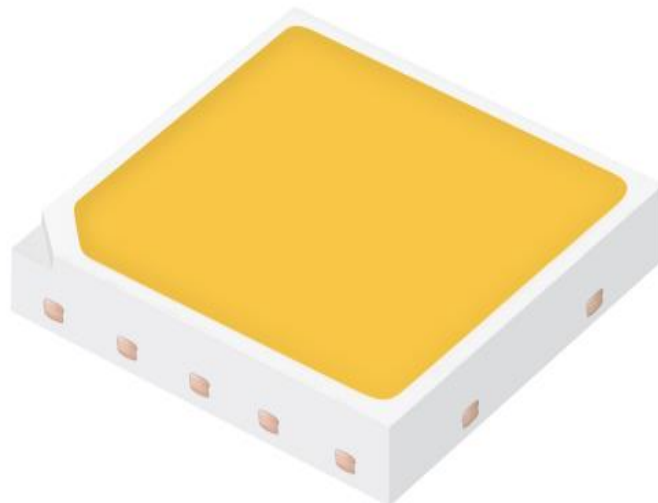


High Power LED Series

# LH508D

## General



High efficacy and lumen makes

The LH508D suitable for Streetlight and High-bay applications

### Features & Benefits

- Operates at a maximum current of up to 250mA
- Uniform light distribution under any beam angle
- Strengthened Anti sulfurization
- Color binning @ 85°C



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## 1. Characteristics

### a) Absolute Maximum Rating

Item	Symbol	Rating	Unit	Condition
Operating Temperature	$T_{opr}$	-40 ~ +105	°C	
Storage Temperature	$T_{stg}$	-40 ~ +100	°C	-
LED Junction Temperature	$T_j$	125	°C	-
Forward Current	$I_F$	250	mA	-
Peak Pulse Forward Current	$I_{FP}$	330	mA	Duty cycle ≤ 1/10, pulse width 10ms
Soldering Temperature		260 <10	°C	-
Electrostatic Discharge Withstand Voltage(HBM)	ESD(HBM)	±8 (Class 3B)	kV	-

### b) Electro-optical Characteristics ( $I_F = 160$ mA, $T_j = 25$ °C )

Item	Unit	Rank	Min.	Typ.	Max.
Forward Voltage ( $V_F$ )	V	YE	23.0	-	25.0
		3	70 / -50	-	-
Color Rendering Index ( $R_a$ ) / R9	-	5	80 / 0		
		7	90 / 50		
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

## 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	2	L	5	N	6	0	3	X	E	T	5	A	3

Digit	PKG Information	Code	Specification		
1 2 3	Samsung Package High Power	SPH	High Power PKG		
4 5	Color	WH	White		
6	Product Version	2	2nd 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		
		7	Min. 90		
13 14	Forward Voltage (V)	XE	Bin code	D1	23.0 – 24.0
				E1	24.0 – 25.0
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)	A3			

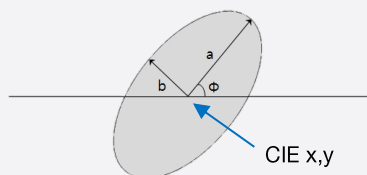
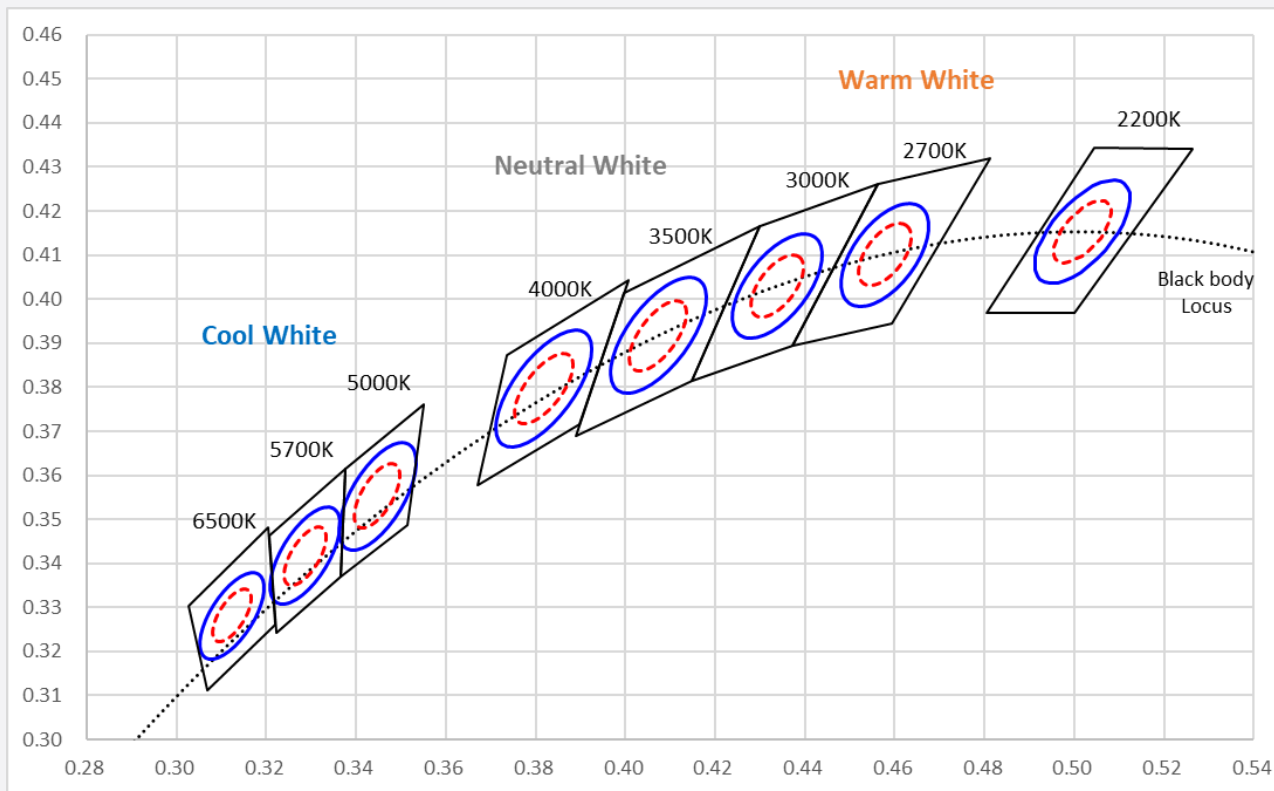
a) Luminous flux Rank ( I<sub>f</sub> = 160 mA, T<sub>j</sub> = 25°C )

