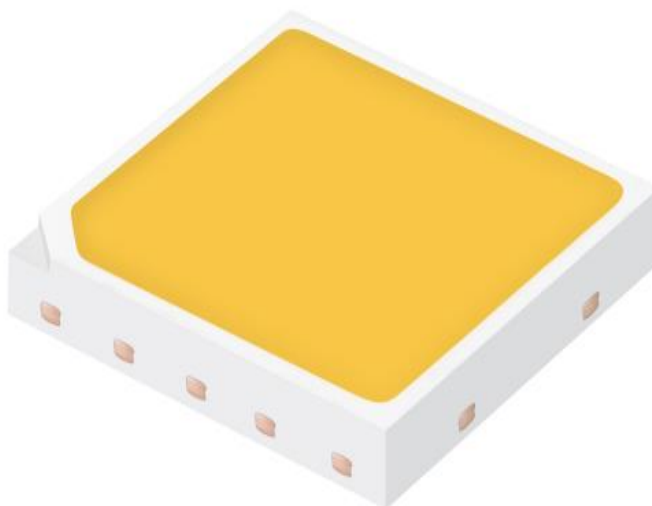


High Power LED Series

# LH508C ECO General



High efficacy and lumen makes

The LH508C ECO suitable for Streetlight and High-bay applications

## Features & Benefits

- Operates at a maximum current of up to 220mA
- Uniform light distribution under any beam angle
- Color binning @ 85°C



## Table of Contents

1.	Characteristics	-----	3
2.	Product Code Information	-----	5
3.	Typical Characteristics Graphs	-----	9
4.	Outline Drawing & Dimension	-----	11
5.	Reliability Test Items & Conditions	-----	12
6.	Soldering Conditions	-----	13
7.	Tape & Reel	-----	14
8.	Label Structure	-----	16
9.	Packing Structure	-----	17
10.	Precautions in Handling & Use	-----	19

## 1. Characteristics

### a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Operating Temperature	T <sub>opr</sub>	-40 ~ +105	°C	
Storage Temperature	T <sub>stg</sub>	-40 ~ +100	°C	-
LED Junction Temperature	T <sub>j</sub>	125	°C	-
Forward Current	I <sub>F</sub>	220	mA	-
Peak Pulse Forward Current	I <sub>FP</sub>	300	mA	Duty cycle≤1/10, pulse width 10ms
Soldering Temperature		260 <10	°C	-
Electrostatic Discharge Withstand Voltage(HBM)	ESD(HBM)	±2	kV	-

### b) Electro-optical Characteristics ( I<sub>F</sub> = 160 mA, T<sub>j</sub> = 25°C )

Item	Unit	Rank	Min.	Typ.	Max.
Forward Voltage (V <sub>F</sub> )	V	XE	23.5	-	25.5
Color Rendering Index (R <sub>a</sub> ) / R9	-	3	70 / -50	-	-
		5	80 / 0		
Thermal Resistance (junction to chip point)	°C/W		-	3	-
Beam Angle	°			120	

#### Notes:

Samsung maintains measurement tolerance of: luminous flux = ±7 %, forward voltage = ±5%, CRI = ±3, R9 = ±6.5

c) Luminous Flux Characteristics ( $I_F = 160 \text{ mA}$ )

CRI (Ra) Min.	Nominal CCT (K)	Flux Rank	Flux @ $T_J = 25 \text{ }^\circ\text{C}$ (lm)		
			Min.	Typ.	Max.
70	2200K	A4	560		
	2700K	A4	620		
	3000K	A4	640		
	3500K	A4	650		
	4000K	A4	660		
	5000K	A4	660		
	5700K	A4	650		
	6500K	A4	640		
80	2200K	A4	470		
	2700K	A4	550		
	3000K	A4	580		
	3500K	A4	600		
	4000K	A4	610		
	5000K	A4	610		
	5700K	A4	600		
	6500K	A4	600		

**Notes:**

- 1) Tested in pulsed operating condition at rated test current (10 ms pulse width) and rated temperature
- 2) Samsung maintains measurement tolerance of: Luminous flux =  $\pm 7 \%$ , CRI =  $\pm 1$ , R9 =  $\pm 6.5$

## 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	1	L	5	N	6	0	3	X	E	T	5	A	4

Digit	PKG Information	Code	Specification			
1 2 3	Samsung Package High Power	SPH	High Power PKG			
4 5	Color	WH	White			
6	Product Version	1	1st Version			
7 8	Form Factor	L5	5050 size			
9	Lens Type	N	No lens			
10	Model	6	5050 Series			
11	Internal Code	0				
12	CRI	3	Min. 70			
		5	Min. 80			
13 14	Forward Voltage (V)	XE	Bin code	D1	23.5 – 24.5	
				E1	24.5 – 25.5	
15	CCT (K)	Y	2200K			
		W	2700K			
		V	3000K			
		U	3500K			
		T	4000K			
		R	5000K			
		Q	5700K			
		P	6500K			
16	MacAdam Step	3	MacAdam 3-Step			
		5	MacAdam 5-Step			
17 18	Luminous Flux (lm)	A4	508C ECO			

