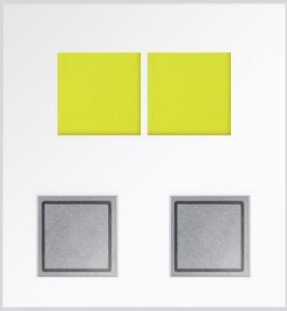
High Power LED T-Series

6W White

SPHWHTT2N6A0



Features

- Package : Ceramic package
- Dimension : 3.50 mm x 3.75 mm
- Chip Technology : Thin GaN
- ESD : 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM)
- Qualifications : AEC-Q102 Qualified with RV-level 1

SAMSUNG

Table of Contents

1. Characteristics

a) Typical Characteristics (T_b = 25℃)[1]

Item	Symbol	Value	Unit.
Chromaticity Coordinate	Cx Cy	0.32 0.33	
Luminous Flux (I_F = 1,000 ㎃)	Φ_V	Typ. 780	lm
Forward Voltage (I_F =1,000 ㎃)	V_F	Typ. 6.30	V
Viewing Angle	Φ	Typ. 120	º
Reverse Current	I_R	Not designed for reverse operation	
Real Thermal Resistance (Junction to Board point)	$R_{th\_J\text{-}B\ (Real)}$	Typ. 2.2 Max. 3.1	K/W
Electrical Thermal Resistance (Junction to Board point)	$R_{th\_J\text{-}B\ (Elec.)}$	Typ. 1.5 Max. 2.0	K/W
Radiant Surface	A	2.19	㎟

Note:

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

b) Absolute Maximum Rating

Item	Symbol	Rating	Unit
Ambient / Operating Temperature	T_a	-45 ~ +135	ºC
Storage Temperature	T_{stg}	-45 ~ +135	ºC
LED Junction Temperature	T_j	150	ºC
Maximum Forward current [2] (T_S:25℃) [3]	I_F	1,500	㎃
Minimum Forward current[2] (T_S:25℃) [3]	I_F	50	㎃
Maximum Reverse current		Do not apply for reverse current	
ESD Sensitivity[4]	-	±8 HBM	kV

Note:

[2] Driving the product at forward current (IF) below Min. IF or above Max. IF may result in unpredictable behavior of the product.

[3] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 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	T	2	N	6	A	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 (T2 for 2chip PKG type)
9	Lens configuration (N for no lens)
10	Typical power (Internal code)
11 12	Specific property (A0 for T Series)
13 14	Forward voltage property
15 16	CIE coordination property
17 18	Luminous flux property

a) Voltage Bins [5] (I_F= 1,000 mA, T_b= 25 ºC)

Symbol	Voltage Bin Code	Voltage Range (V)	
		Min	Max
V_F	DF	5.45	6.95

b) Luminous Flux Bins [5] (I_F= 1,000 mA, T_b= 25 ºC)

Symbol	Bin Code	Flux Range (lm)	
		Min	Max
Φ_V	6G	705	775
	7G	738	811
	8G	775	851
	1J	811	896

Note:

[5] Luminous flux measuring equipment: CAS140CT

Φ_V and V_F tolerances are ±7% and ±0.1V, respectively.

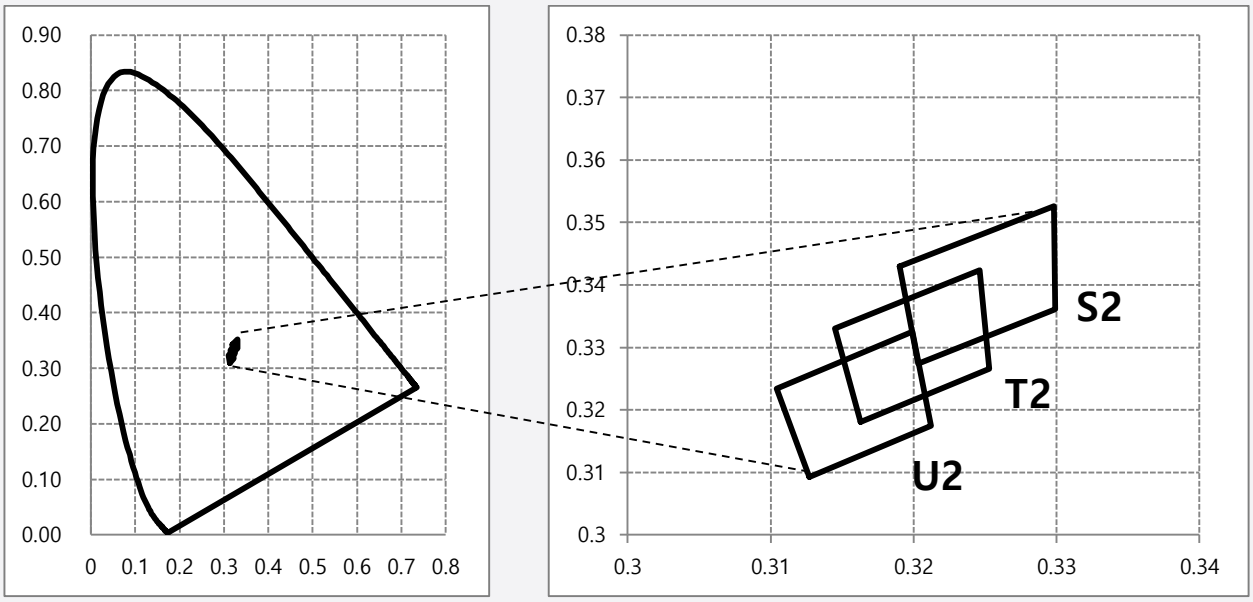
c) Color Bins [6] (I_F= 1,000 mA, T_b= 25 ºC)

Symbol	Color Bin Code	Cx				Cy			
Cx, Cy	S2	0.3190	0.3203	0.3299	0.3298	0.3430	0.3274	0.3361	0.3526
	T2	0.3163	0.3145	0.3246	0.3253	0.3181	0.3330	0.3424	0.3266
	U2	0.3127	0.3104	0.3199	0.3212	0.3093	0.3234	0.3325	0.3175

Note:

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

• Color Bin Definition

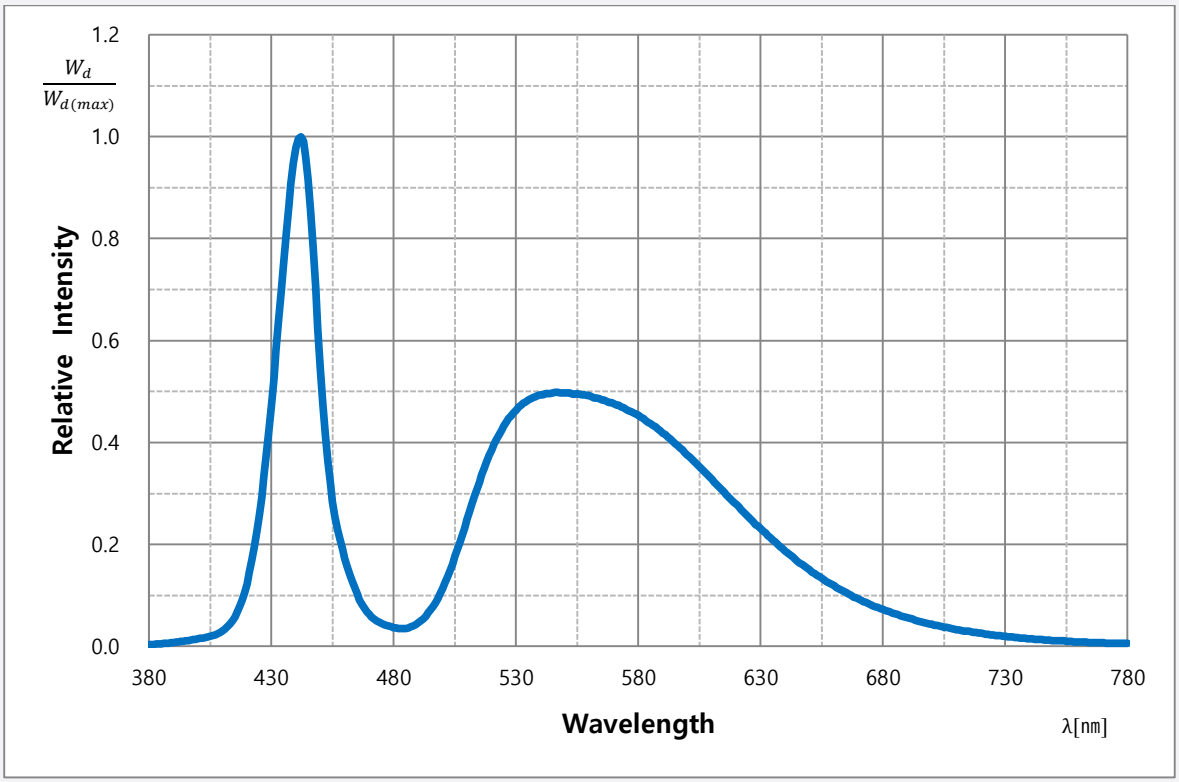


d) Luminous Flux Bins according to Color Bin (I_F = 1,000 mA, T_b = 25 ºC)

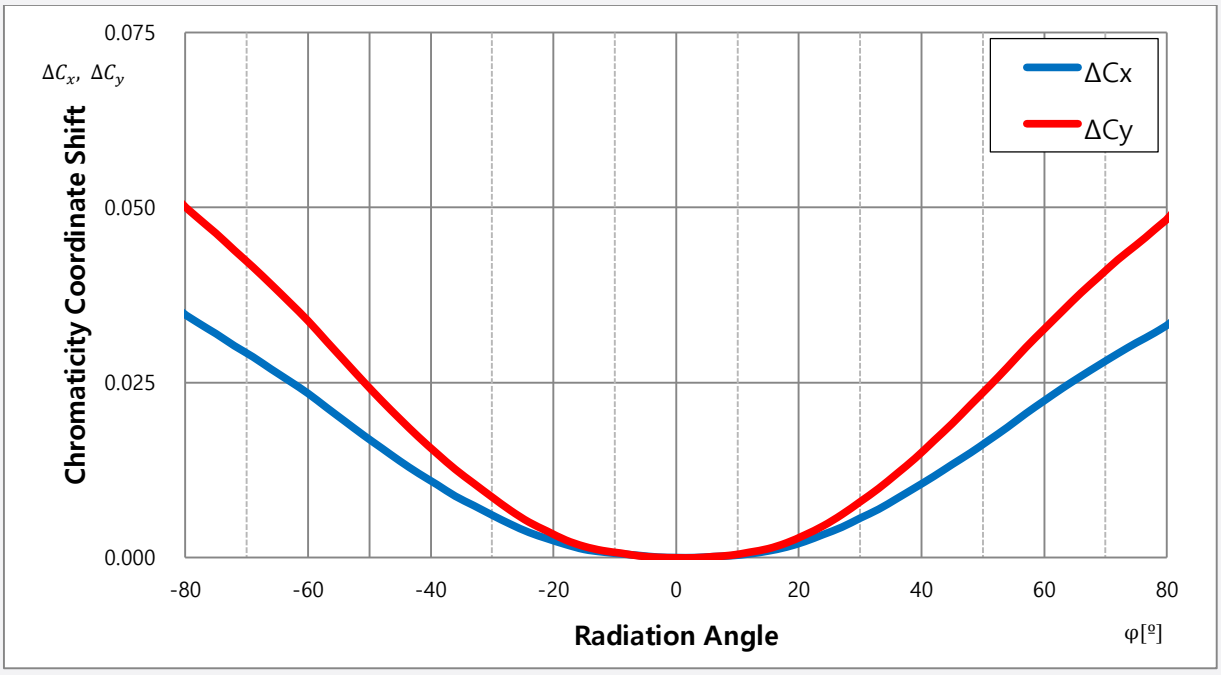
Symbol	Flux Bin Code	6G		7G		8G	
		Min	Max	Min	Max	Min	Max
		705	775	738	811	775	851
Φ_V	S2			O		O	
	T2	O		O		O	
	U2	O		O		O	