CRI (R <sub>a</sub> ) Min.	Nominal CCT(K)	Product Code	VF Rank	Chrom Rank (Bins)	Flux		Flux Range (Φ <sub>v</sub> , lm)				
					Rank	Bins					
70	2200	SPHWH2L5N603XEY3A3	XE	Y3, Y5	A3		58	580-620			
		SPHWH2L5N603XEY5A3					62	620-660			
	2700	SPHWH2L5N603XEW3A3		W3, W5		64	640-680				
		SPHWH2L5N603XEW5A3				68	680-720				
	3000	SPHWH2L5N603XEV3A3		V3, V5		65	650-690				
		SPHWH2L5N603XEV5A3				69	690-730				
	3500	SPHWH2L5N603XEU3A3		U3, U5		67	670-710				
		SPHWH2L5N603XEU5A3				71	710-750				
	4000	SPHWH2L5N603XET3A3		T3, T5		69	690-730				
		SPHWH2L5N603XET5A3				73	730-770				
	5000	SPHWH2L5N603XER3A3		R3, R5		68	680-720				
		SPHWH2L5N603XER5A3				72	720-760				
	5700	SPHWH2L5N603XEQ3A3		Q3, Q5		67	670-710				
		SPHWH2L5N603XEQ5A3				71	710-750				
	6500	SPHWH2L5N603XEP3A3		P3, P5		66	660-700				
		SPHWH2L5N603XEP5A3				70	700-740				
	80	2200		SPHWH2L5N605XEY3A3		XE	Y3, Y5	A3		47	470-510
				SPHWH2L5N605XEY5A3						51	510-550
2700		SPHWH2L5N605XEW3A3	W3, W5	55	550-590						
		SPHWH2L5N605XEW5A3		59	590-630						
3000		SPHWH2L5N605XEV3A3	V3, V5	58	580-620						
		SPHWH2L5N605XEV5A3		62	620-660						
3500		SPHWH2L5N605XEU3A3	U3, U5	60	600-640						
		SPHWH2L5N605XEU5A3		64	640-680						
4000		SPHWH2L5N605XET3A3	T3, T5	62	620-660						
		SPHWH2L5N605XET5A3		66	660-700						
5000		SPHWH2L5N605XER3A3	R3, R5	62	620-660						
		SPHWH2L5N605XER5A3		66	660-700						
5700		SPHWH2L5N605XEQ3A3	Q3, Q5	61	610-650						
		SPHWH2L5N605XEQ5A3		65	650-690						
6500		SPHWH2L5N605XEP3A3	P3, P5	61	610-650						
		SPHWH2L5N605XEP5A3		65	650-690						
90		2200	SPHWH2L5N607XEY3A3	XE	Y3, Y5		A3			41	410-450
			SPHWH2L5N607XEY5A3							45	450-490
	2700	SPHWH2L5N607XEW3A3	W3, W5		46	460-500					
		SPHWH2L5N607XEW5A3			50	500-540					
	3000	SPHWH2L5N607XEV3A3	V3, V5		48	480-520					
		SPHWH2L5N607XEV5A3			52	520-560					
	3500	SPHWH2L5N607XEU3A3	U3, U5		49	490-530					
		SPHWH2L5N607XEU5A3			53	530-570					
	4000	SPHWH2L5N607XET3A3	T3, T5		52	520-560					
		SPHWH2L5N607XET5A3			56	560-600					
	5000	SPHWH2L5N607XER3A3	R3, R5		52	520-560					
		SPHWH2L5N607XER5A3			56	560-600					
	5700	SPHWH2L5N607XEQ3A3	Q3, Q5		52	520-560					
		SPHWH2L5N607XEQ5A3			56	560-600					

