

High Power LED FX Series

# 1W Amber SPHAMTA1N1Co



## Features & Benefits

- 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 Deg.
- Qualifications: The product qualification test based on the guidelines of AEC-Q102.

**SAMSUNG**

## Table of Contents

1.	Characteristics	-----	3
2.	Product Code Information	-----	4
3.	Typical Characteristics Graphs	-----	7
4.	Soldering Temperature Location	-----	11
5.	Mechanical Dimension	-----	12
6.	Soldering Conditions	-----	13
7.	Tape & Reel	-----	14
8.	Label Structure	-----	15
9.	Packing Structure	-----	16
10.	Precautions in Handling & Use	-----	17
11.	Company Information	-----	18

## 1. Characteristics

### a) Typical Characteristics

Item	Symbol	Value	Unit.
Luminous Flux ( $I_F = 350 \text{ mA}$ )	$I_m$	Typ. 75	lm
Forward Voltage ( $I_F = 350 \text{ mA}$ )	$V_F$	Typ. 3.2	V
Viewing Angle	$\varphi$	Typ. 120	Deg
Reverse Current	$I_R$	Not designed for reverse operation	
Real Thermal Resistance (Junction to Solder point)	$R_{th\_J-S} \text{ (Real)}$	7.6	K/W
		8.2	
Electrical Thermal Resistance (Junction to Solder point)	$R_{th\_J-S} \text{ (Elec.)}$	6.0	K/W
		6.5	
Radian Surface	A	0.70	$\text{mm}^2$

**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	$^{\circ}\text{C}$
Storage Temperature	$T_{stg}$	-40 ~ +125	$^{\circ}\text{C}$
LED Junction Temperature	$T_j$	150	$^{\circ}\text{C}$
Maximum Forward current <sup>[2]</sup> ( $T_j$ : 25 $^{\circ}\text{C}$ ) <sup>[3]</sup>	$I_F$	700	mA
Minimum Forward current <sup>[2]</sup> ( $T_j$ : 25 $^{\circ}\text{C}$ ) <sup>[3]</sup>	$I_F$	50	mA
Maximum Reverse current		Do not apply for reverse current	
ESD Sensitivity <sup>[4]</sup>	-	$\pm 8 \text{ HBM}$	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	A	M	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 (AM for automotive amber 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 <sup>[5]</sup> ( $I_F= 350 \text{ mA}$ ,  $T_j= 25^\circ\text{C}$ )**

Symbol	Bin Code	Flux Range (lm)	
		Min	Max
$\Phi$	C1	60	70
	D1	70	80
	E1	80	90

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

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

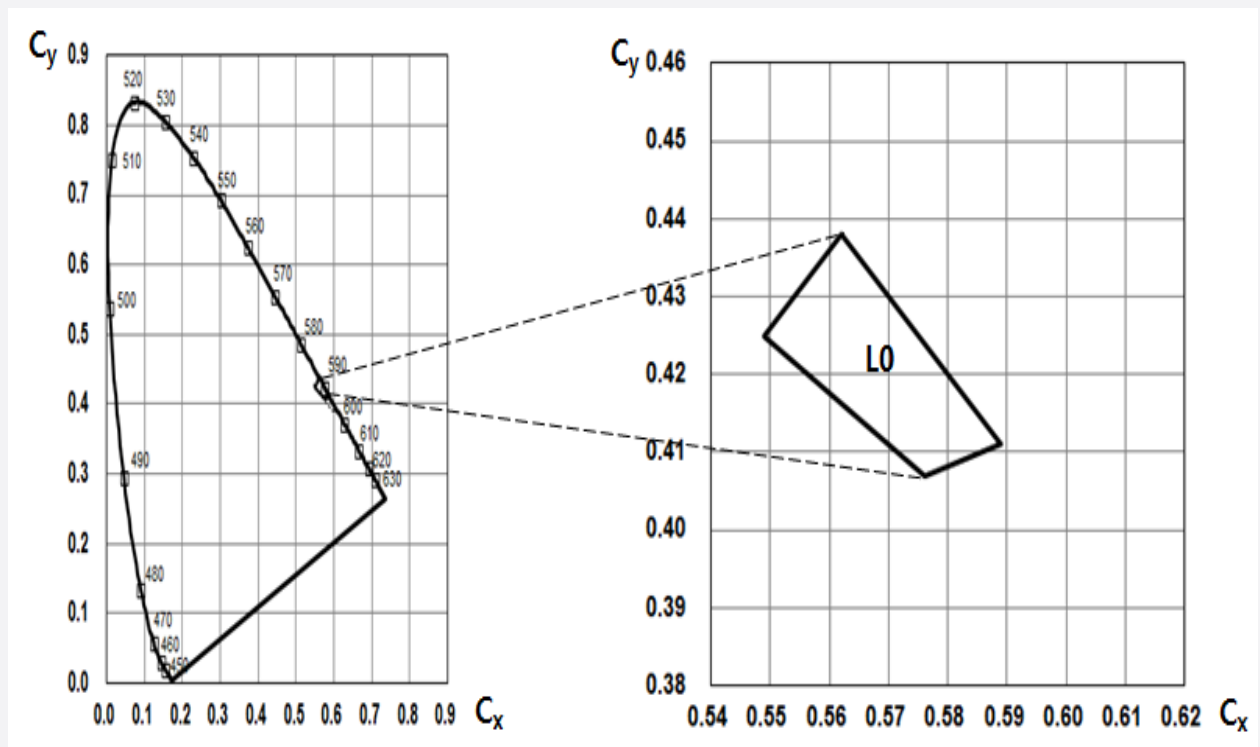
$\Phi_V$  and  $V_F$  tolerances are  $\pm 7\%$  and  $\pm 0.1 \text{ V}$ , respectively.