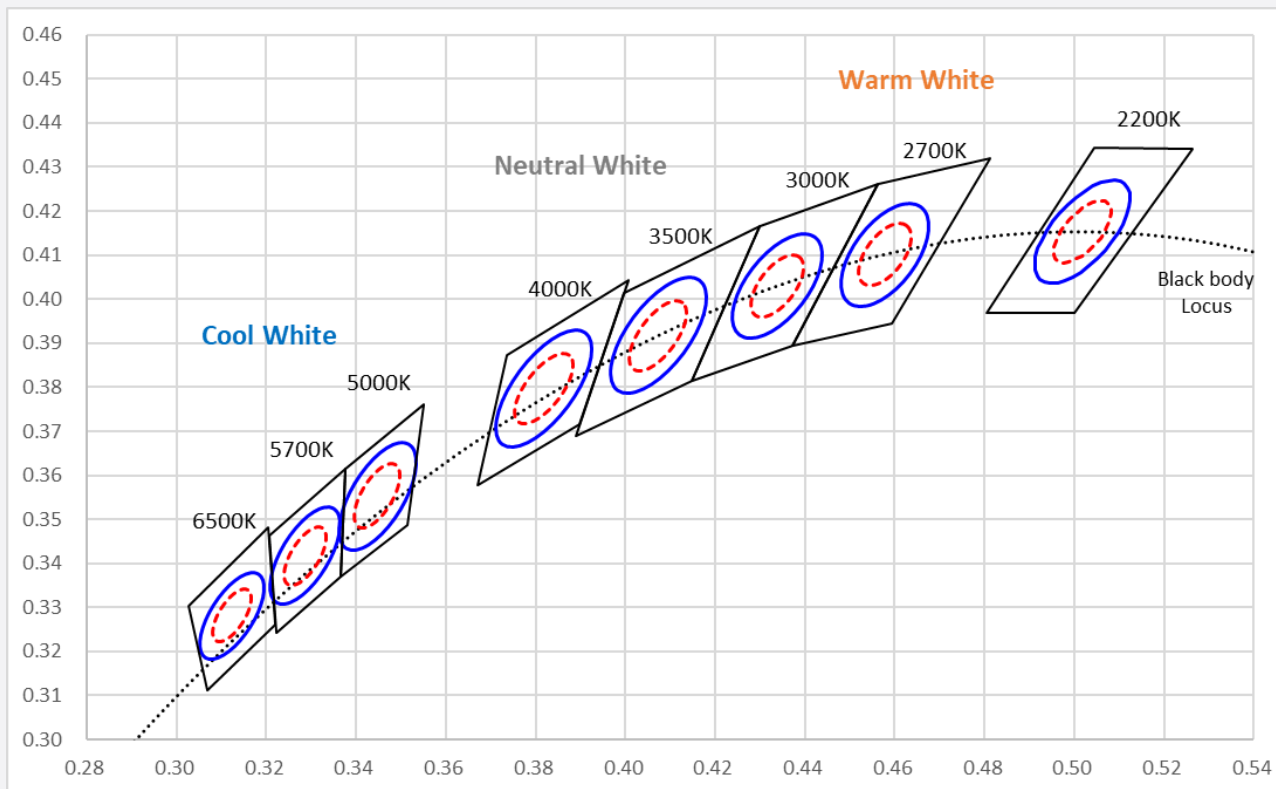
a) Luminous flux Rank (  $I_f = 160 \text{ mA}$ ,  $T_j = 25^\circ\text{C}$  )

CRI (Ra) Min.	Nominal CCT(K)	Product Code	VF Rank	Chrom Rank (Bins)	Flux		Flux Range ( $\Phi_v$ , lm)				
					Rank	Bins					
70	2200	SPHWH1L5N603XEY3A4	XE	Y3, Y5	A4		56	560-600			
		SPHWH1L5N603XEY5A4					60	600-640			
	2700	SPHWH1L5N603XEW3A4		W3, W5		62	620-660				
		SPHWH1L5N603XEW5A4				66	660-700				
	3000	SPHWH1L5N603XEV3A4		V3, V5		64	640-680				
		SPHWH1L5N603XEV5A4				68	680-720				
	3500	SPHWH1L5N603XEU3A4		U3, U5		65	650-690				
		SPHWH1L5N603XEU5A4				69	690-730				
	4000	SPHWH1L5N603XET3A4		T3, T5		66	660-700				
		SPHWH1L5N603XET5A4				70	700-740				
	5000	SPHWH1L5N603XER3A4		R3, R5		66	660-700				
		SPHWH1L5N603XER5A4				70	700-740				
	5700	SPHWH1L5N603XEQ3A4		Q3, Q5		65	650-690				
		SPHWH1L5N603XEQ5A4				69	690-730				
	6500	SPHWH1L5N603XEP3A4		P3, P5		64	640-680				
		SPHWH1L5N603XEP5A4				68	680-720				
	80	2200		SPHWH1L5N605XEY3A4		XE	Y3, Y5	A4		47	470-510
				SPHWH1L5N605XEY5A4						51	510-550
2700		SPHWH1L5N605XEW3A4	W3, W5	55	550-590						
		SPHWH1L5N605XEW5A4		59	590-630						
3000		SPHWH1L5N605XEV3A4	V3, V5	58	580-620						
		SPHWH1L5N605XEV5A4		62	620-660						
3500		SPHWH1L5N605XEU3A4	U3, U5	60	600-640						
		SPHWH1L5N605XEU5A4		64	640-680						
4000		SPHWH1L5N605XET3A4	T3, T5	61	610-650						
		SPHWH1L5N605XET5A4		65	650-690						
5000		SPHWH1L5N605XER3A4	R3, R5	61	610-650						
		SPHWH1L5N605XER5A4		65	650-690						
5700		SPHWH1L5N605XEQ3A4	Q3, Q5	60	600-640						
		SPHWH1L5N605XEQ5A4		64	640-680						
6500		SPHWH1L5N605XEP3A4	P3, P5	60	600-640						
		SPHWH1L5N605XEP5A4		64	640-680						

**b) Voltage Bins (  $I_F = 160 \text{ mA}$ ,  $T_j = 25^\circ\text{C}$  )**

Nominal CCT (K)	CRI (R <sub>a</sub> ) Min.	Product Code	Voltage Rank	Voltage Bin	Voltage Range (V)
-	-	-	XE	D1	23.5 – 24.5
				E1	24.5 – 25.5

c) Chromaticity Region & Coordinates (  $I_F = 160 \text{ mA}$ ,  $T_j = 85^\circ\text{C}$  )



CRI	CCT	Rank	CIE x	CIE y	$\Phi$	A	b
70 80	2200K	Y3	0.5019	0.4153	49.3	0.0086	0.0040
		Y5				0.0144	0.0066
	2700K	W3	0.4578	0.4101	53.7	0.0081	0.0042
		W5				0.0135	0.0070
	3000K	V3	0.4338	0.4030	53.2	0.0083	0.0041
		V5				0.0138	0.0068
	3500K	U3	0.4073	0.3917	54.0	0.0093	0.0041
		U5				0.0155	0.0069
	4000K	T3	0.3818	0.3797	53.7	0.0094	0.0040
		T5				0.0157	0.0067
	5000K	R3	0.3447	0.3553	59.6	0.0082	0.0035
		R5				0.0137	0.0058
	5700K	Q3	0.3287	0.3417	59.1	0.0075	0.0032
		Q5				0.0125	0.0053
	6500K	P3	0.3123	0.3282	58.6	0.0067	0.0029
		P5				0.0112	0.0048