**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	23.0 – 24.0
				E1	24.0 – 25.0

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



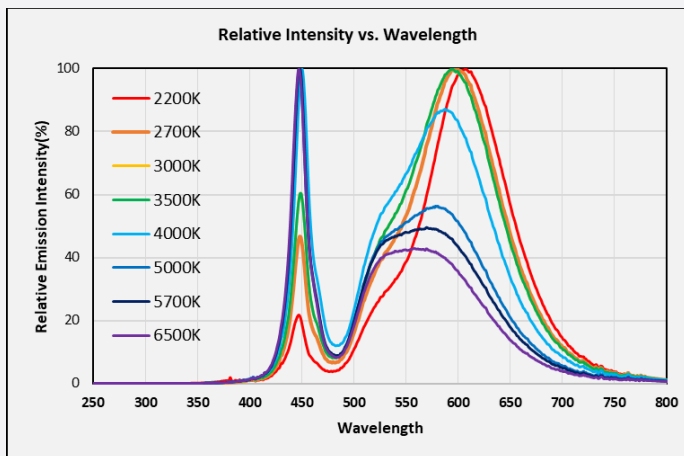
CRI	CCT	Rank	CIE x	CIE y	$\Phi$	A	b
70	2200K	Y3	0.5019	0.4153	49.3	0.0086	0.0040
		Y5				0.0144	0.0066
	2700K	W3	0.4578	0.4101	53.7	0.0081	0.0042
		W5				0.0135	0.0070
	3000K	V3	0.4338	0.4030	53.2	0.0083	0.0041
		V5				0.0138	0.0068
	3500K	U3	0.4073	0.3917	54.0	0.0093	0.0041
		U5				0.0155	0.0069
	4000K	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:  $C_x, C_y = \pm 0.005$

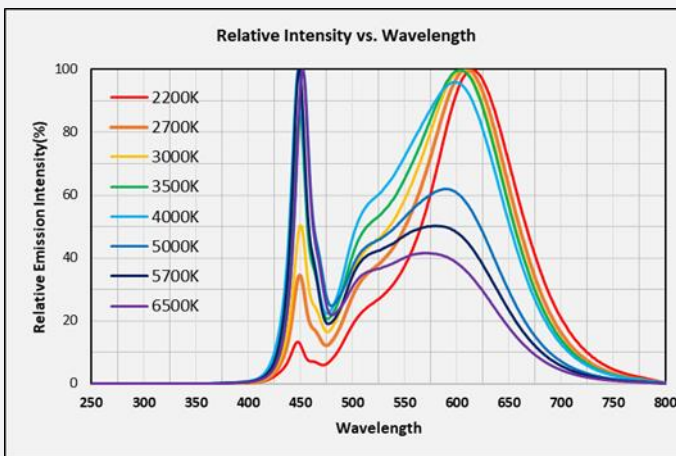
### 3. Typical Characteristic Graphs

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

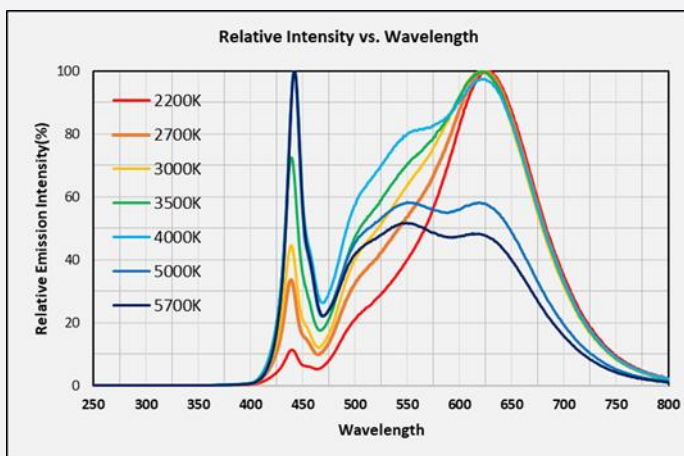
CRI70+



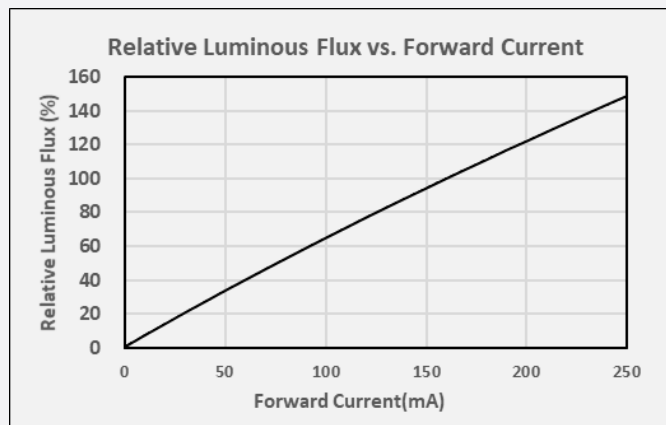
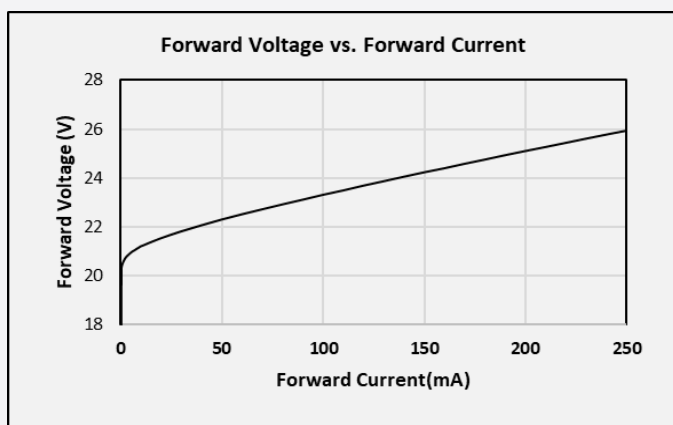
CRI80+



