High Power LED C Series

1W White

SPHWHTA1N1A0

Features

- Package : Silicone covered ceramic substrate
- Dimension : 1.2 mm x 1.6 mm
- Technology : Thin GaN
- Chip Configuration : 1 chip
- ESD Voltage : 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM)
- Viewing Angle: 120º
- Qualifications : AEC-Q102 with RV-level 1 Qualified

SAMSUNG

Table of Contents

1. Characteristics

a) Typical Characteristics

[T_S= 25℃] [1]

Item	Symbol	Value	Unit.
Luminous Flux (I_F = 350 ㎃)	Φ_V	Typ. 140	lm
Forward Voltage (I_F = 350 ㎃)	V_F	Typ. 3.0	V
Viewing Angle	Φ	Typ. 120	º
Reverse Current	I_R	Not designed for reverse operation	
Real Thermal Resistance (Junction to Solder point)	$R_{th\_J\text{-}S\ (Real)}$	Typ. 5.2 Max. 6.0	K/W
Electrical Thermal Resistance (Junction to Solder point)	$R_{th\_J\text{-}S\ (Elec.)}$	Typ. 3.3 Max. 3.8	K/W
Radian Surface	A	0.52	㎟

Note:

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

b) Absolute Maximum Rating

Item	Symbol	Rating	Unit
Ambient / Operating Temperature	T_a	-45 ~ +125	ºC
Storage Temperature	T_{stg}	-45 ~ +125	ºC
LED Junction Temperature	T_j	150	ºC
Maximum Forward current[2] (T_S:25℃) [3]	I_F	700	㎃
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 25 ㎳
[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	A	1	N	1	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 up)
7 8	product configuration and type (A1 for automotive PKG type)
9	lens configuration (N for no lens)
10	max power (1 for 1W)
11 12	specific property (A0 for C Series)
13 14	forward voltage property
15 16	CIE coordination property
17 18	luminous flux property

a) Luminous Flux Bins [5] (I_F = 350 mA, T_S= 25ºC)

Symbol	Flux Bin Code	Flux Range (lm)	
		Min	Max
Φ_V	2C	129	141
	3C	135	148
	4C	141	155
	5C	148	163

b) Voltage Bins [5] (I_F = 350 mA, T_s = 25 ºC)

Symbol	Voltage Bin Code	Voltage Range (V)	
		Min	Max
V_F	1D	2.75	3.00
	1E	3.00	3.25

Note:

[5] Luminous flux measuring equipment : CAS140CT

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

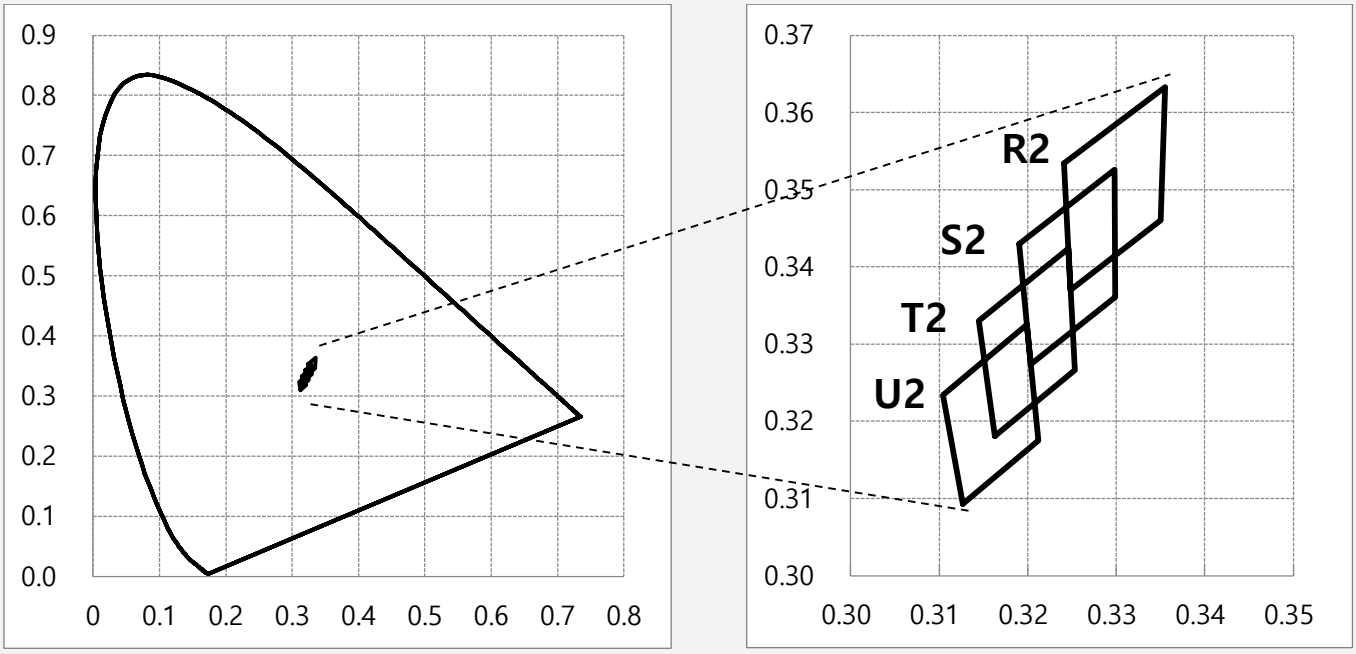
c) Color Bin [6](I_F = 350 mA)