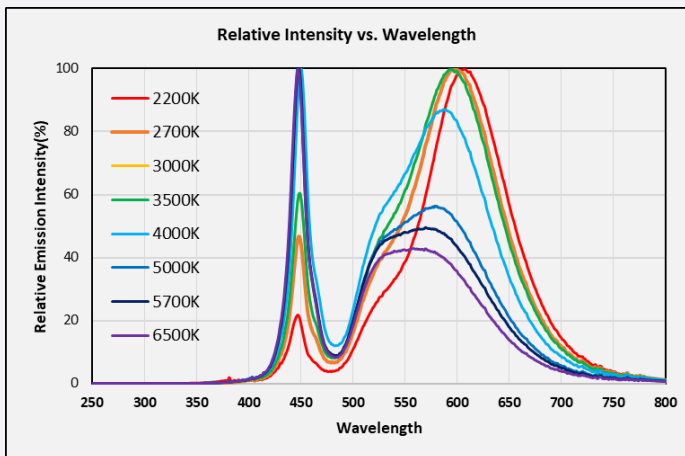
Note : Samsung maintains measurement tolerance of:  $C_x, C_y = \pm 0.005$



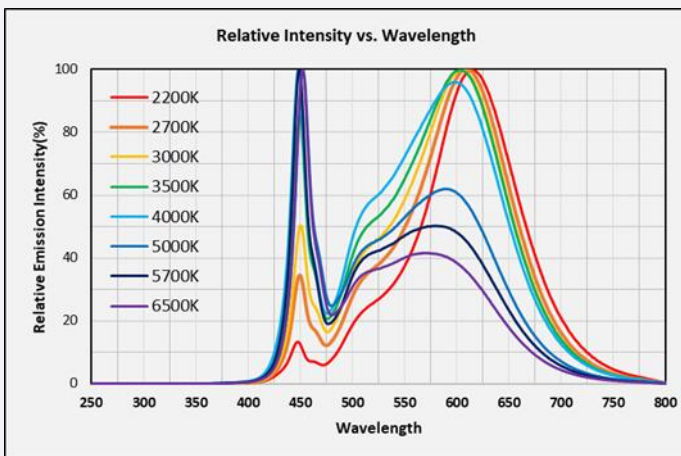
### 3. Typical Characteristic Graphs

a) Spectral Distribution ( $I_F = 160 \text{ mA}$ ,  $T_J = 25^\circ\text{C}$ )

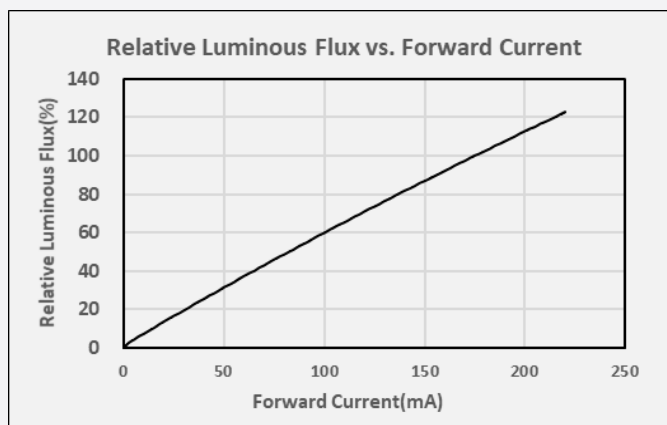
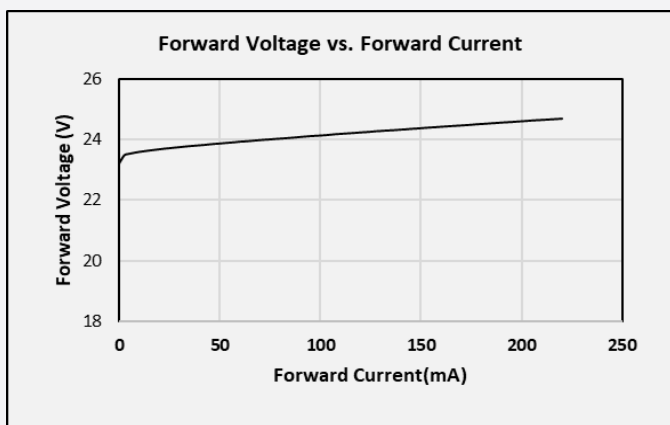
CRI70+



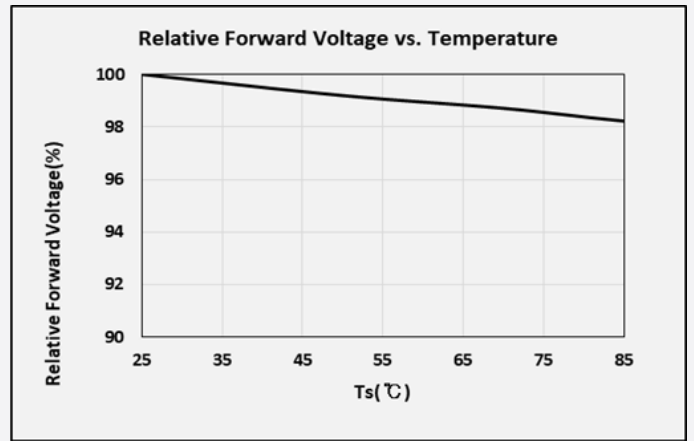
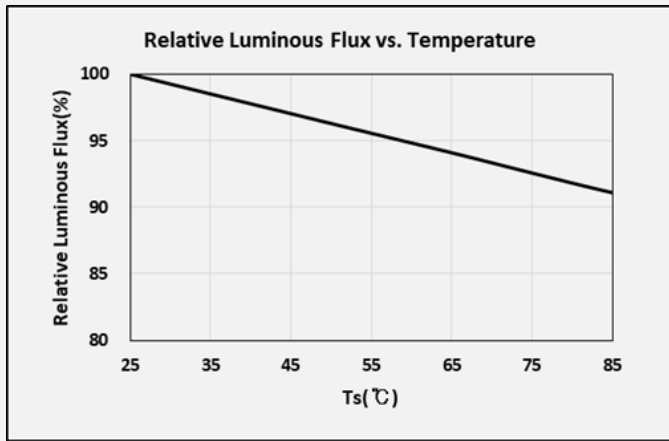
CRI80+