3. Typical Characteristics Graphs

a) Spectrum Distribution (I_F= 1,000 mA, T_b= 25 ºC) [7]

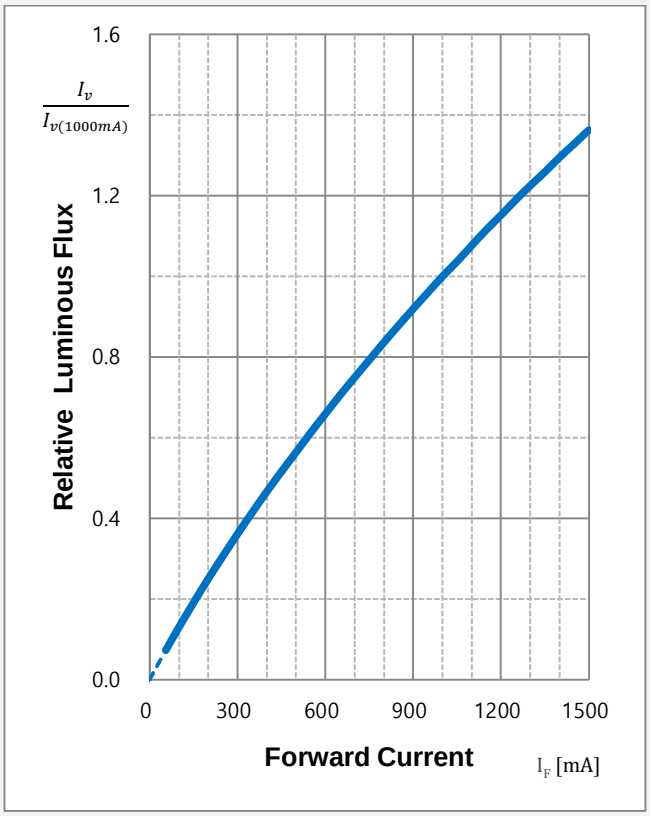


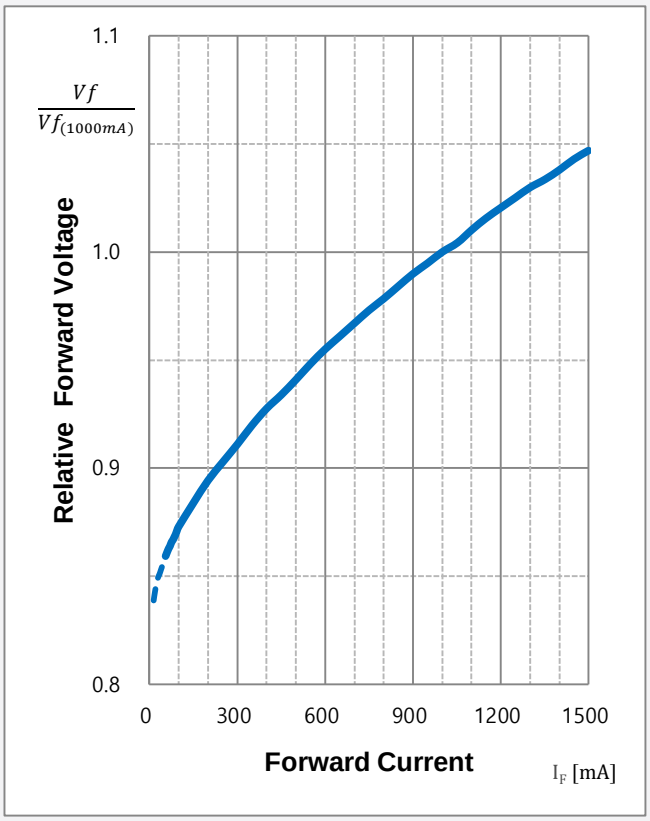
b) Typical Chromaticity Coordinate Shift vs Radiation Angle (I_F= 1,000 mA, T_b= 25 ºC) [7]

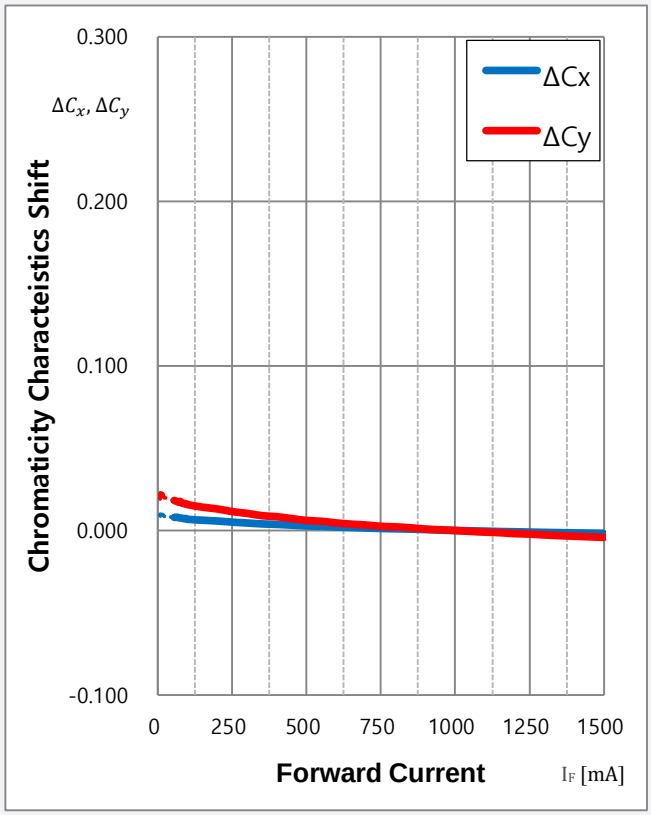


Note: [7] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 25ms.

c) Forward Current Characteristics (T_b= 25 °C) [8]