### 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

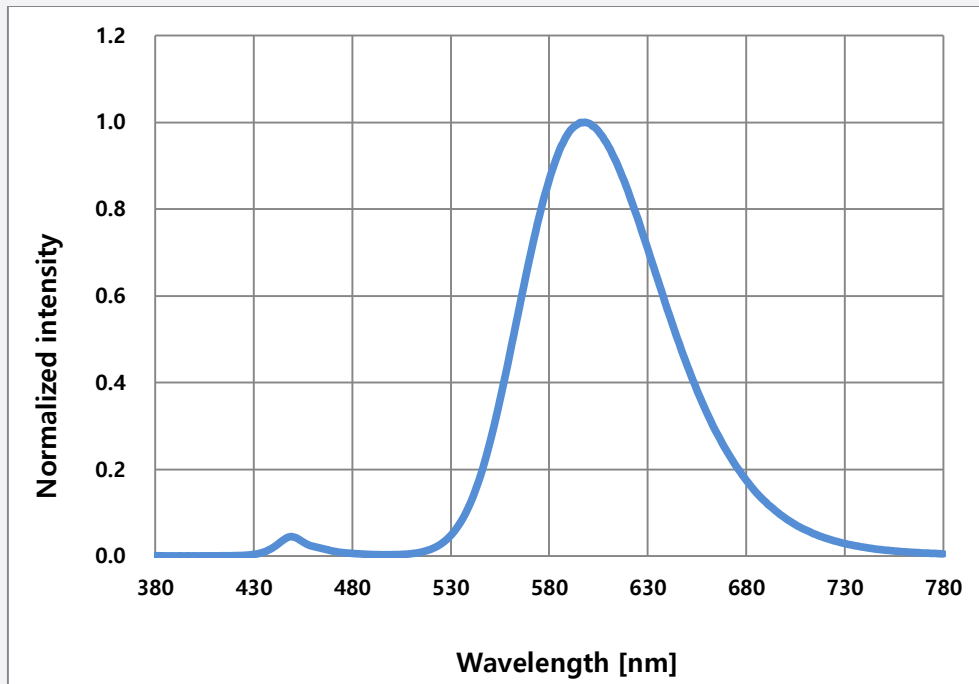
#### Note

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

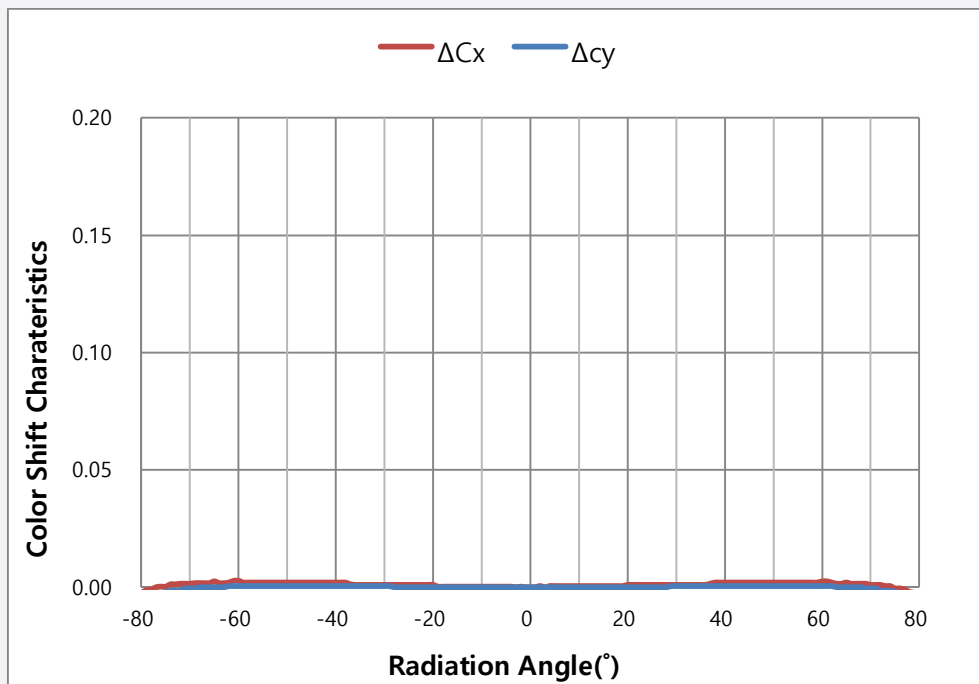


### 3. Typical Characteristics Graphs

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