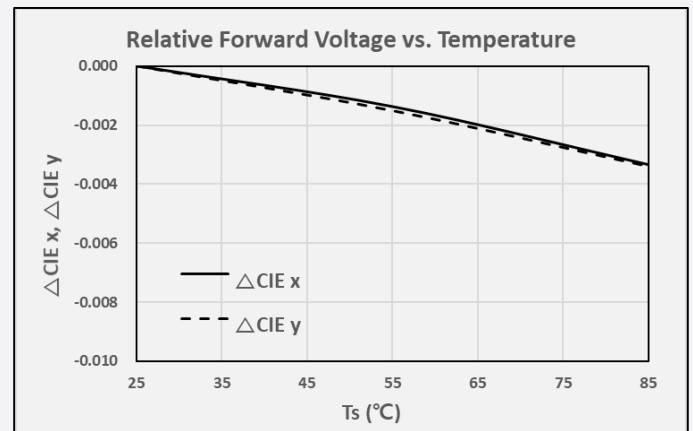
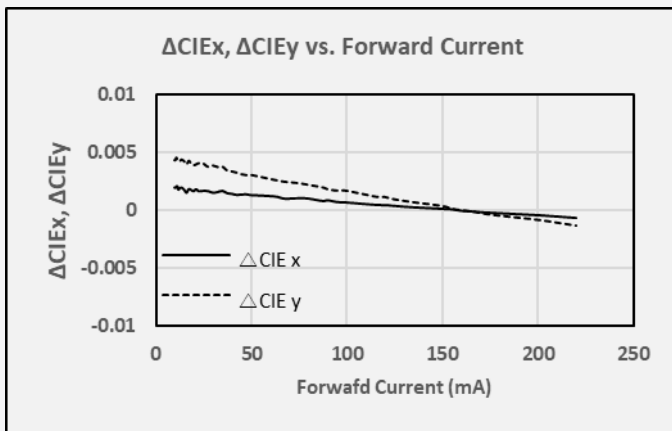
b) Forward Current Characteristics ( $T_J = 25^\circ\text{C}$ )



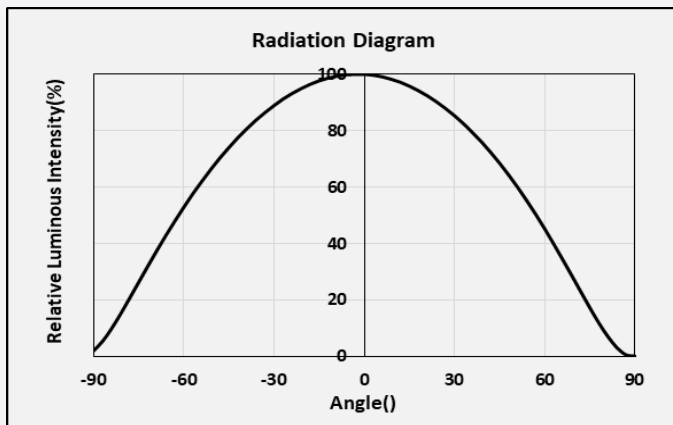
c) Temperature Characteristics ( $I_f = 160 \text{ mA}$ )



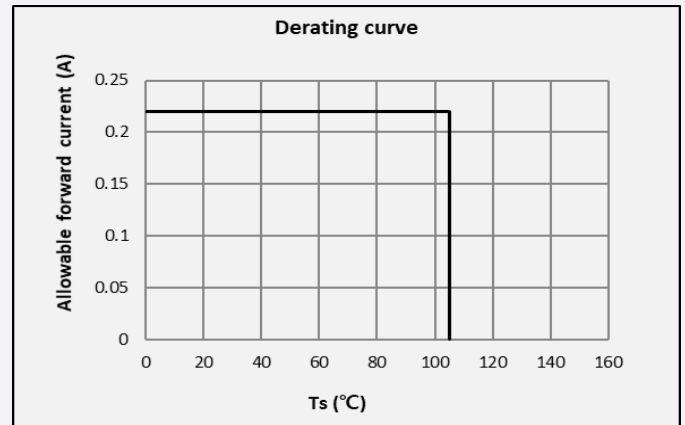
d) Color Shift Characteristics ( $I_f = 160 \text{ mA}$ ,  $T_j = 25^\circ\text{C}$ )



e) Beam Angle Characteristics ( $I_f = 160 \text{ mA}$ ,  $T_j = 25^\circ\text{C}$ )