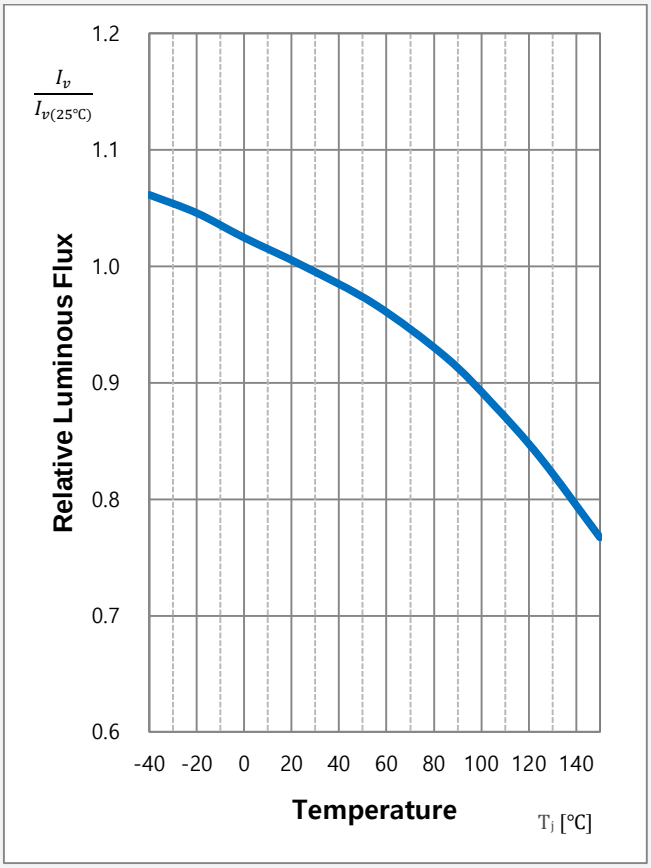


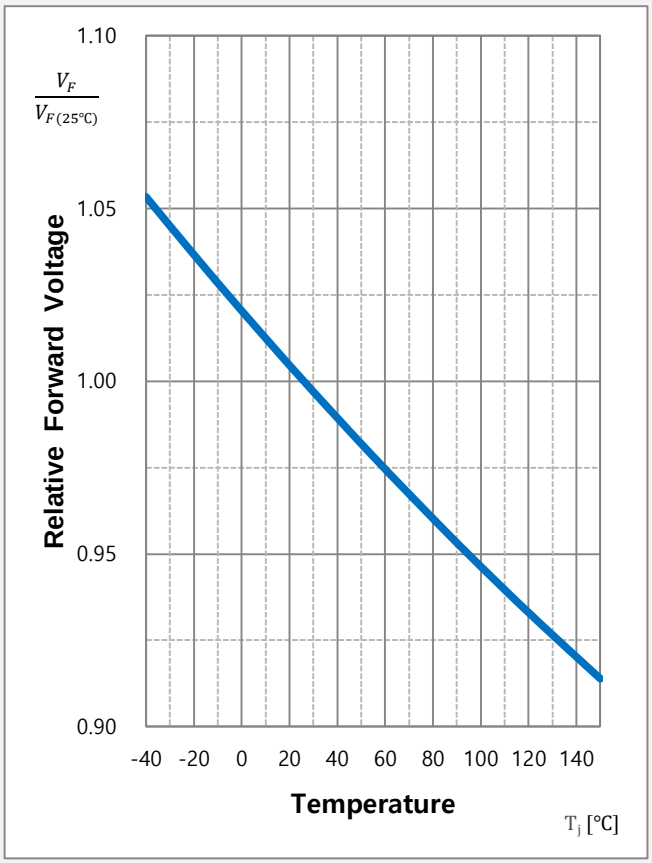


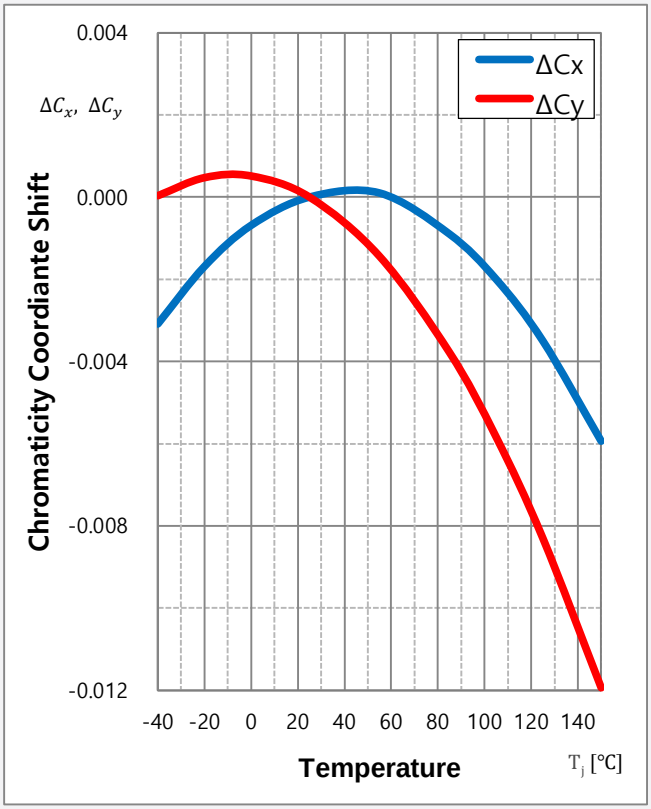
Note:

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

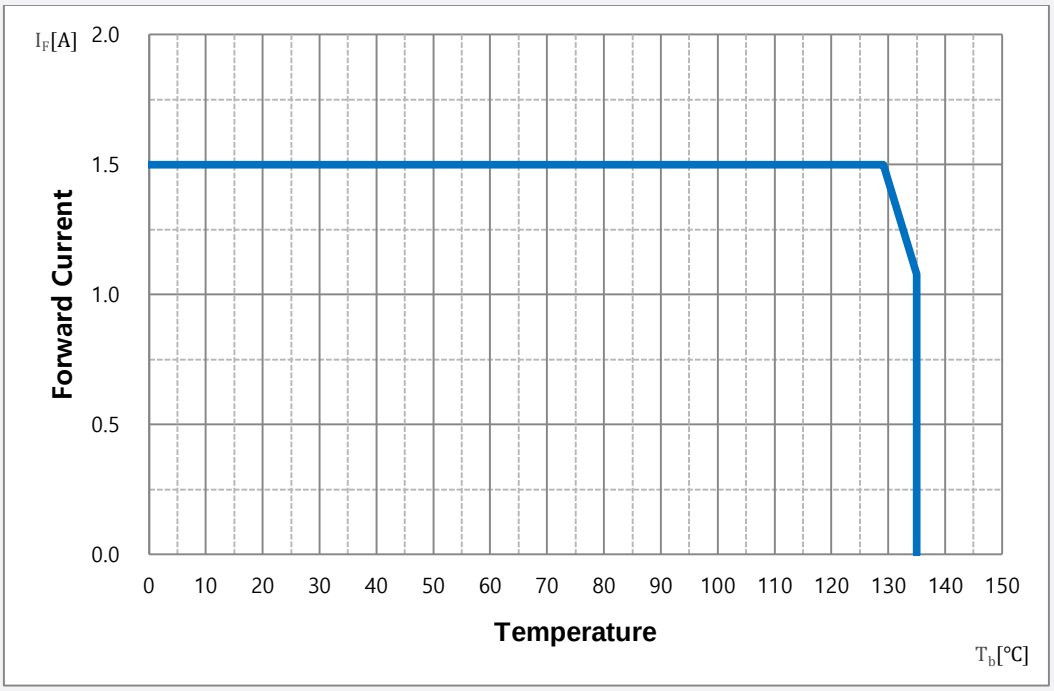
d) Temperature Characteristics (I_F= 1,000 mA)







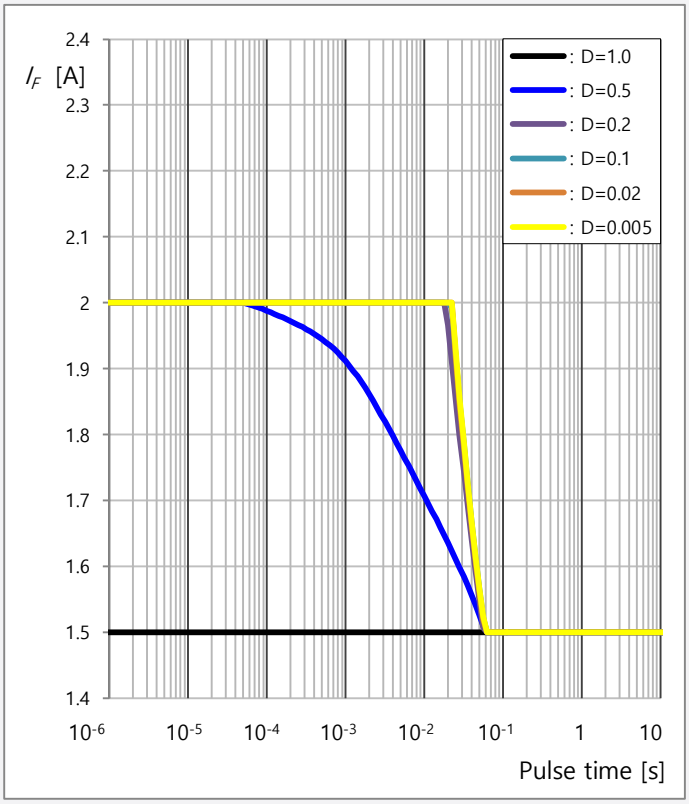
e) Derating Curve [9]



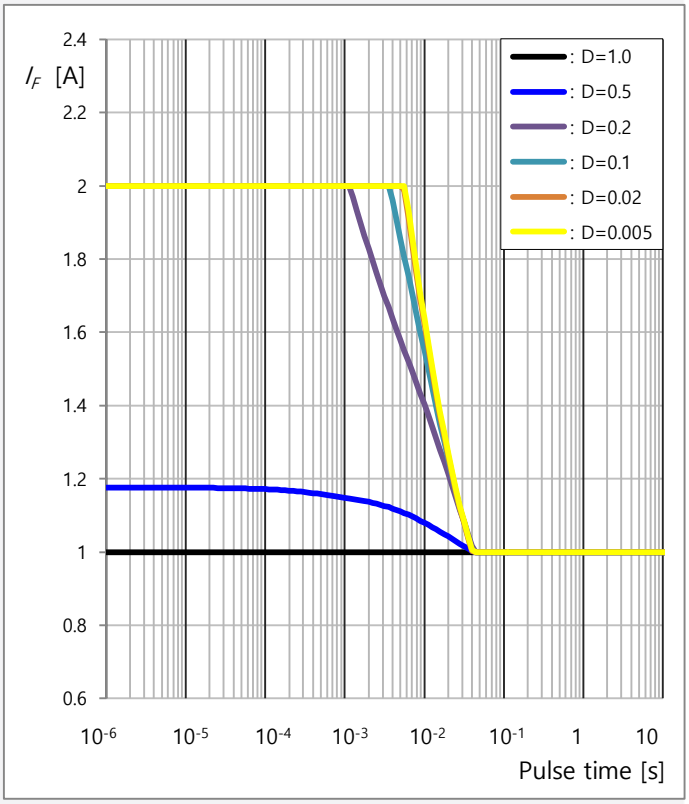
Note: [9] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 25ms.

f) Permissible Pulse Handling Capability ($I_F = f(t_p)$; D: Duty cycle)

