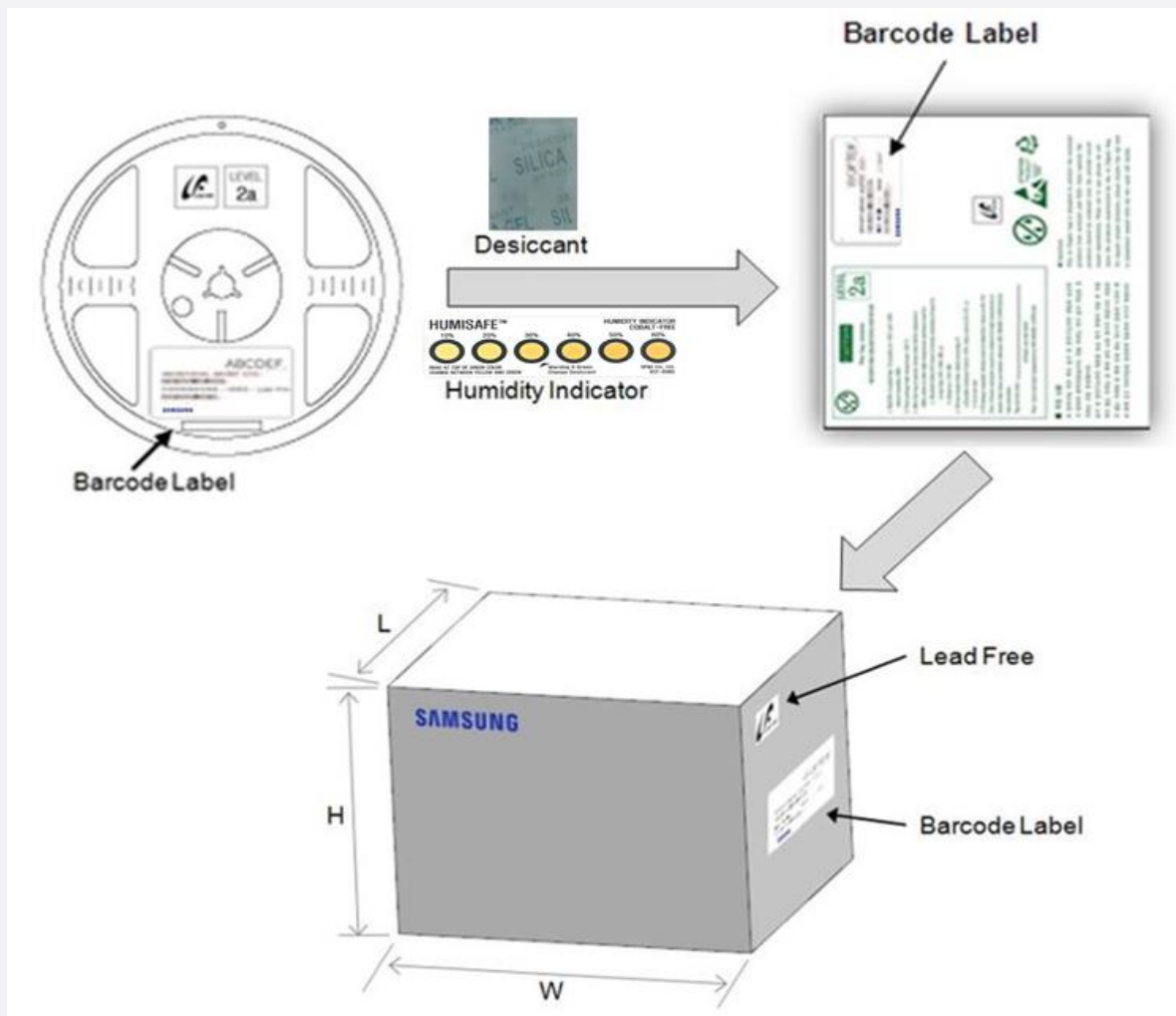


①②③③②③④⑤⑥⑦⑧⑨ / 1ⒶⒷⒸ / 3,000 pcs

①②	: Production site
③	: Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
④	: Year (D: 2019, E: 2020, F: 2021...)
⑤	: Month (1~9, A, B, C)
⑥	: Day (1~9, A, B~V)
⑦⑧⑨	: Serial number (001 ~ 999)
ⒶⒷⒸ	: Product serial number (001 ~ 999)

## 9. Packing Structure

### a) Packing Process



Dimension of Transportation Box in mm

Width	Length	Height
220	245	182

## 10. Precautions in Handling & 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 Electronics, they should be packed by a sealed container with nitrogen gas injected. (Shelf life of sealed bags: 12 months, temp.  $\sim 40^{\circ}\text{C}$ ,  $\sim 90\%$  RH)
- 5) After storage bag is open, device subjected 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  $30^{\circ}\text{C}$  /  $60\%$  RH.
  - b. Stored at  $<10\%$  RH.
- 6) Repack unused products using anti-moisture packing, fold to close any openings and store in a dry place with  $<10\%$  RH
- 7) Devices require baking before mounting, if humidity card reading is  $>60\%$  at  $23\pm 5^{\circ}\text{C}$ .
- 8) Devices must be baked for 1 day at  $60\pm 5^{\circ}\text{C}$ , 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) 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) Risk of Sulfurization (or Tarnishing)

The lead frame from Samsung Electronics is a plated package and it may change to black(or dark colored) when it is exposed to Ag (a), Sulfur (S), Chlorine (Cl) or other halogen compound. It requires attention.

Sulfide (Sulfurization) of the lead frame may cause a change of degradation intensity, chromaticity coordinates and it may cause open circuit in extreme cases. It requires attention.

Sulfide (Sulfurization) of the lead frame may cause of storage and using with oxidizing substances together.

Therefore, LED is not recommend to use and store with the below list. : Rubber, Plain paper, lead solder cream etc.

## 11. Company Information

# SAMSUNG

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