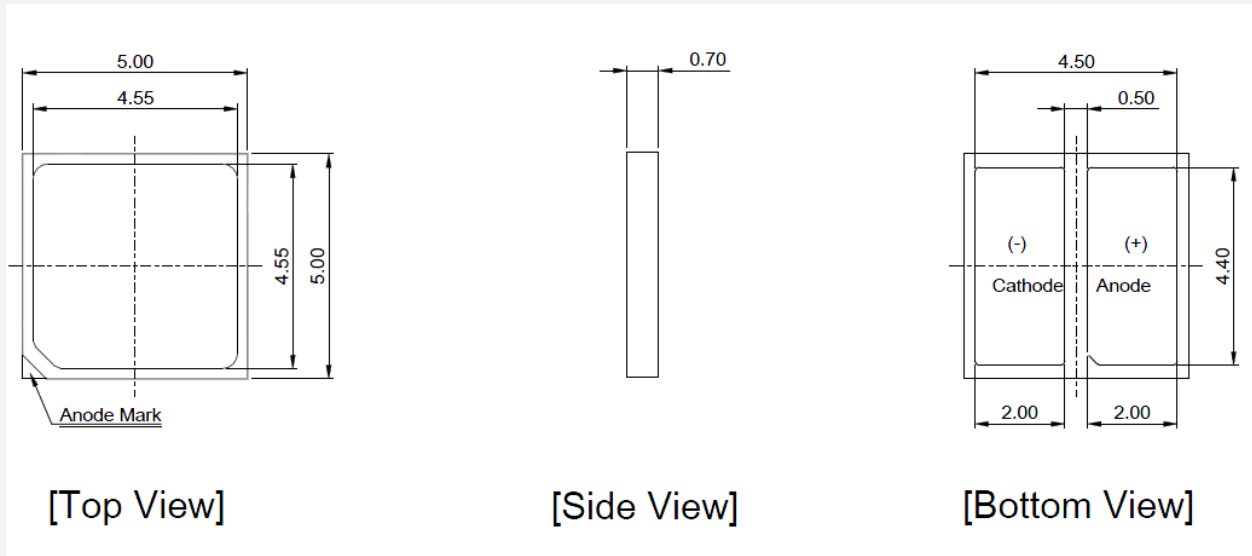


f) Derating Curve



## 4. Outline Drawing & Dimension

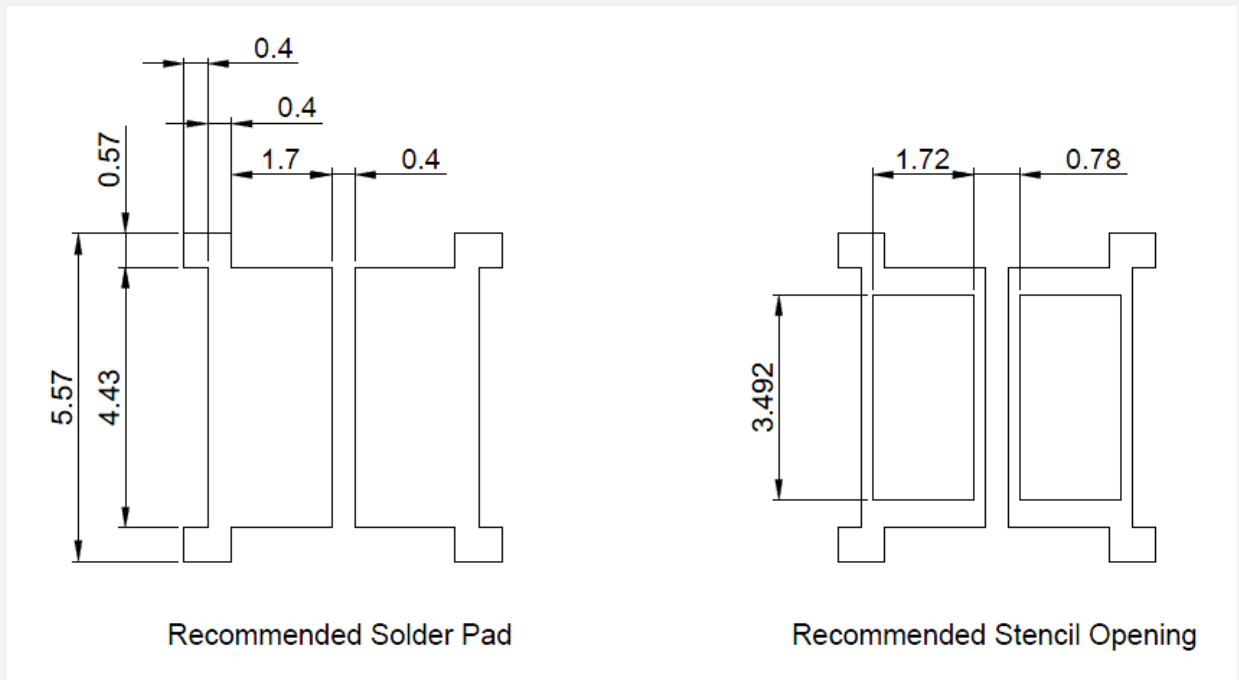
### a) Mechanical Dimensions



#### Notes:

- 1) Mark for the Anode
- 2) Unit : mm
- 3) Tolerance :  $\pm 0.1\text{mm}$

### b) Recommended Solder Pad



## 5. Reliability Test Items & Conditions

### a) Test Items

Test Item	Test Condition	Test Hour / Cycle
High Temperature Operating Life Test	85°C, 110mA	1000 h
Wet High Temperature Operating Life Test	85°C, 85 % RH, DC 110mA	1000 h
Temperature Cycling	-45°C / 15min ~ 125°C / 15min Temperature change within 5min	500 cycles
ESD (HBM)	R1: 10 MΩ R2: 1.5 kΩ C: 100 pF V: ±8 kV	5 times
Vibration Test	20~ 80 Hz (displacement: 0.06 inch, max. 20 g) 80 ~ 2 kHz (max. 20 g) min. frequency ↔ max. frequency 4 min transfer	4 times
Mechanical Shock Test	1500g, 0.5 ms each of the 6 surfaces (3 axis x 2 sides)	5 times