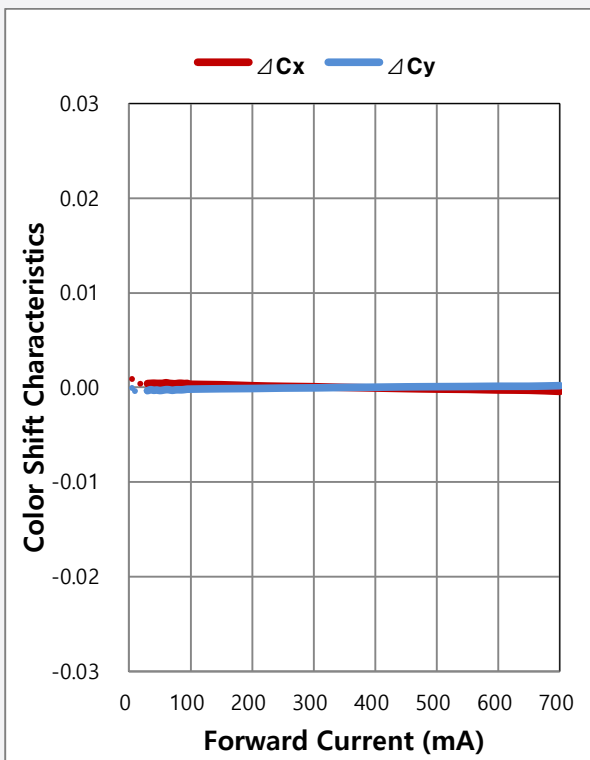
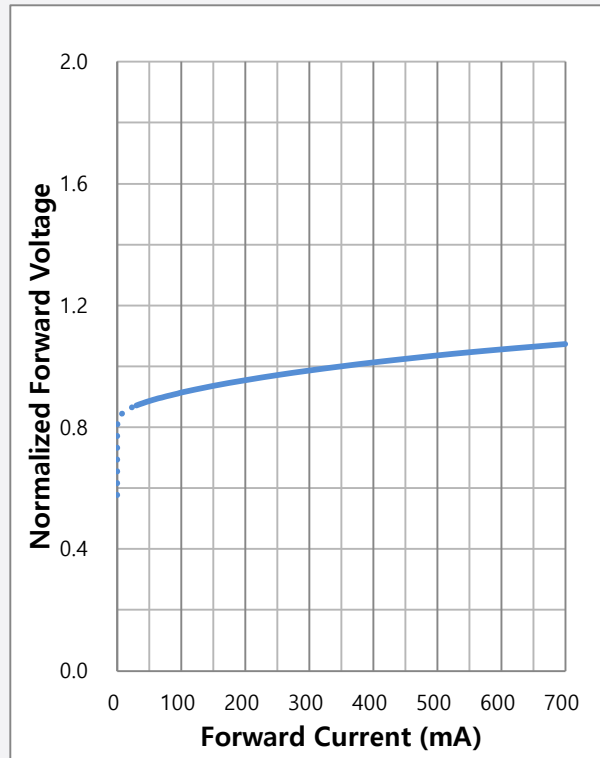
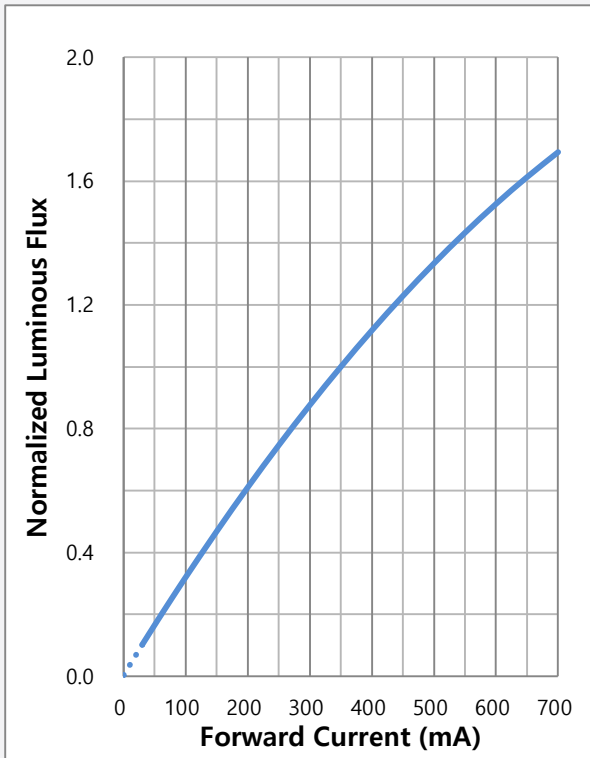
b) Typical Chromaticity Coordinate Shift vs Radiation Angle ( $I_F= 350 \text{ mA}$ ,  $T_s= 25 \text{ }^\circ\text{C}$ )<sup>[7]</sup>