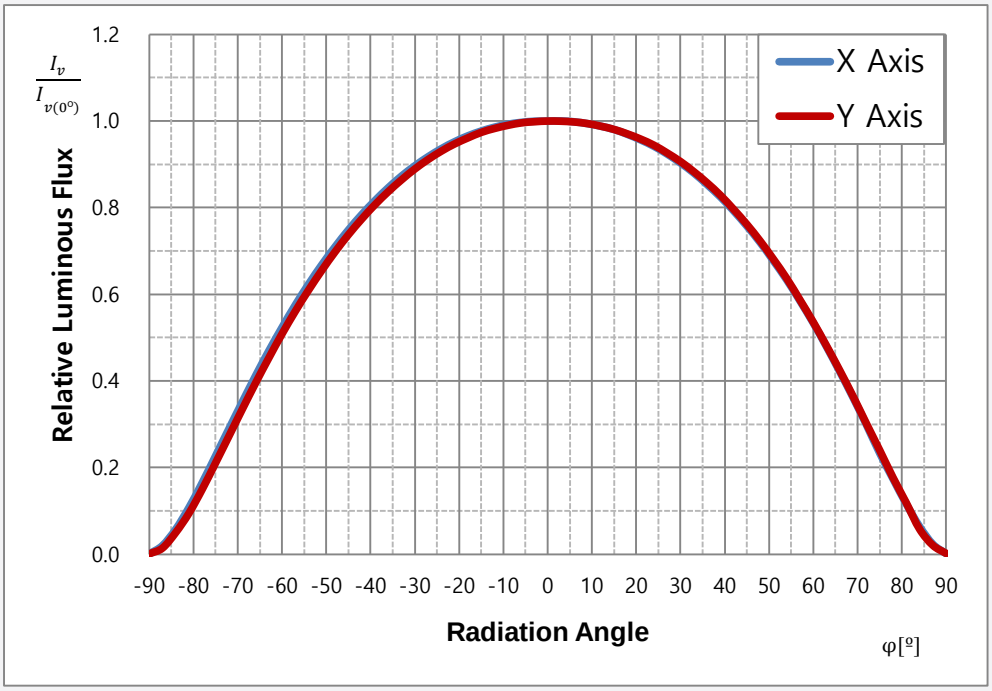
Tb = 0℃ - 129℃



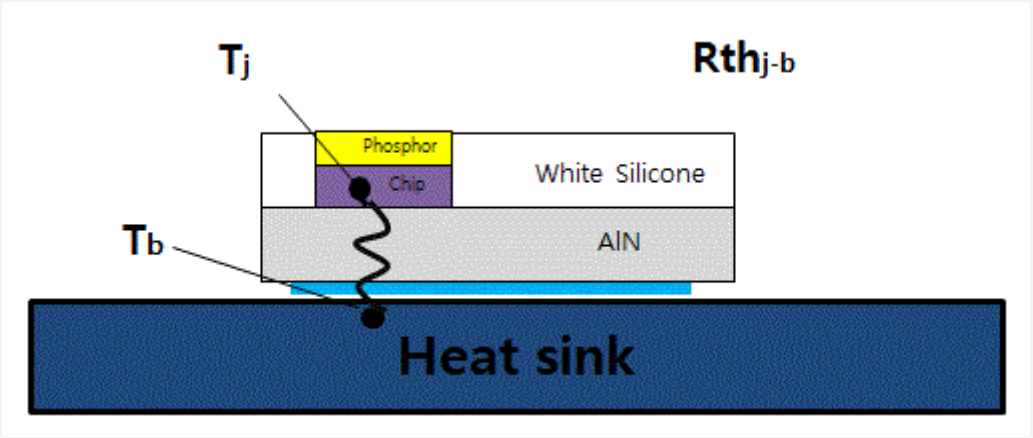
Tb = 135℃



g) Beam Angle Characteristics (I_F= 1,000 mA, T_b= 25 ºC)



4. Soldering Temperature Location



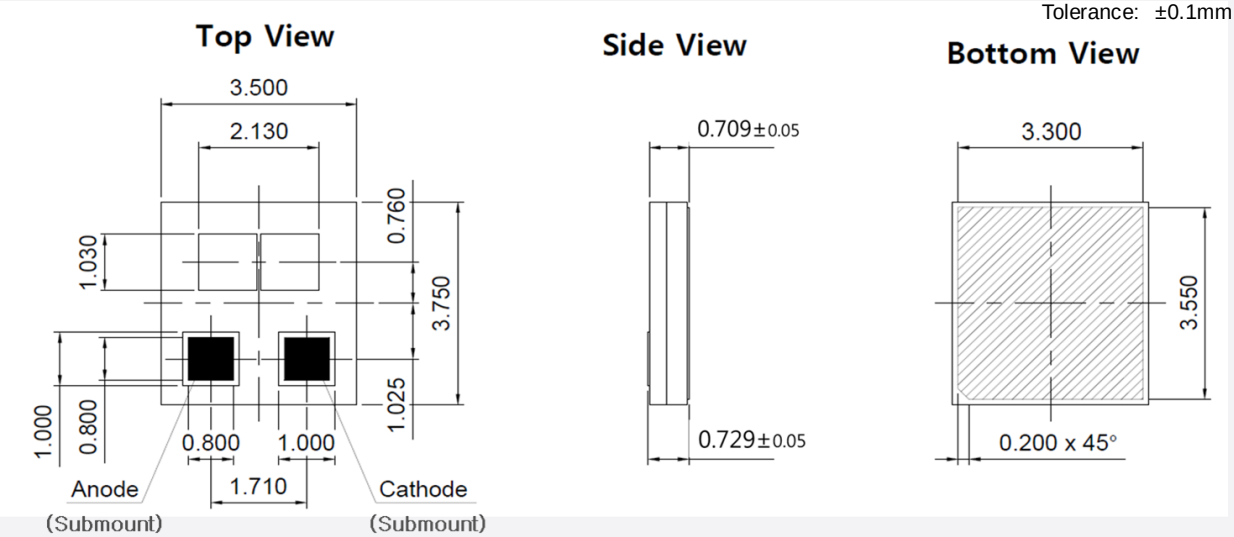
T_j : Temperature of Junction

T_b : Temperature of Board

Rth_{j-b} : Thermal Resistance from Junction to Board

5. Mechanical Dimension

Tolerance: ±0.1mm



Note:

The dimensions in parentheses are for reference purposes. Unit: mm, Approximate Weight : 27mg

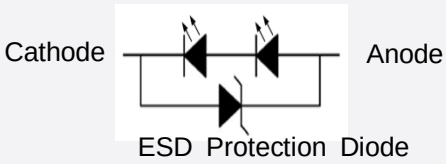
There may be occasional probing marks on the Submount, but no problem with wedge bonding.