CRI90+

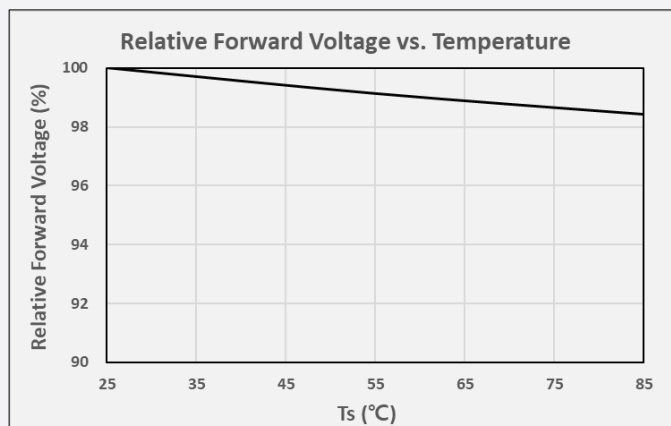
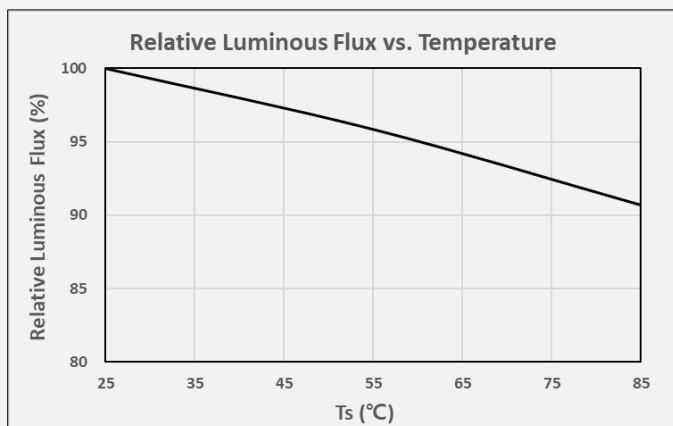


b) Forward Current Characteristics ( $T_j = 25^\circ\text{C}$ )

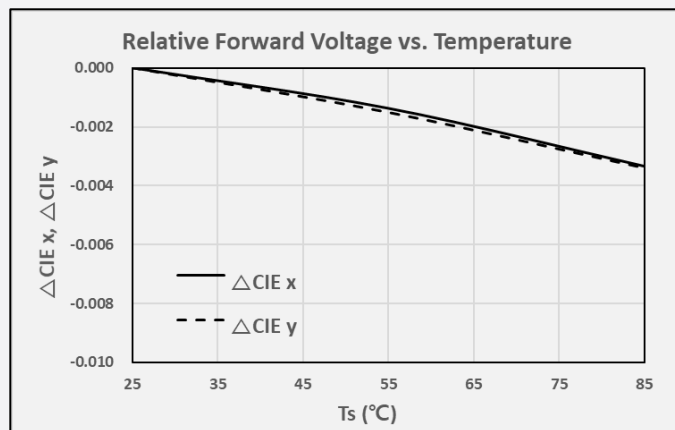
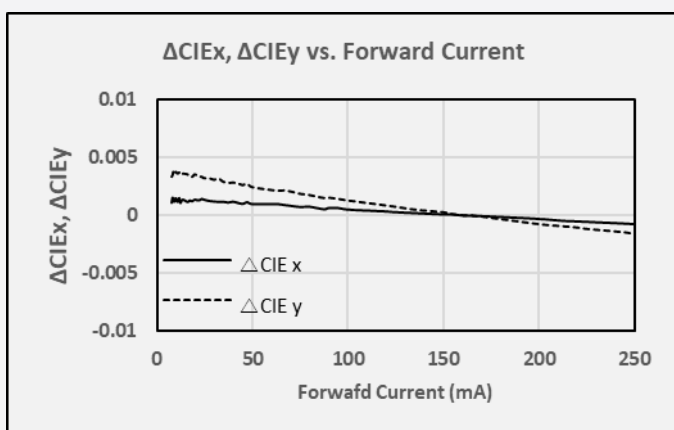




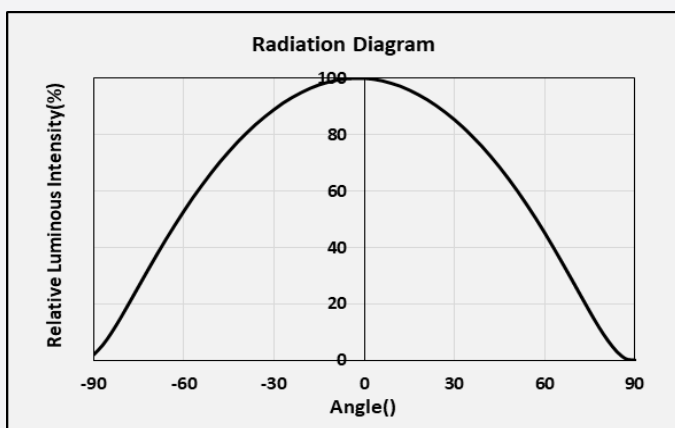
### c) Temperature Characteristics ( $I_F = 160 \text{ mA}$ )