Symbol	Color Bin Code	Cx				Cy			
Cx, Cy	R2	0.3241	0.3248	0.3350	0.3355	0.3534	0.3370	0.3460	0.3633
	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] Luminous flux measuring equipment : CAS140CT

Chromaticity coordinates : Cx, Cy according to CIE 1931. Cx and Cy tolerances are ±0.005, respectively.

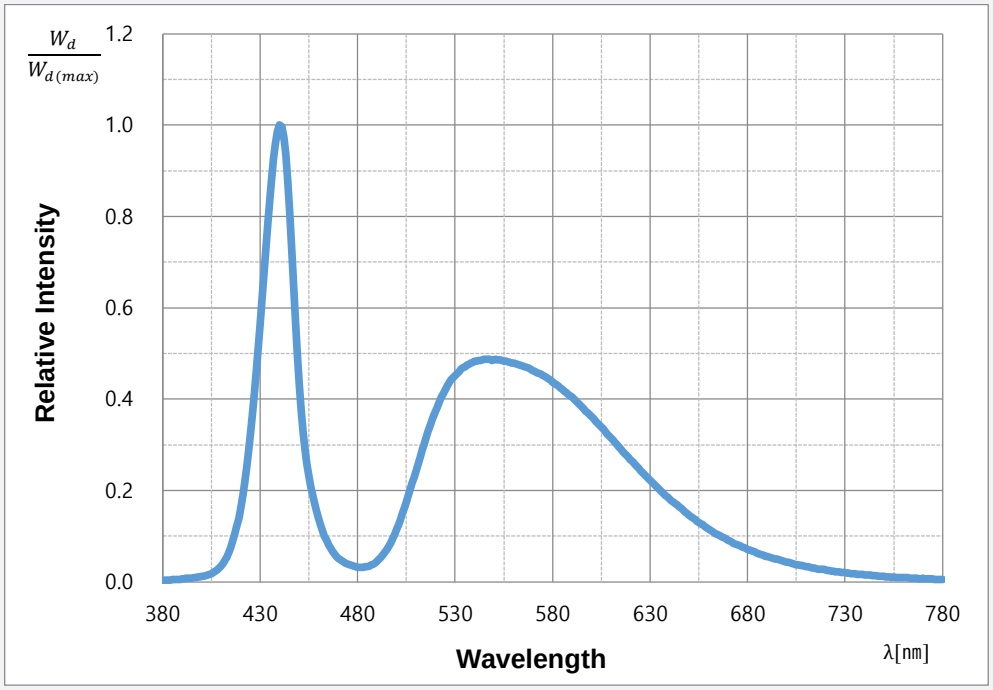


d) Luminous Flux Bins according to Color Bin (I_F = 350 mA, T_S = 25 ºC)