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

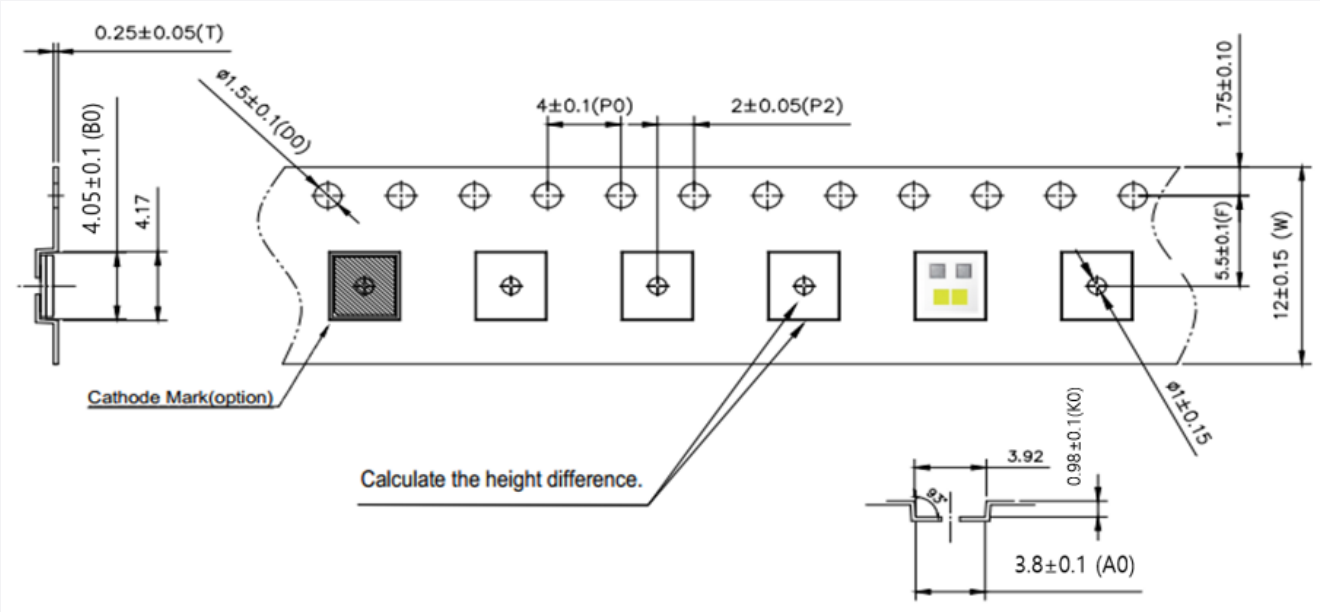


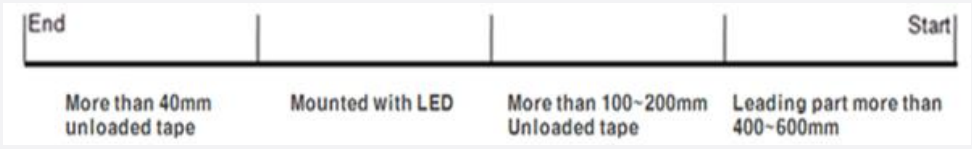
c) Material Information

Description	Material
Substrate	AlN Substrate
LED Die	Thin GaN
Phosphor	Phosphor In Glass
Zener Diode	Silicon
Wire	Au
Resin Mold	Silicone
Sub Mount	Silicon

6. Tape & Reel

a) Taping Dimension

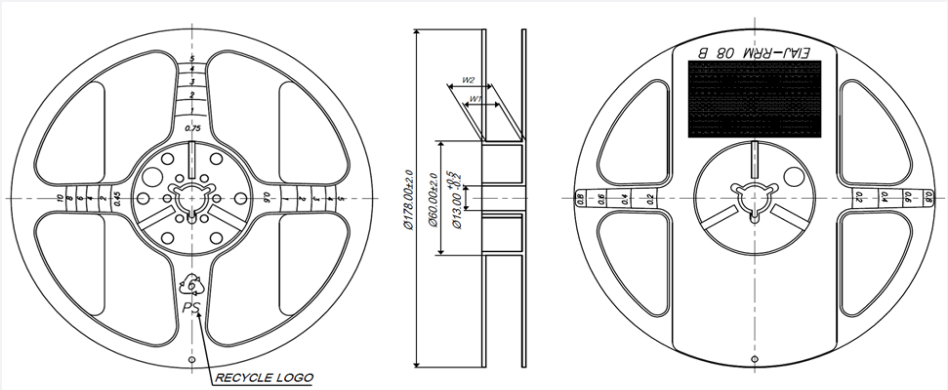




Note:

Unit: mm, LED taping quantity: 1,000EA / Reel

b) Reel Dimension



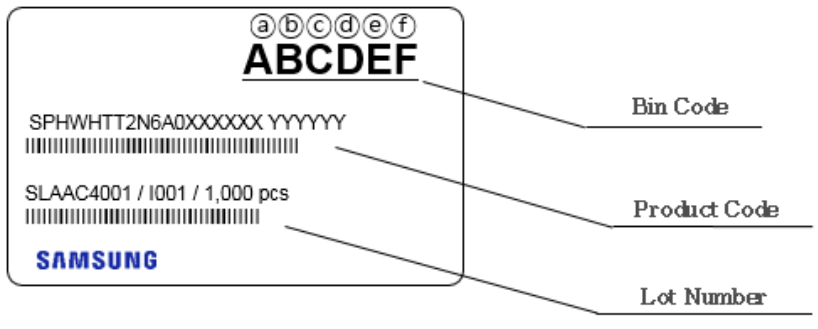
Width	W1	W2
8mm	9 ±0.3	11.9 ±1.0

Notes:

Unit: mm, Tolerance: ±0.2mm

7. Label Structure

a) Label Structure



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

Bin Code:

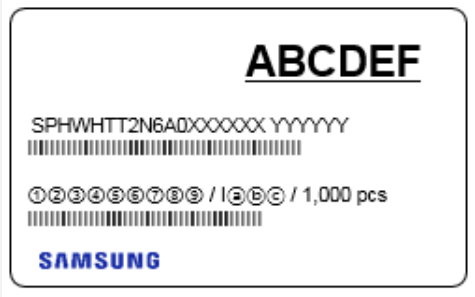
ⓐⓑ: Forward Voltage (V_F) Bin (refer to page 5)