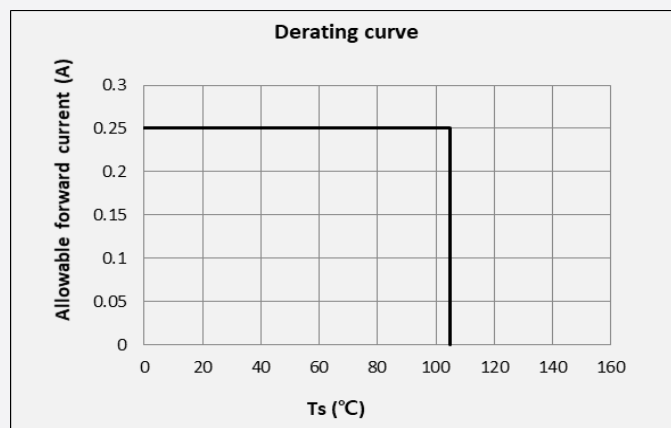
### d) Color Shift Characteristics ( $I_F = 160 \text{ mA}$ , $T_j = 25^\circ\text{C}$ )



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



### f) Derating Curve



g) Luminous Flux Characteristics<sup>1)</sup> (CRI = 70, CCT = 4000K)

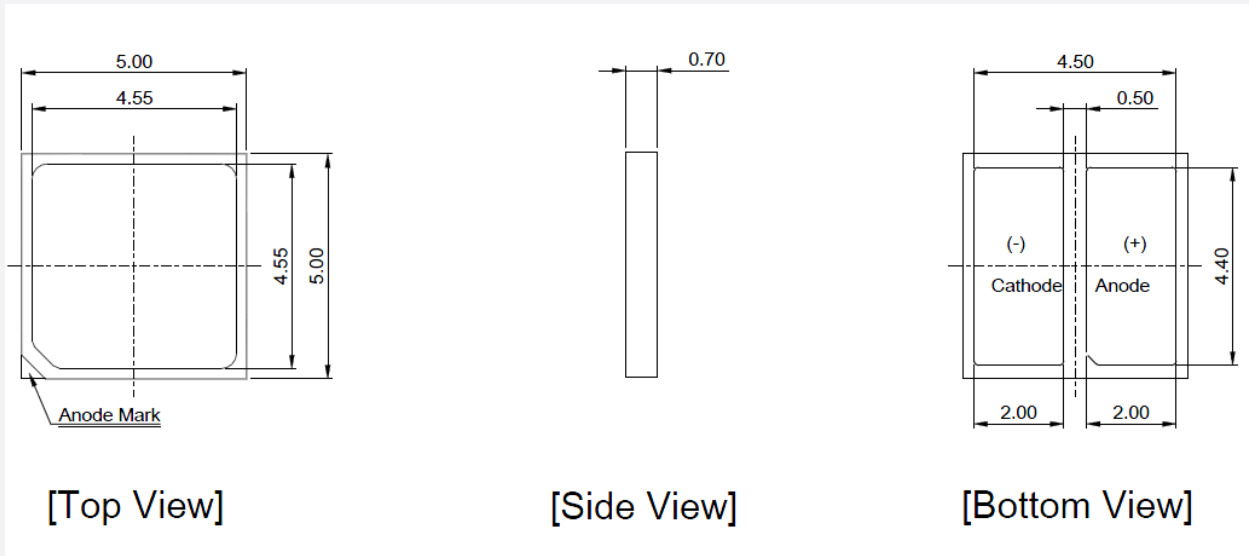
CRI (Ra) Min.	Nominal CCT (K)	I <sub>F</sub>	Typ. @ T <sub>J</sub> = 25 °C		
			V <sub>F</sub> Forward voltage	lm Flux	lm/W Luminous efficacy
70	4000K	45mA	22.0 V	217 lm	220 lm/W
		90mA	23.0 V	421 lm	204 lm/W
		150mA	24.1 V	679 lm	188 lm/W
		160mA	24.3 V	720 lm	185 lm/W
		200mA	25.0 V	881 lm	176 lm/W
		250mA	25.9 V	1073 lm	166 lm/W