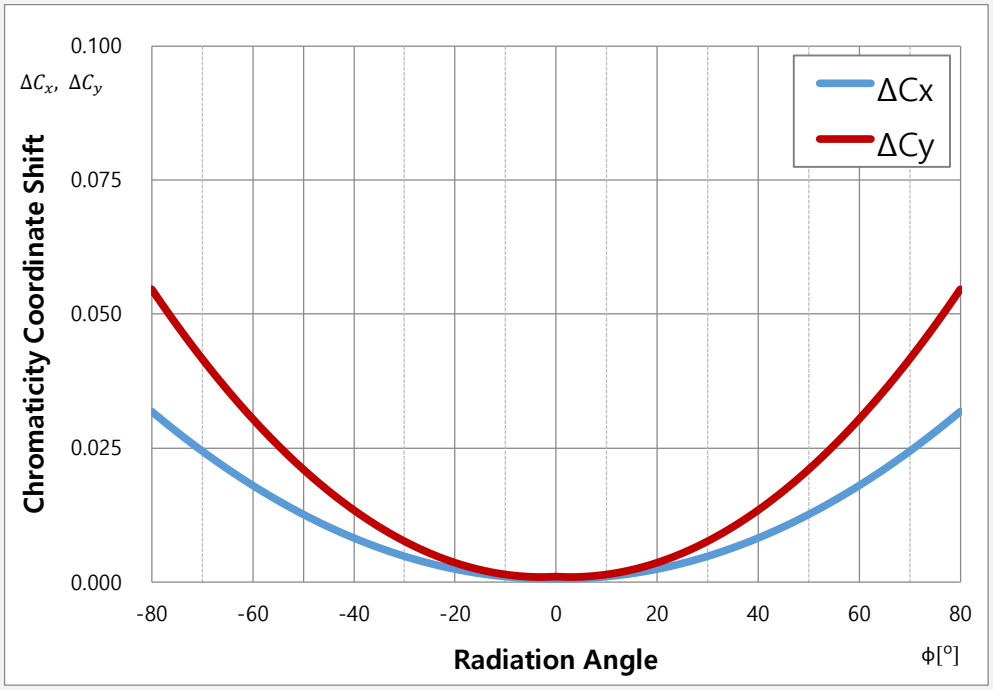
Symbol	Flux Bin Code	Flux Range (lm)							
		2C		3C		4C		5C	
		Min	Max	Min	Max	Min	Max	Min	Min
		129	141	135	148	141	155	148	163
Φ_V	R2			O		O		O	
	S2	O		O		O		O	
	T2	O		O		O		O	
	U2	O		O		O			

3. Typical Characteristics Graphs

a) Spectrum Distribution (I_F = 350 mA, T_S= 25 ºC) [7]



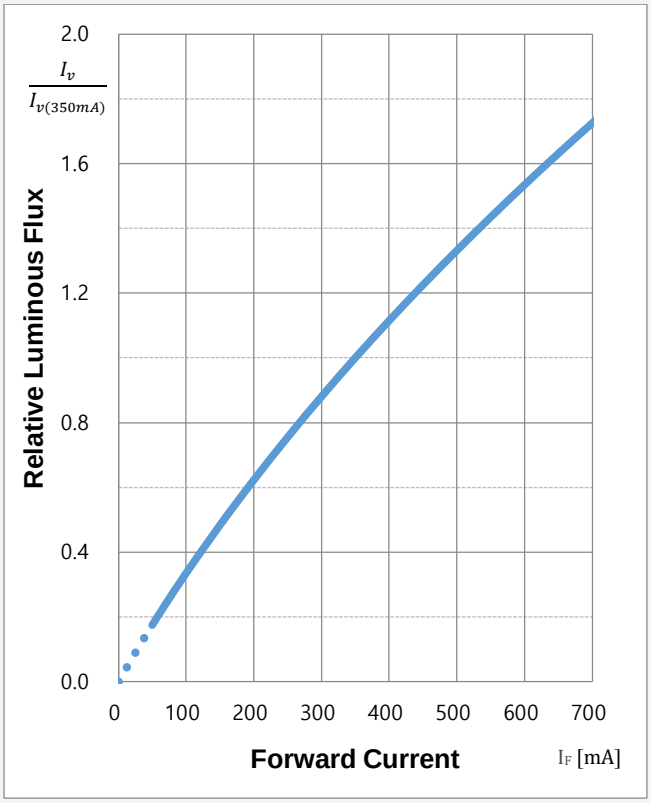
b) Typical Chromaticity Coordinate Shift vs Radiation Angle (I_F = 350 mA, T_S = 25 ºC) [7]