ⓒⓓ: Chromaticity (Cx, Cy) Bin (refer to page 5)

ⓔⓕ: Luminous Flux(Iv) Bin (refer to page 5)

b) Lot Number

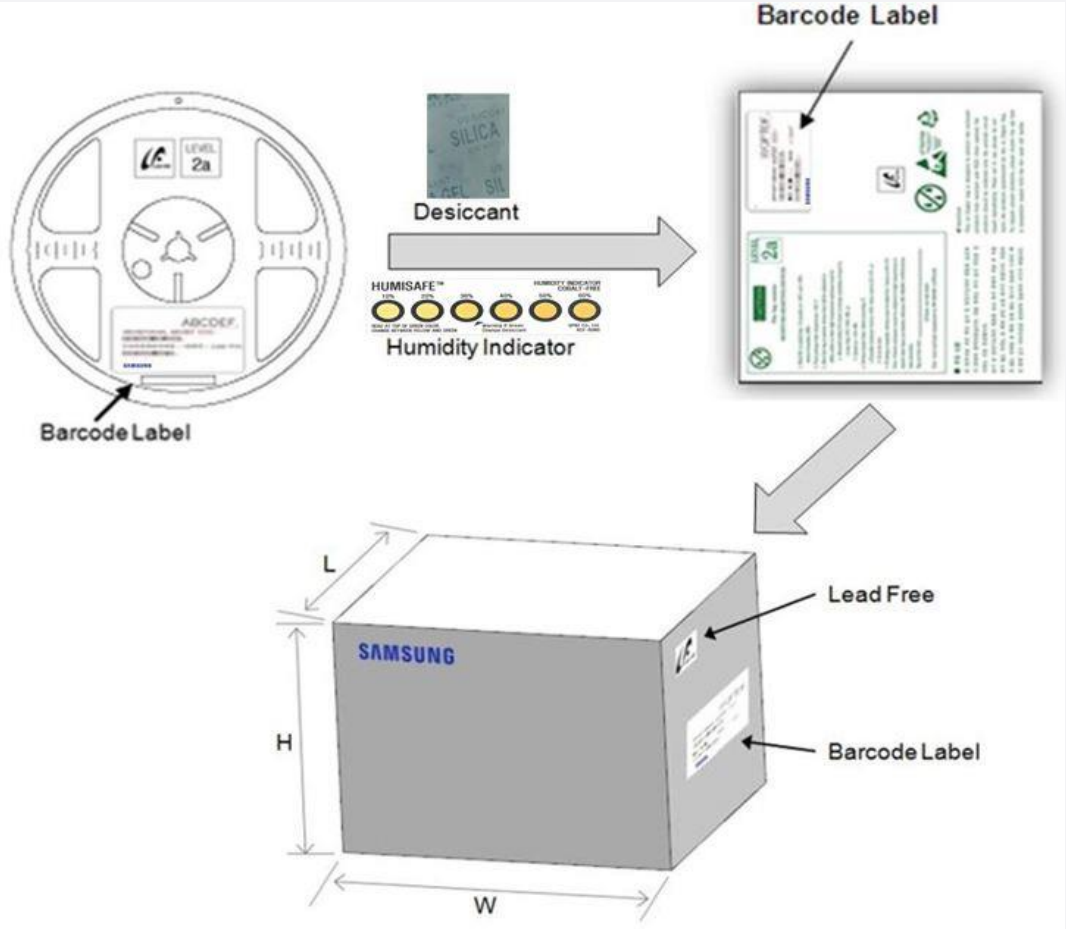
The lot number is composed of the following characters:



①②③③②③④⑤⑥⑦⑧⑨ / Iⓐⓑⓒ / x,000 pcs	
①②	Production site (S : SAMSUNG LED, L : Kiheung , Korea)
③	Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
④	Year (F: 2021, G: 2022, H: 2023…)
⑤	Month (1~9, A, B, C)
⑥	Day (1~9, A, B~V)
⑦⑧⑨	Serial number (001 ~ 999)
ⓐⓑⓒ	Product serial number (001 ~ 999)

8. Packing Structure

a) Packing Process



Dimension of Transportation Box in mm

Width	Length	Height
220	245	182

9. Precautions in Handling & Use

1) For over-current protection, we recommend the use of resistors to prevent sudden current surges caused by slight shifts in voltage

2) LEDs should not be contacted to any type of fluid (i.e. water, oil, organic solvent, etc.). If cleaning is required, only use isopropyl alcohol.

3) The maximum ambient temperature must be considered in order for the maximum temperature ratings not to be exceeded.

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. ~40℃, ~90% RH)

5) After storage bag is open, LED 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℃ / 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) LEDs require baking before mounting, if humidity card reading is >60% at 23±5℃.

8) If baking is required, LEDs must be baked for 1 day at 60±5℃.

9) LEDs are sensitive to electrostatic discharge and surges. Applying any voltage exceeding the absolute maximum rating of the LED can cause permanent damage to the device. Damaged LEDs may have some unusual characteristics such as increased leakage current, lower turn-on voltage or may light abnormally at low current. When handling LEDs, using grounding wrist-bands or anti-static gloves is recommended.

10) VOCs (volatile organic compounds) present in adhesives, flux, hardeners or organic additives, etc. that are used in luminaires may lead to discoloration of the LED when exposed to heat or light. Note that VOCs can permeate silicone bags. This phenomenon can significantly affect light output from the luminaire. To avoid this issue, please carefully evaluate materials used in your process and/or luminaire to be free of VOCs.

11) To avoid risk of sulfurization (or tarnishing), do not use or store LEDs near materials containing sulfur, fluorine, chlorine, bromine, iodine or other halogens or compounds that can potentially react with the LED's silver plated lead frame. Examples of these materials include: various rubbers, paper products, certain solder pastes, cleaning solutions, adhesives, etc. or may be present in certain environments in form of fertilizers, lubricants, etc. This reaction can result into the lead frame darkening when exposed to such compounds, resulting in degradation of intensity, change in forward voltage, chromaticity coordinate shift and it may go as far as becoming an open circuit in more extreme cases.

10. Company Information

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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.

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