**Notes:**

- 1) Reference Only

## 4. Outline Drawing & Dimension

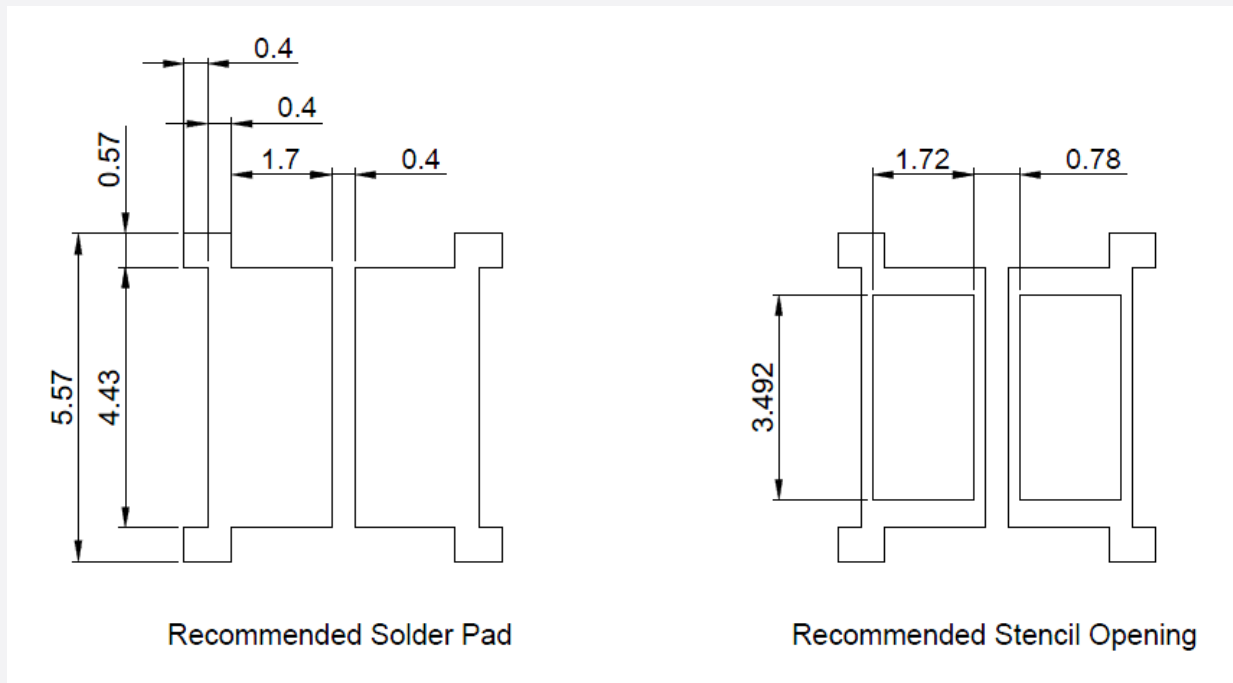
### a) Mechanical Dimensions



**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, 160mA	1000 h
Wet High Temperature Operating Life Test	85°C, 85 % RH, DC 160mA	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