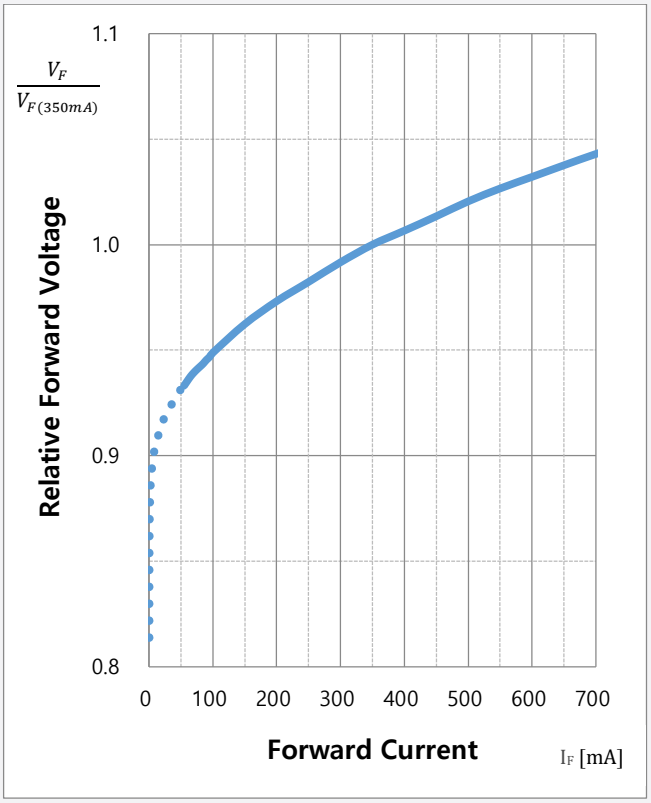


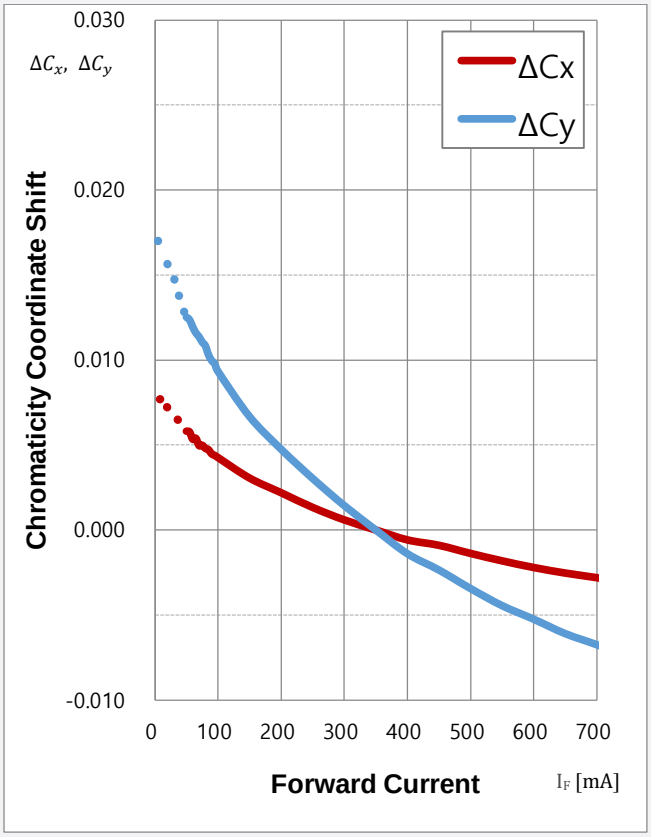
Note:

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

c) Forward Current Characteristics (T_s = 25 ºC) [8]