**Note:**

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

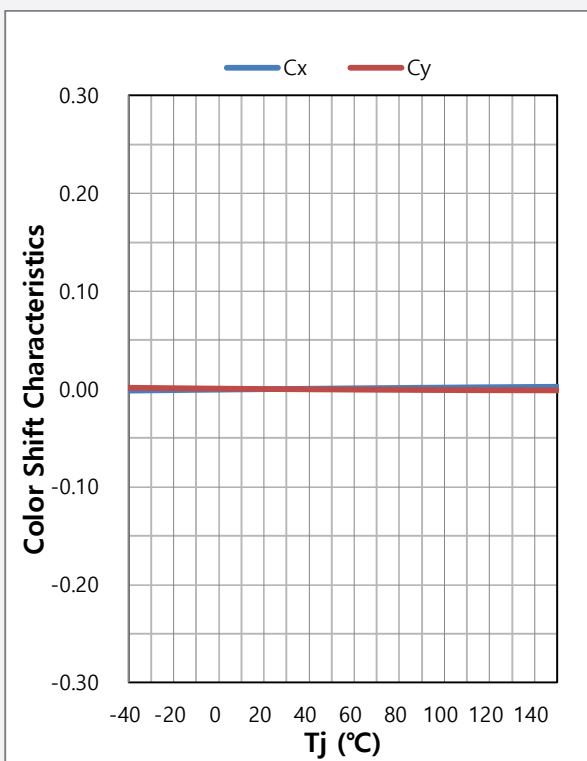
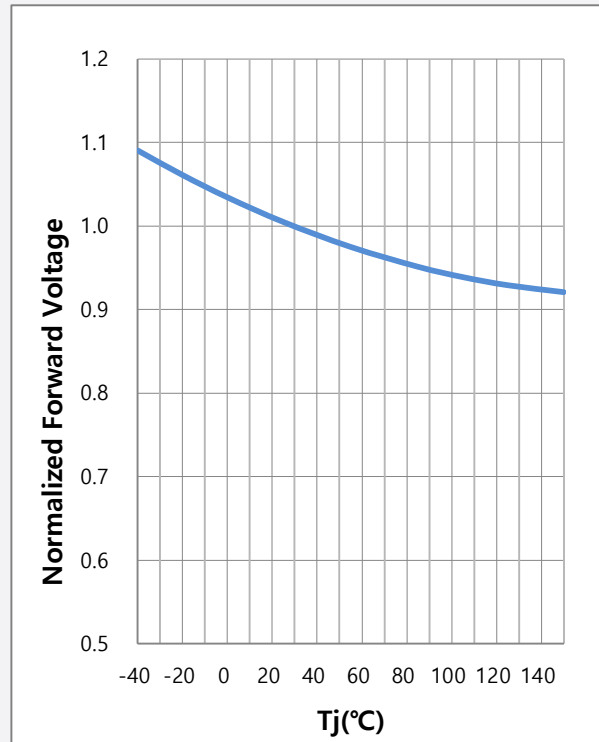
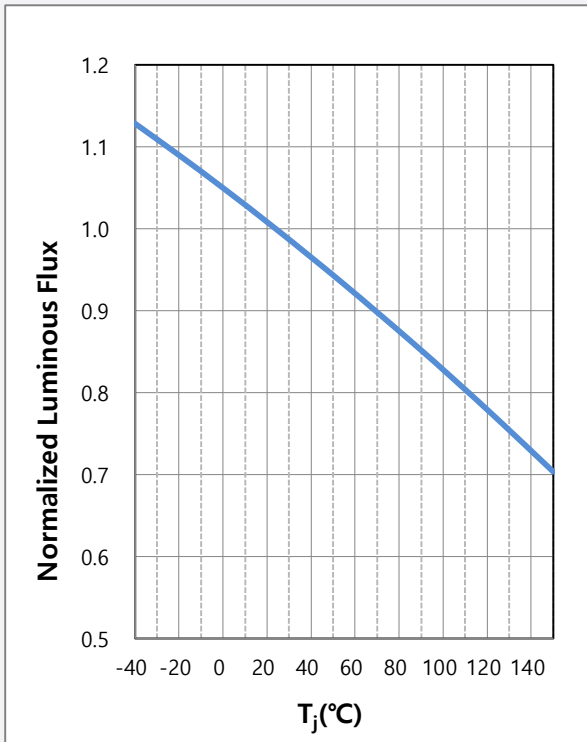
c) Forward Current Characteristics ( $T_s = 25\text{ }^\circ\text{C}$ )<sup>[8]</sup>

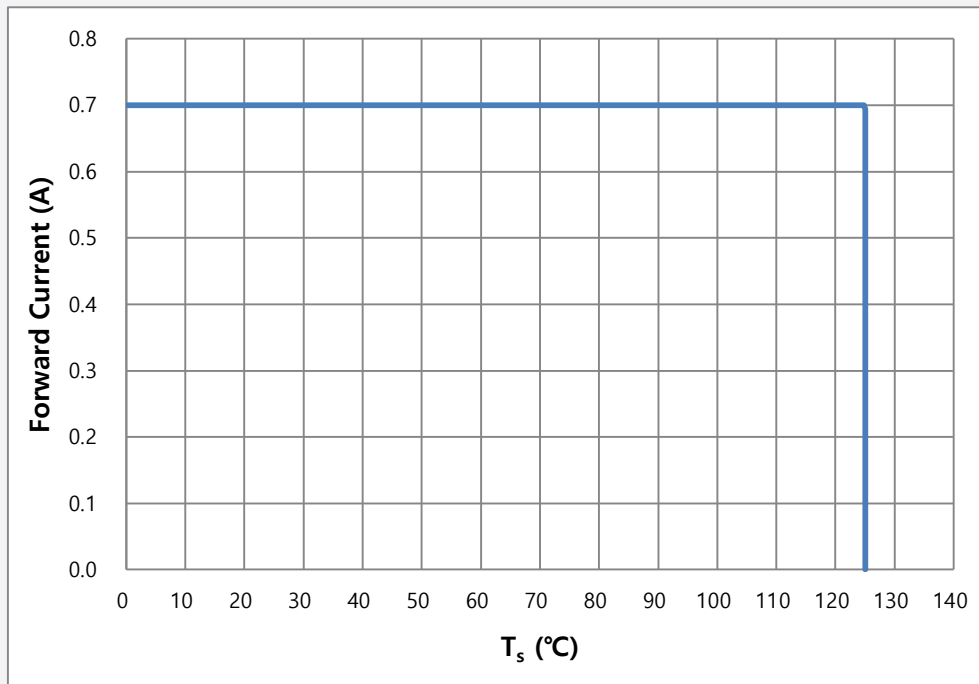


Note:

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

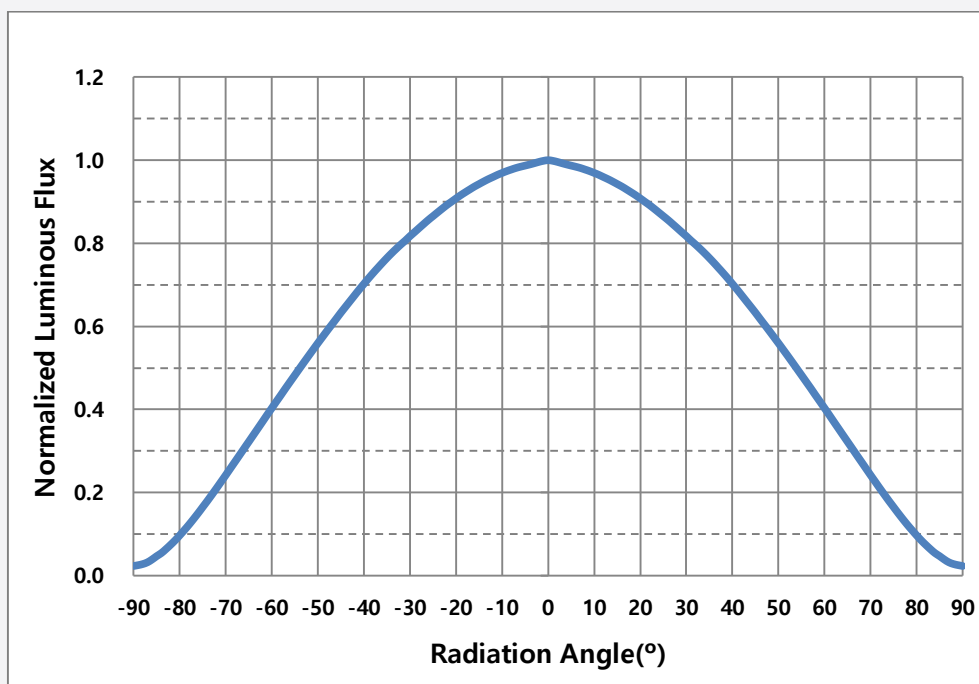


**d) Temperature Characteristics ( $I_F = 350$  mA)**

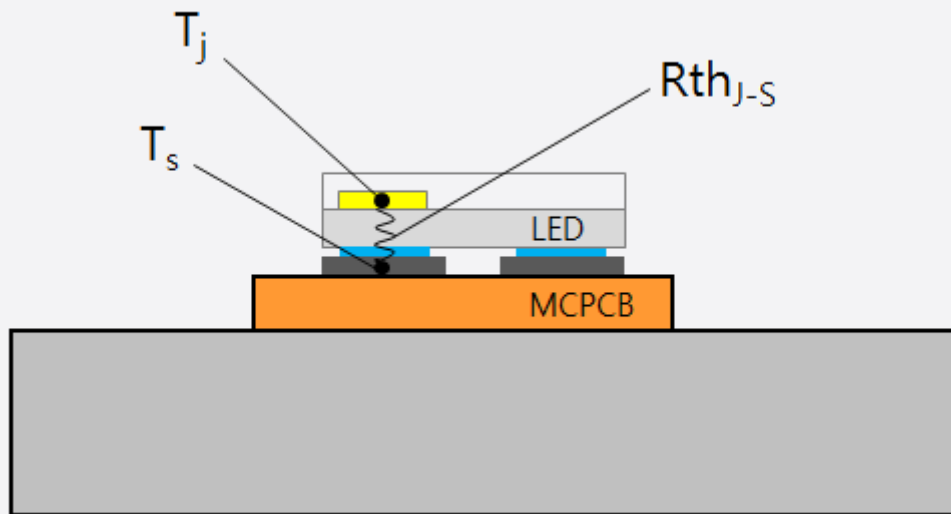
**e) Derating Curve<sup>[9]</sup>**

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,  $T_s = 25$  °C)**

#### 4. Soldering Temperature Location

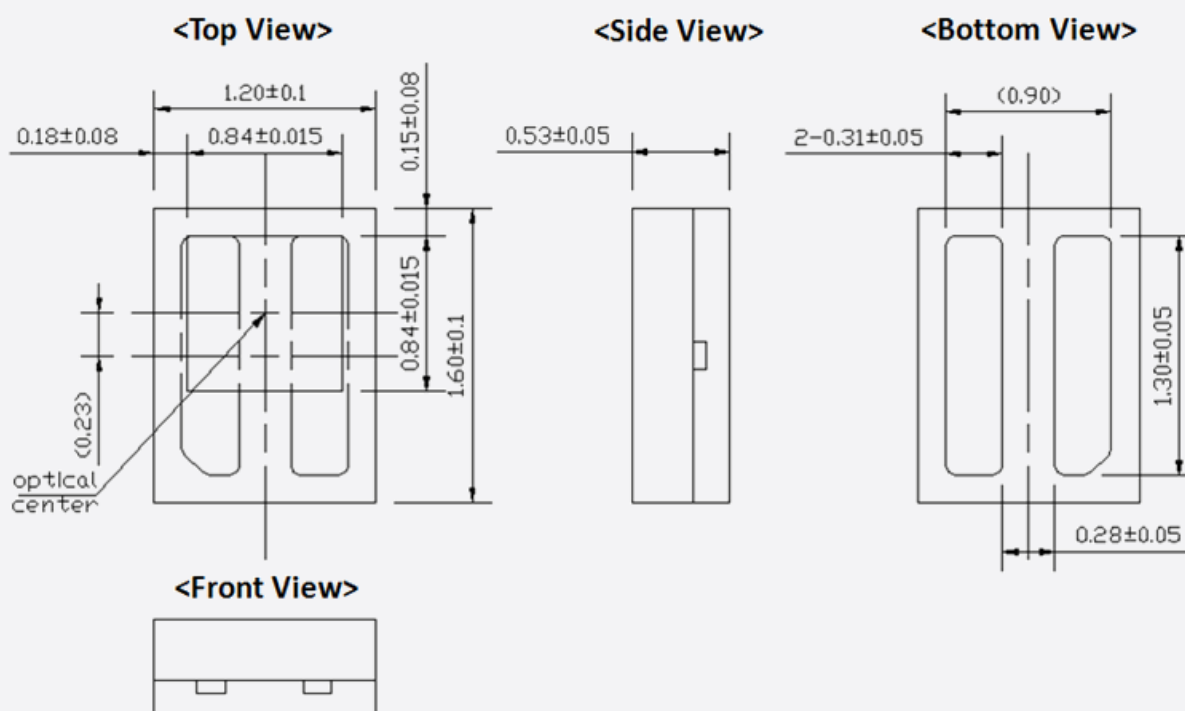


$T_j$ : Temperature of Junction

$T_s$ : 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.