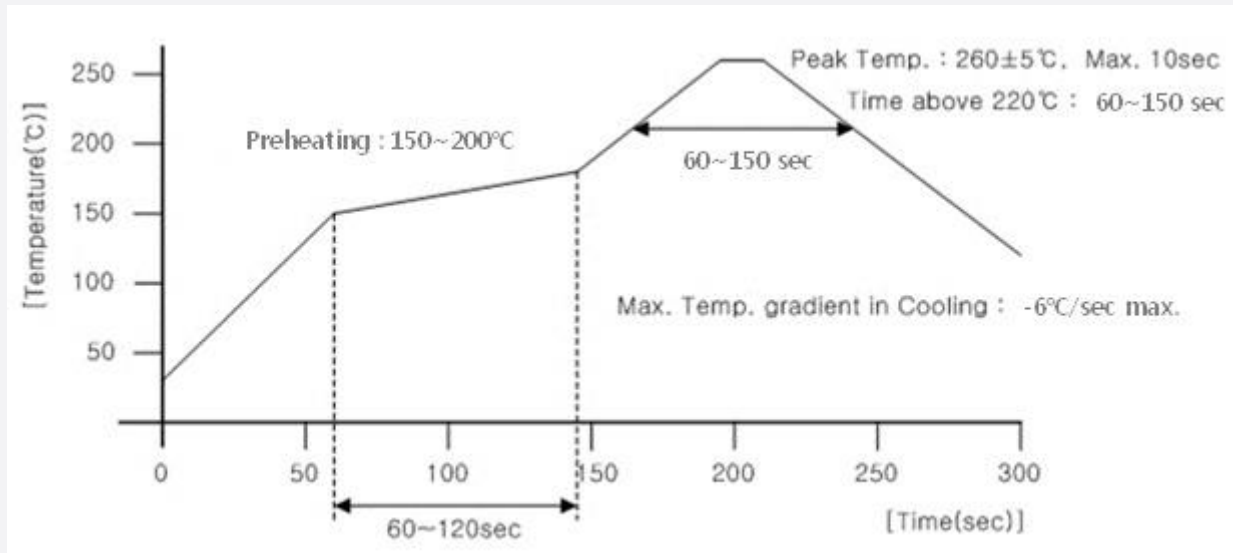
### b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T <sub>c</sub> = 25°C)	Limit	
			Min.	Max.
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = Sorting Current	L.S.L. * 0.9	U.S.L. * 1.1
Luminous Flux	Φ <sub>v</sub>	I <sub>F</sub> = Sorting Current	L.S.L. * 0.7	U.S.L. * 1.3

## 6. Soldering Conditions

### a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



### b) Manual Soldering Conditions

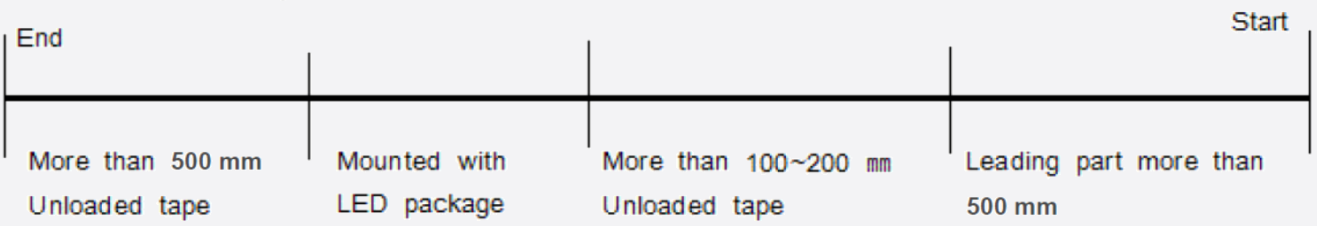
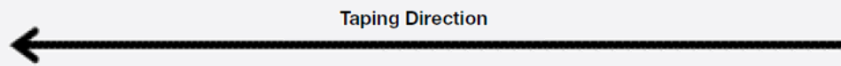
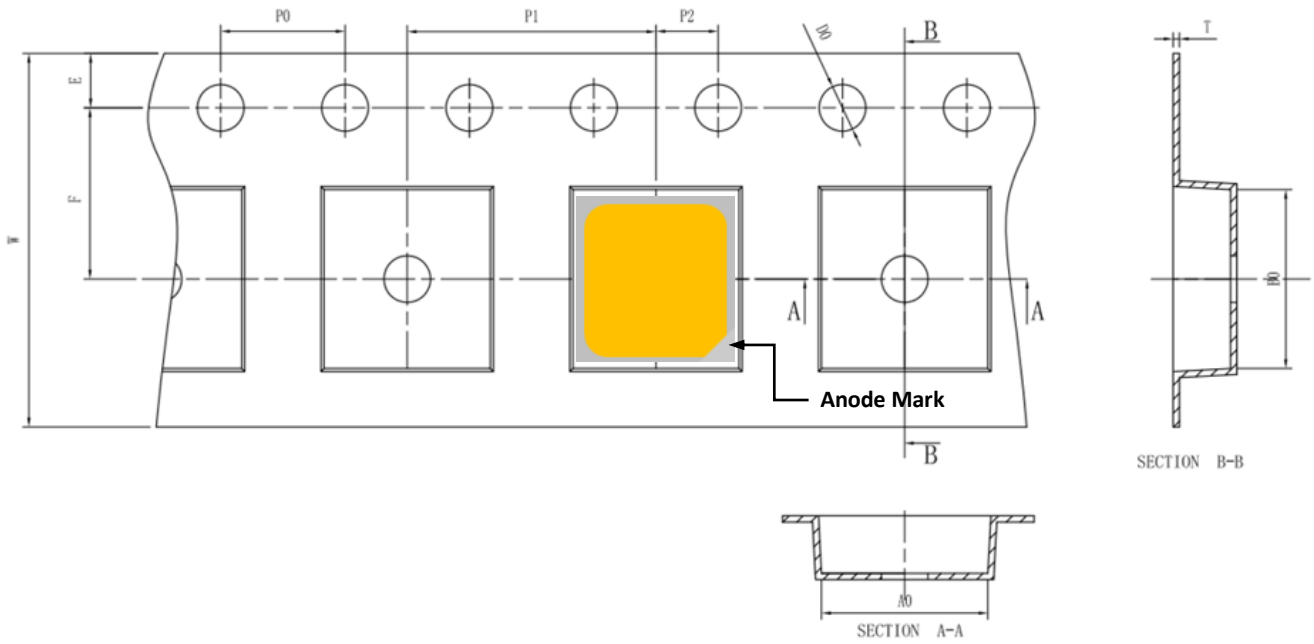
Not more than 5 seconds @ max. 300°C, under soldering iron.