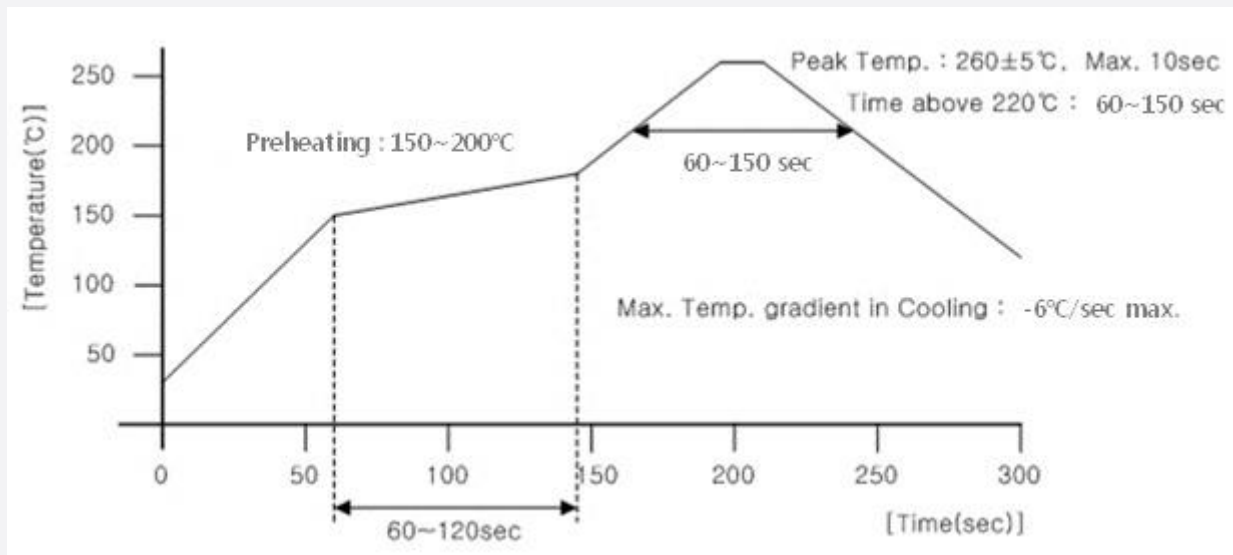
### b) Criteria for Judging the Damage

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

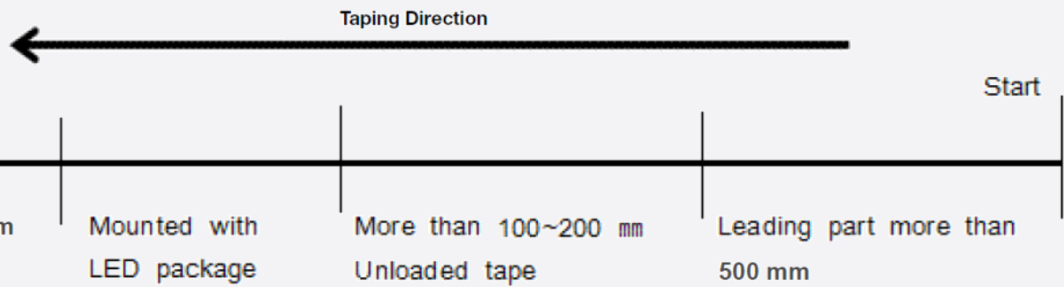
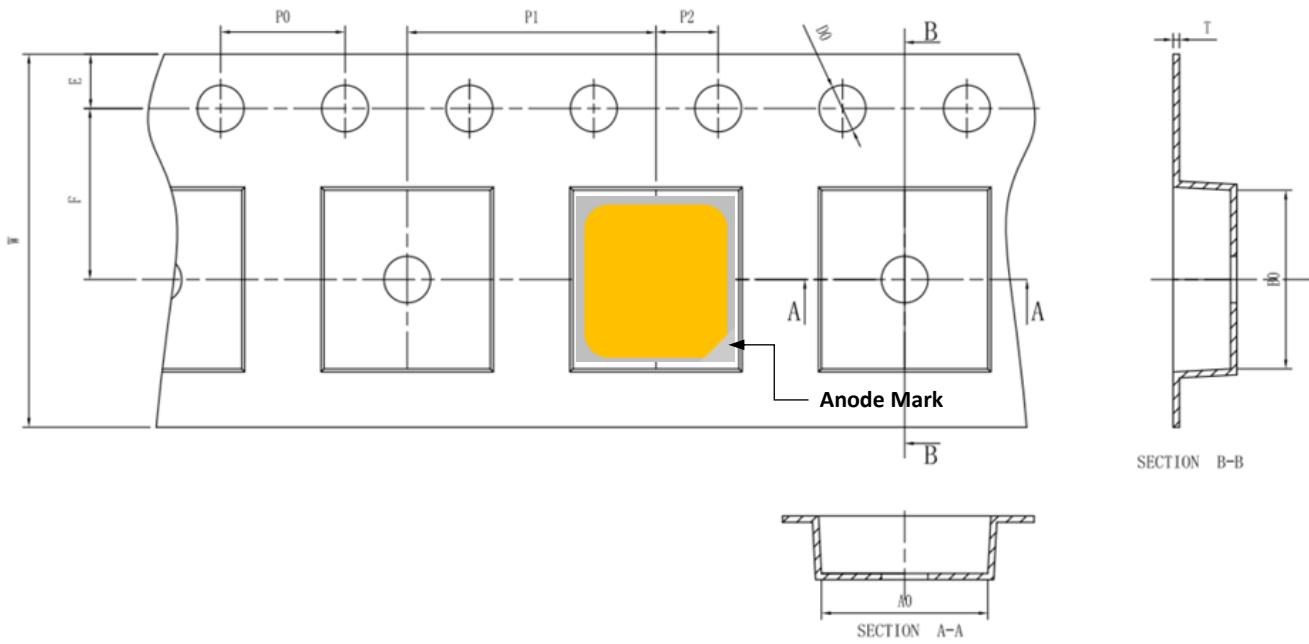
Not more than 5 seconds @ max. 300°C, under soldering iron.

## 7. Tape & Reel

### a) Taping Dimension

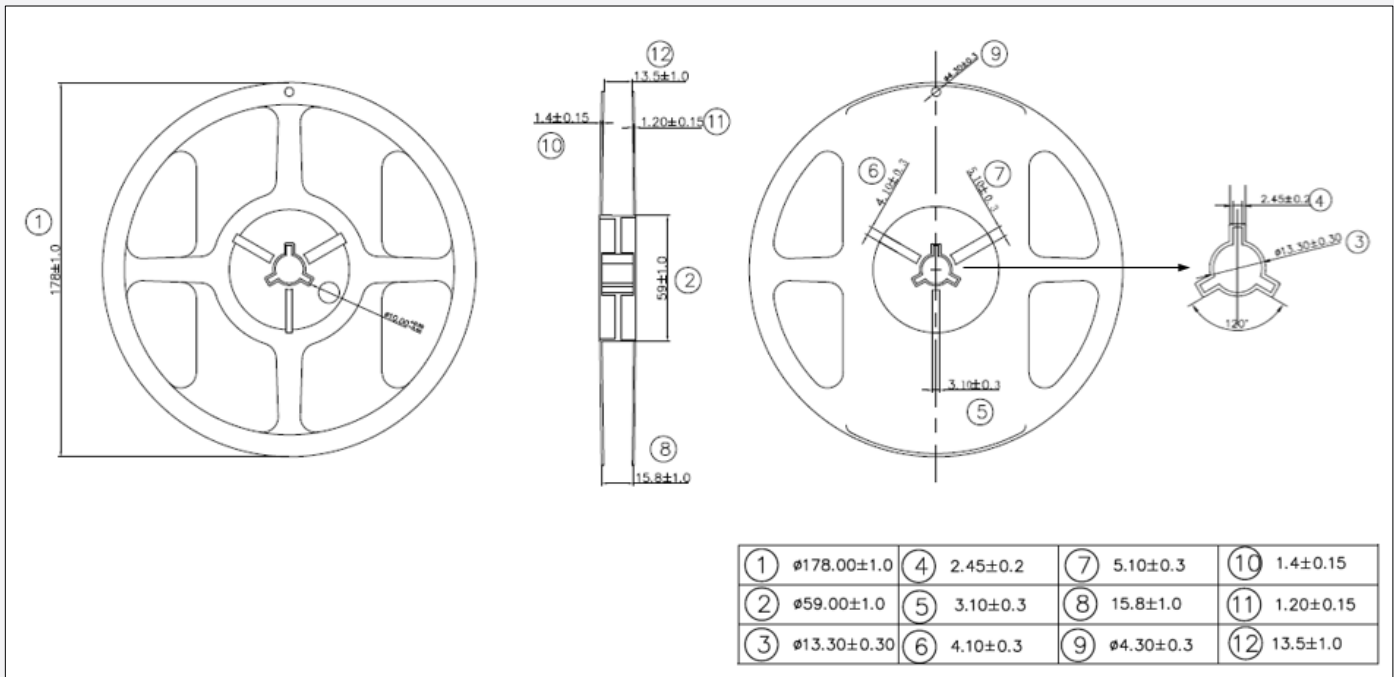
(unit: mm)

ITEM	W	A0	B0	K0	E	F	D0	D1	P0	P1	P2	T	LENGTH	PCS/REEL
5.35	12.00	5.40	5.20	0.95	1.75	5.50	1.50	1.50	4.00	8.00	2.00	0.20	m	PCS