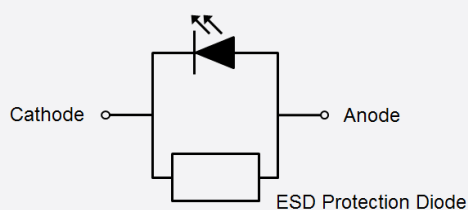
Unit: mm

### 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

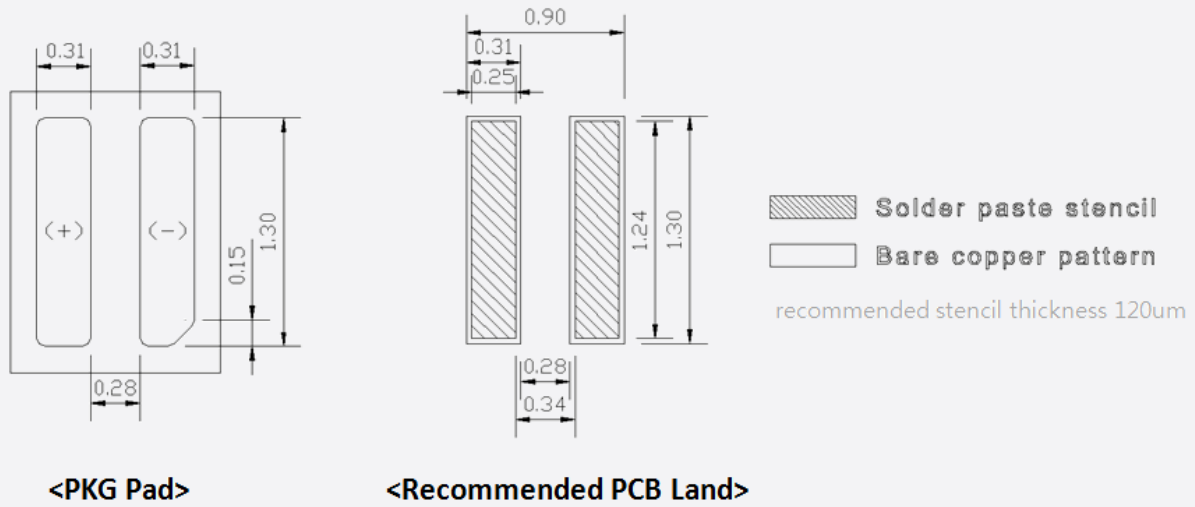


### c) Material Information

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

## 6. Soldering Conditions

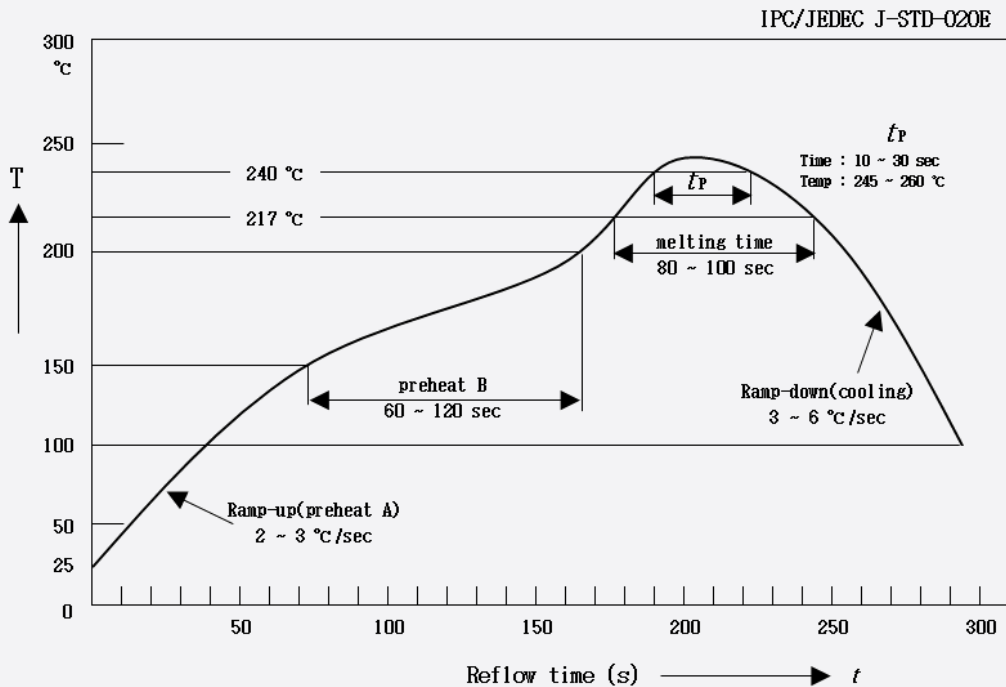
### a) Pad Configuration & Solder Pad Layout