## 7. Tape & Reel

### a) Taping Dimension

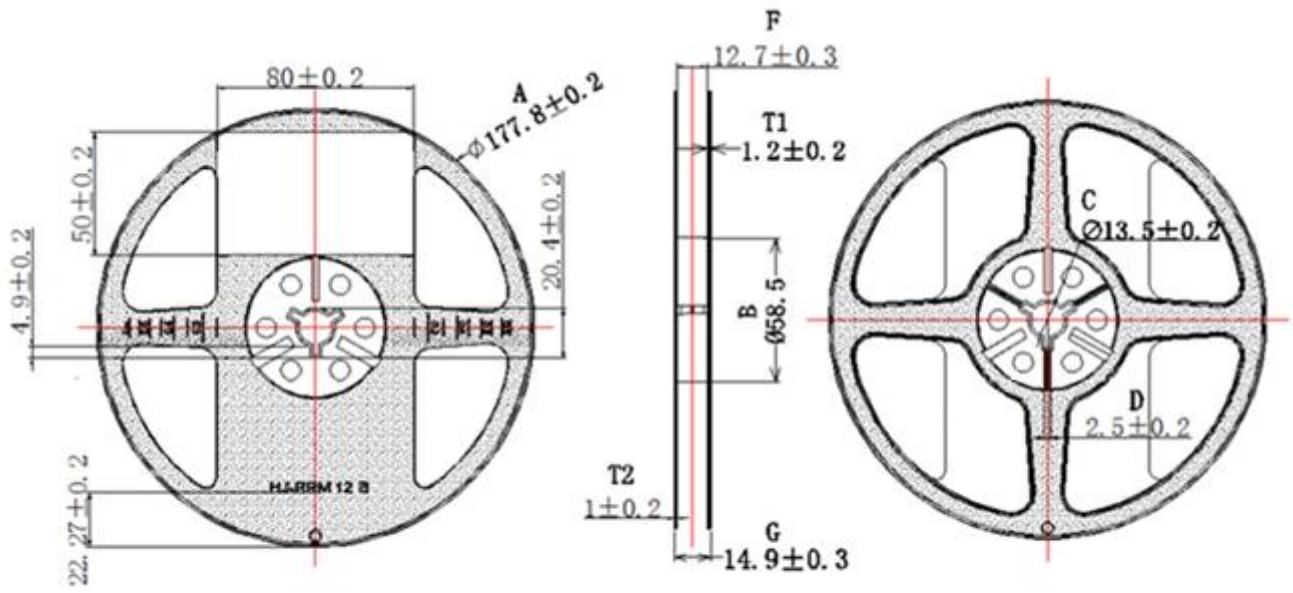
(unit: mm)

ITEM	W	A0	B0	K0	E	F	D0	D1	P0	P1	P2	T	LENGTH	PCS/REEL
5.35	+0.10 -0.10	+0.05 -0.05	+0.05 -0.05	+0.05 -0.05	+0.10 -0.10	+0.10 -0.10	+0.10 -0.00	+0.10 -0.00	+0.10 0.00	+0.10 -0.10	+0.10 -0.10	+0.05 -0.05	m	PCS



## b) Reel Dimension (max 2,000 pcs)

(unit: mm)



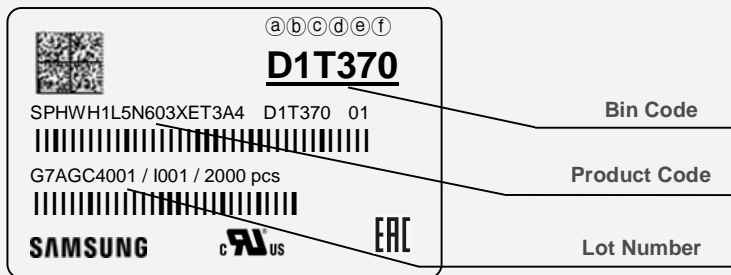
A±0.2	B±0.2	C±0.2	D±0.2	E±0.2	F±0.3	G±0.3	T1±0.2	T2±0.2
177.8	58.5	13.5	2.5	8	12.7	14.9	1.2	1

## Notes:

- 1) Quantity: The quantity/reel is 2000 pcs
- 2) All dimensions are millimeters.
- 3) Packaging : P/N, Manufacturing data code no. and quantity are indicated on the aluminum packing bag.

## 8. Label Structure

### a) Label Structure



Note: Denoted bin code and product code above is only an example (see description on page 4)

Bin Code:

- ⒶⒷ: Forward Voltage bin (refer to page 6)
- ⒸⒹ: Chromaticity bin (refer to page 7)
- ⒺⒻ: Luminous Flux bin (refer to page 5)

### b) Lot Number

The lot number is composed of the following characters:



①②③④⑤⑥⑦⑧⑨ / | Ⓐ Ⓑ Ⓒ / xxxx pcs

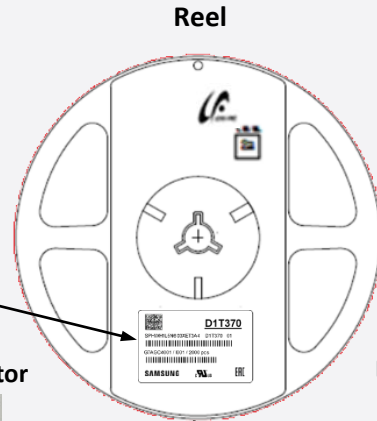
- ①② : Production site (G7 : Guangzhou ,China)
- ③ : Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
- ④ : Year (G:2022, H:2023 ... )
- ⑤ : Month (1-9, A, B, C)
- ⑥ : Day (1-9, A, B-V)
- ⑦⑧⑨ : Samsung Electronics Product serial number (001 - 999)
- ⒶⒷⒸ : Reel number(001 - 999)



## 9. Packing Structure

### a) Packing Process

#### Reel



Humidity indicator

Desiccant



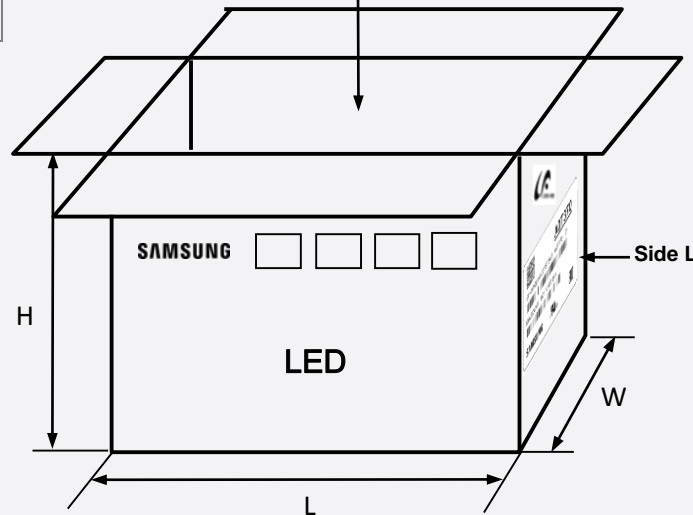
#### Aluminum Vinyl Packing Bag



#### Outer Box

Material: Paper (SW3B(B))