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

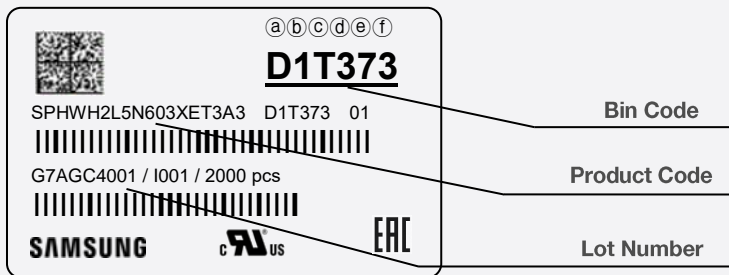
(unit: mm)

**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 / IⒶⓃⓒ / xxxx pcs

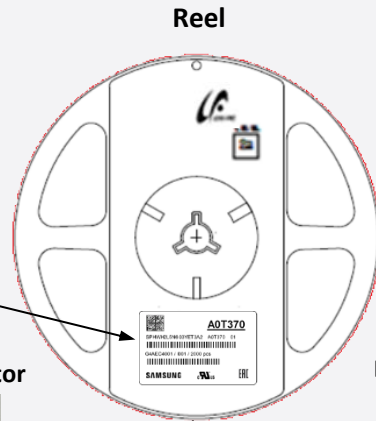
- ①② : Production site (G7 : Guangzhou ,China)
- ③ : Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
- ④ : Year (G:2022, H:2023 ... )
- ⑤ : Month (1-9, A, B, C)
- ⑥ : Day (1-9, A, B-V)
- ⑦⑧⑨ : Samsung Electronics Product serial number (001 - 999)
- ⒶⓃⓒ : Reel number(001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



## 9. Packing Structure

### a) Packing Process

#### Reel



Humidity indicator

Desiccant

#### Aluminum Vinyl Packing Bag

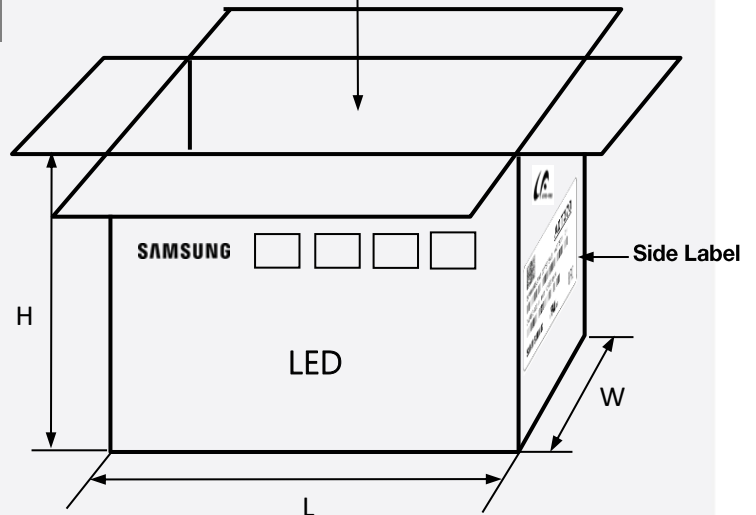


#### Outer Box

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

#### Side Label



Paper(SW3B(B))

b) Aluminum Vinyl Packing Bag



**CAUTION**

This bag contains  
**MOISTURE SENSITIVE DEVICES**

**LEVEL**  
2a

1. Shelf life in sealed bag: 12 months at < 40°C and < 90% relative humidity (RH)
2. Peak package body temperature: 240 °C
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°C / 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°C, or
  - b. 2a is not met.
5. If baking is required, devices must be baked for 10 ~ 24 hours at 60±5°C

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



D1T373

SPHWH2L5N603XET3A3 D1T373 01

|||||

G7AGC4001 / I001 / 2000 pcs

|||||

**SAMSUNG**      **US**     **ERC**



LEAD-FREE





ATTENTION  
OBSERVE PRECAUTIONS  
FOR HANDLING  
ELECTROSTATIC  
SENSITIVE  
DEVICES



OTHER

**주의 사항**

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

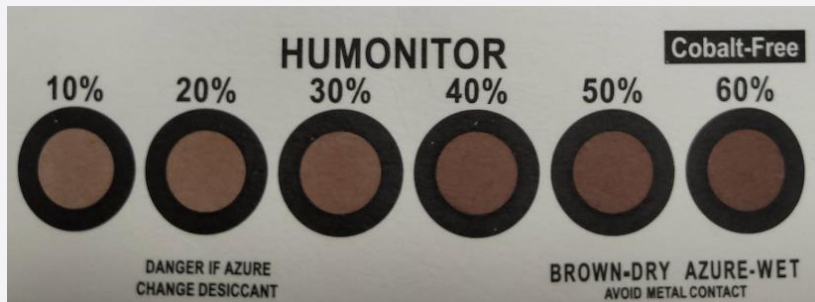
습기 및 정전기로부터 제품을 보호 하기 위해서 개봉 후 사용하지 않는 자재는 본 팩에 넣어 보관 하시기 바랍니다. 사용하지 않는 자재를 본 팩에 넣을 때는 반드시 동봉된 드라이 팩과 함께 넣고 지퍼부분을 완전하게 밀봉하여 주시기 바랍니다.

**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).

"Samsung provides limited warranty for its LED products, the full text of which is available at <https://www.samsung.com/led/lighting/warranty>."

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