Notes: Unit: mm

### b) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.

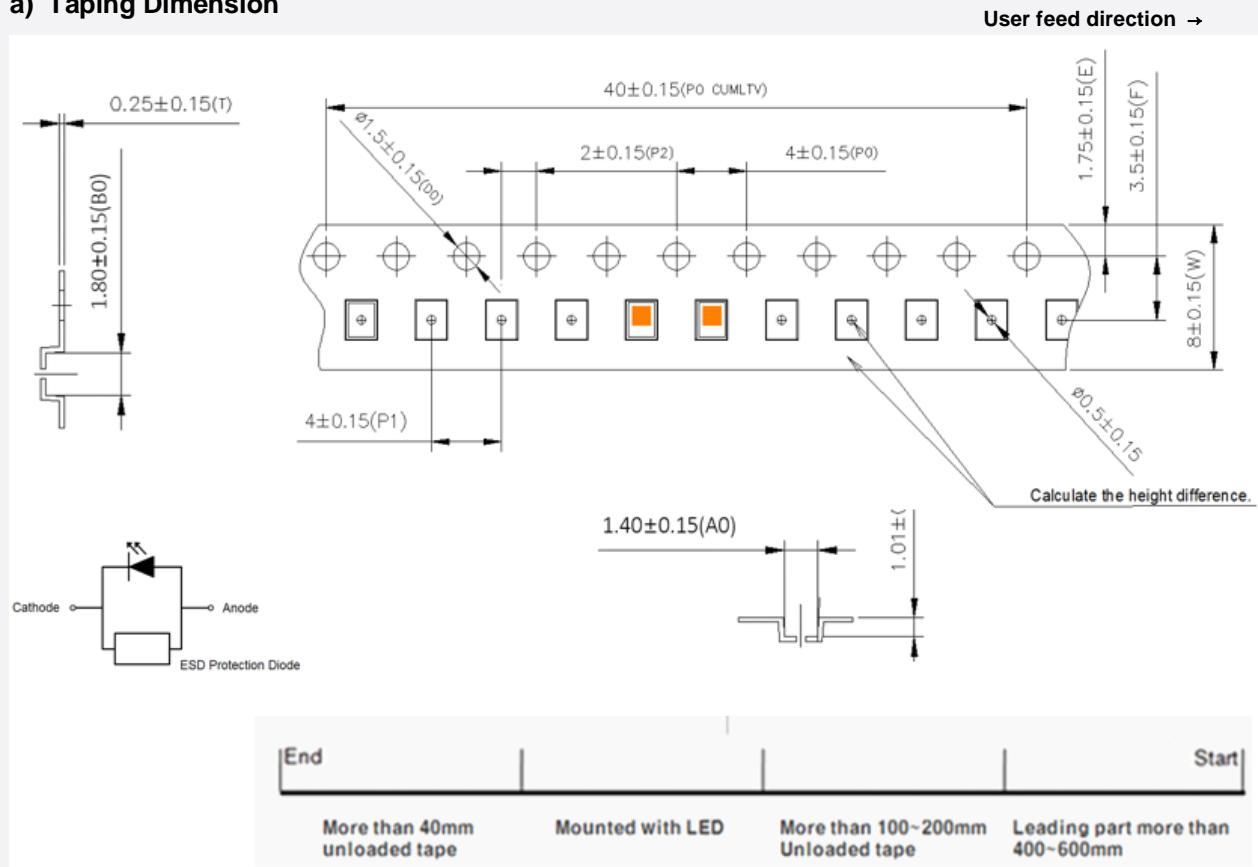


### c) Manual Soldering Conditions

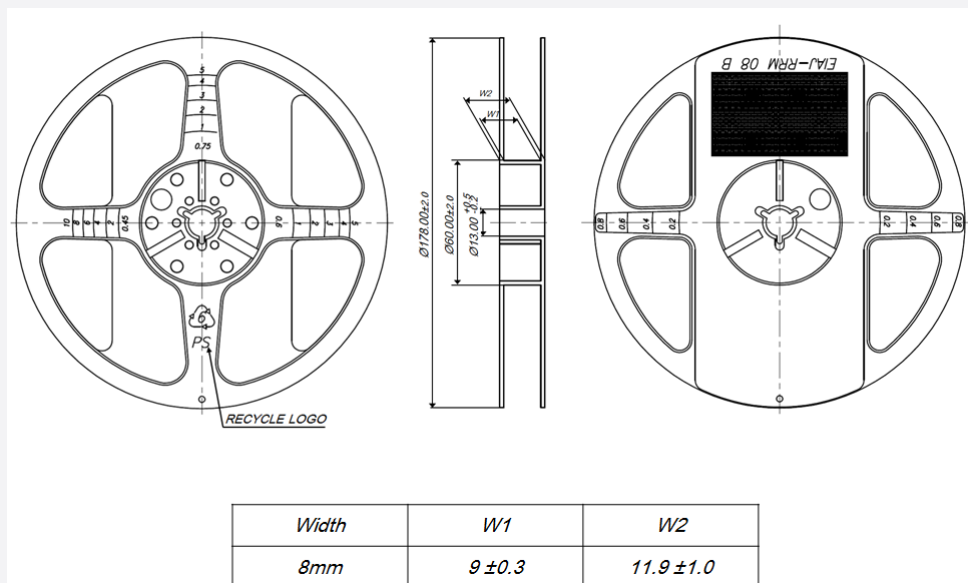
Not more than 5 seconds @ max 300 °C, under soldering iron. (One time only)