Type	Size (mm)			Note
	L	W	H	
7 inch S	245 ± 5	220 ± 5	86 ± 5	Up to 5 reels
7 inch L	245 ± 5	220 ± 5	182 ± 5	Up to 10 reels



Paper(SW3B(B))

#### Side Label



b) Aluminum Vinyl Packing Bag



**CAUTION**

This bag contains  
**MOISTURE SENSITIVE DEVICES**

LEVEL  
**2a**

1. Shelf life in sealed bag: 12 months at < 40℃ and < 90% relative humidity (RH)
2. Peak package body temperature: 240 ℃
3. After this bag is opened, devices that will be subjected to reflow solder or other high temperature processes must be:
  - a. Mounted within 672 hours at factory conditions of equal to or less than 30℃ / 60% RH, or
  - b. Stored at < 10% RH
4. Devices require bake, before mounting, if:
  - a. Humidity Indicator Card is > 60% when read at 23±5℃, or
  - b. 2a is not met.
5. If baking is required, devices must be baked for 10 ~ 24 hours at 60±5℃

Note: If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure.

Bag seal due date: \_\_\_\_\_  
(if blank, see code label)

Note: Level and body temperature by IPC/JEDEC J-STD-020



**D1T370**

SPHWH1L5N603XET3A4 D1T370 01  
  
 G7AGC4001 / I001 / 2000 pcs  


**SAMSUNG**  **ERC**






**■ 주의 사항**

이 알루미늄 지퍼 백은 습기 및 정전기로부터 제품을 보호하기 위하여 제작되었습니다. 개봉 후에는 즉시 솔더 작업을 실시하는 것을 권장합니다.

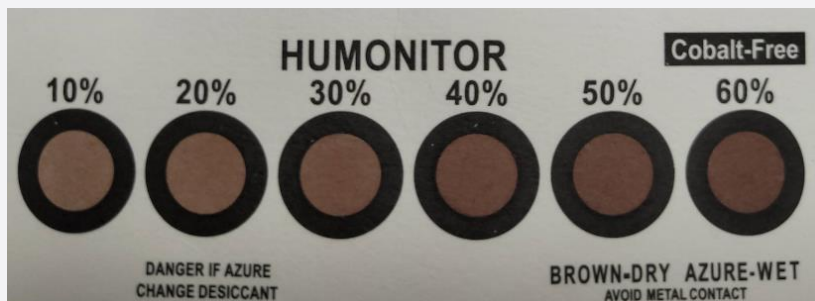
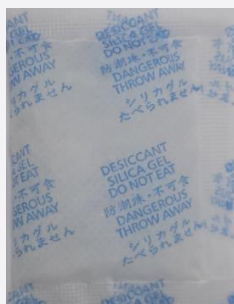
습기 및 정전기로부터 제품을 보호 하기 위해서 개봉 후 사용하지 않는 자재는 본 팩에 넣어 보관 하시기 바랍니다. 사용하지 않는 자재를 본 팩에 넣을 때는 반드시 동봉된 드라이 팩과 함께 넣고 지퍼부분을 완전하게 밀봉하여 주시기 바랍니다.

**■ Important**

This Al Zipper bag is designed to protect the enclosed products from moisture and ESD. Once opened, the products should be soldered onto the printed circuit board immediately. When not in use, please do not leave the products unprotected by the Al Zipper Bag. To repack unused products., please ensure the zip-lock is completely sealed with the dry pack left inside.

c) Silica Gel & Humidity Indicator Card inside Aluminum Vinyl Bag

(This image is for reference only. Silicagel and humidity indicator shapes may be different.)



## 10. Precautions in Handling & Use

- 1) For over-current protection, users are recommended to apply resistors connected in series with the LEDs to mitigate sudden change of the forward current caused by shift of 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 the cleaning agent. Some solvent-based cleaning agent 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 corresponding junction temperature.
- 4) LEDs must be stored in a clean environment. Shelf life of sealed bags is 12 months at temperature 0~40°C, 0~90 % RH.
- 5) After storage bag is opened, 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°C / 60 % RH, or
  - b. Stored at <10 % RH
- 6) Repack unused devices 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°C
- 8) Devices must be baked for 1 hour 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.
- 10) VOCs (Volatile Organic Compounds) can be generated from adhesives, flux, hardener or organic additives used in luminaires (fixtures). Transparent LED silicone encapsulant is permeable to those chemicals and they may lead to a discoloration of encapsulant when they exposed to heat or light. This phenomenon can cause a significant loss of light emitted (output) from the luminaires. In order to prevent these problems, we recommend users to know the physical properties of materials used in luminaires and they must be carefully selected.
- 11) Risk of sulfurization (or tarnishing)

The LED from Samsung Electronics Co., Ltd. uses a silver-plated lead frame and its surface color may change to black (or dark colored) when it is exposed to sulfur (S), chlorine (Cl) or other halogen compound. Sulfurization of lead frame may cause intensity degradation, change of chromaticity coordinates and, in extreme cases, open circuit. It requires caution. Due to possible sulfurization of lead frame, LED should not be used and stored together with oxidizing substances made of materials such as: rubber, plain paper, lead solder cream, etc.

# Legal and additional information.

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

Samsung Electronics Co., Ltd. inspires the world and shapes the future with transformative ideas and technologies, redefining the worlds of TVs, smartphones, wearable devices, tablets, cameras, digital appliances, printers, medical equipment, network systems and semiconductors.

We are also leading in the Internet of Things space through, among others, our Digital Health and Smart Home initiatives. We employ 307,000 people across 84 countries. To discover more, please visit our official website at [www.samsung.com](http://www.samsung.com) and our official blog at [global.samsungtomorrow.com](http://global.samsungtomorrow.com).

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