## 7. Tape & Reel

### a) Taping Dimension



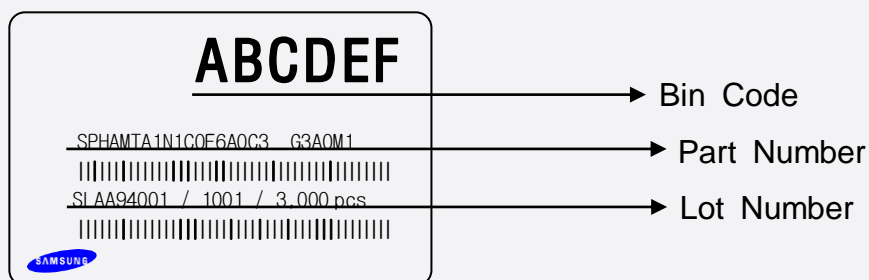
### b) Reel Dimension



Notes:  
Unit: mm

## 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)

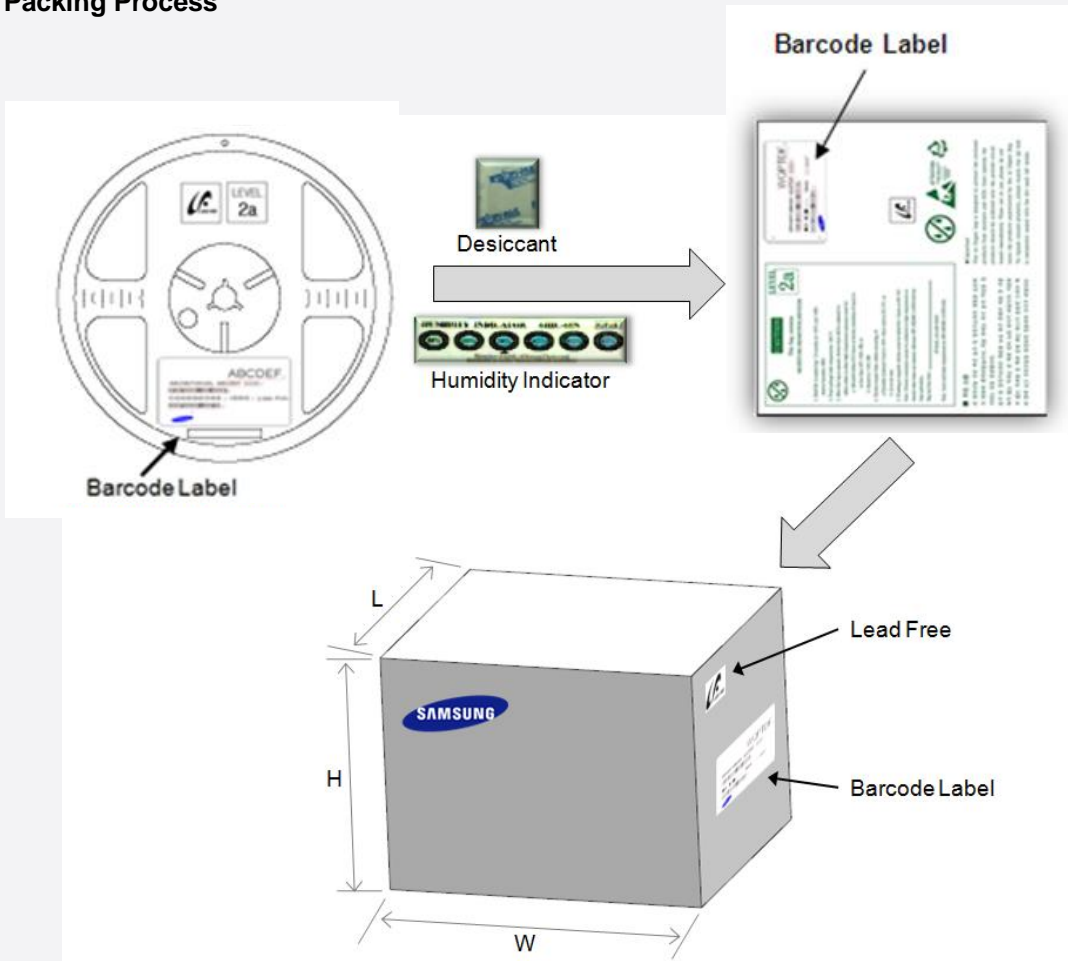
### c) Lot Number Structure

The lot number is composed of the following characters:

No.	Information
1	Production Site : S - SAMSUNG LED, G:GOSIN CHINA
2	Production Site : L – Giheung Korea
3	Product State 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 °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 is >60% at 23± °C
- 8) Devices must be baked for 1 day at 60±5 °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) 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

**Copyright @1995-2017** All rights reserved  
**Samsung Electronics LED BUSINESS**  
1, Samsung-ro Giheung-gu  
Yongin-si, Gyeonggi-do 17113 Korea

**<http://www.samsung.com/sec/business/#>**  
**Sales Contact : cpim@samsung.com**

### **US**

Samsung Semiconductor, Inc.  
7000 Central Parkway NE, Sandy Springs, GA 30328, United  
Tel : +1 678 892 7385

### **Europe**

Samsung Semiconductor Europe GmbH  
Kölner Straße 12, 65760 Eschborn, Germany  
Tel : +49 6196 66 3902

### **Japan**

Samsung Japan Corporation  
10F, Shinagawa Grand Central Tower 2-16-4, Kounan,  
Minato-ku, Tokyo 108-8240, Japan  
Tel : +81 3 6369 6262

### **China(Shenzhen)**

Samsung Electronics Co., Ltd.(Shenzhen office)  
25-26F, Tower A, SCC Financial Center, No.88, Haide 1st Road,  
Nanshan District, Shenzhen, Guangdong Province, P.R.C  
(518064)  
Tel : +86 755 8608 5674

# SAMSUNG

# Legal and additional information.

## [About Samsung Electronics Co., Ltd.](#)

Samsung inspires the world and shapes the future with transformative ideas and technologies. The company is redefining the worlds of TVs, smartphones, wearable devices, tablets, digital appliances, network systems, and memory, system LSI, foundry and LED solutions. For the latest news, please visit the Samsung Newsroom at [news.samsung.com](http://news.samsung.com).

Copyright © 2018 Samsung Electronics Co., Ltd. All rights reserved.  
Samsung is a registered trademark of Samsung Electronics Co., Ltd.  
Specifications and designs are subject to change without notice. Non-metric weights and measurements are approximate. All data were deemed correct at time of creation. Samsung is not liable for errors or omissions. All brand, product, service names and logos are trademarks and/or registered trademarks of their respective owners and are hereby recognized and acknowledged.

Samsung Electronics Co., Ltd.  
95, Samsung 2-ro  
Giheung-gu  
Yongin-si, Gyeonggi-do, 446-711  
KOREA

[www.samsungled.com](http://www.samsungled.com)

**SAMSUNG**