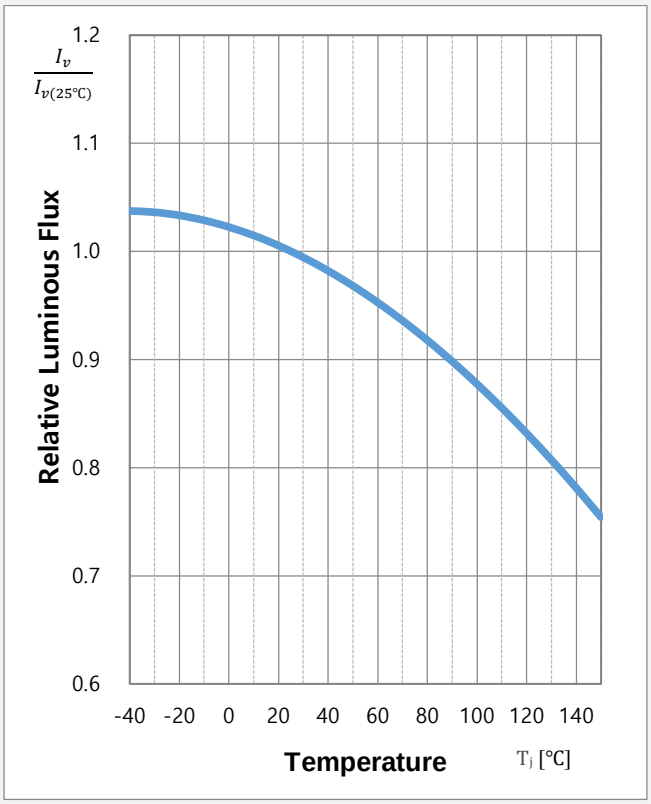


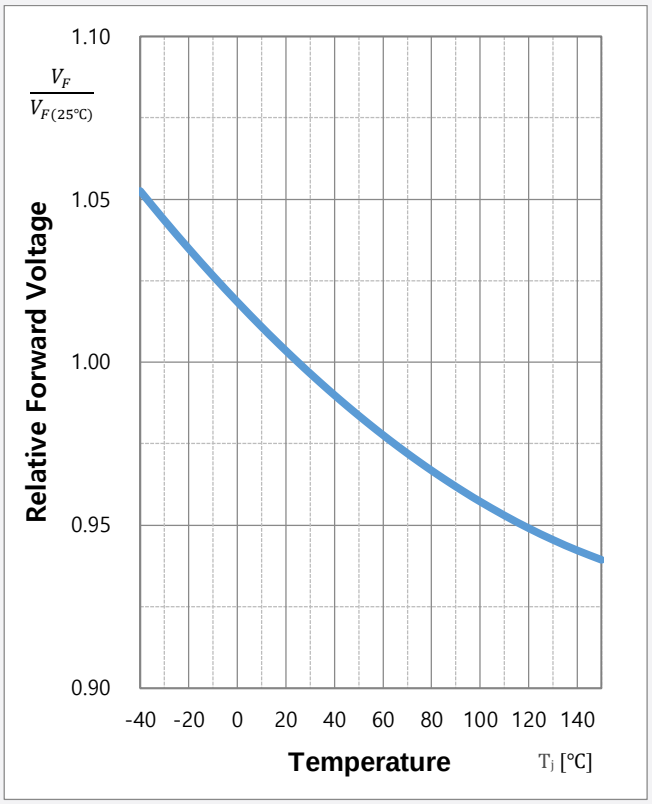


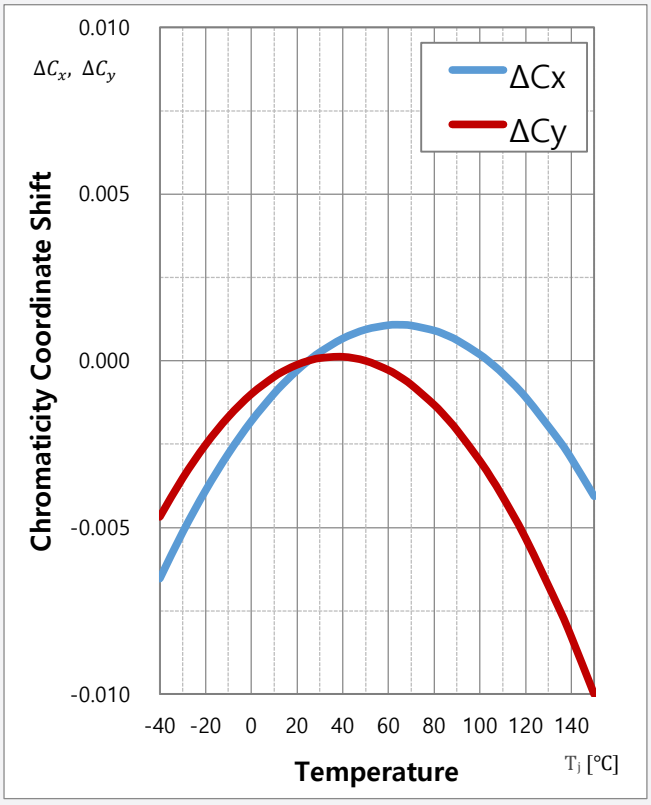
Note:

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

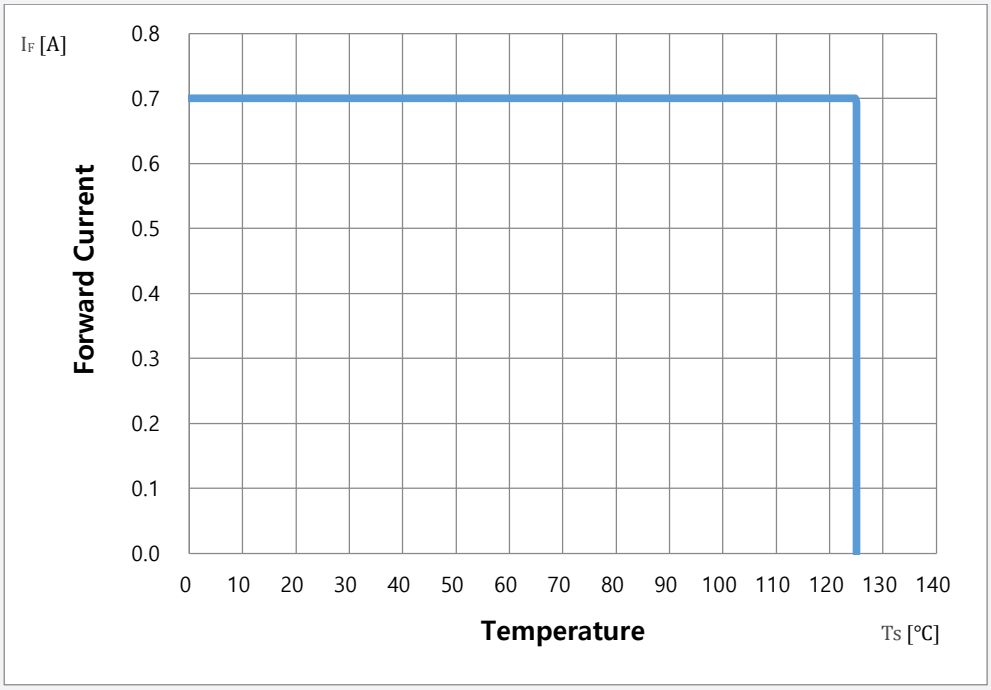
d) Temperature Characteristics (I_F= 350 mA)







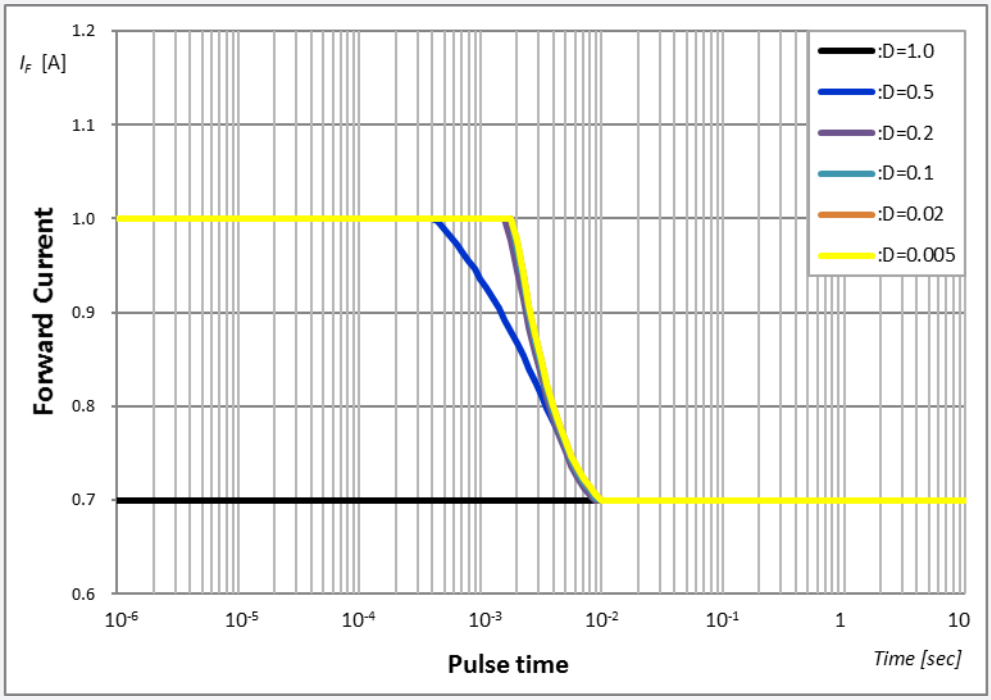
e) Derating Curve [9]



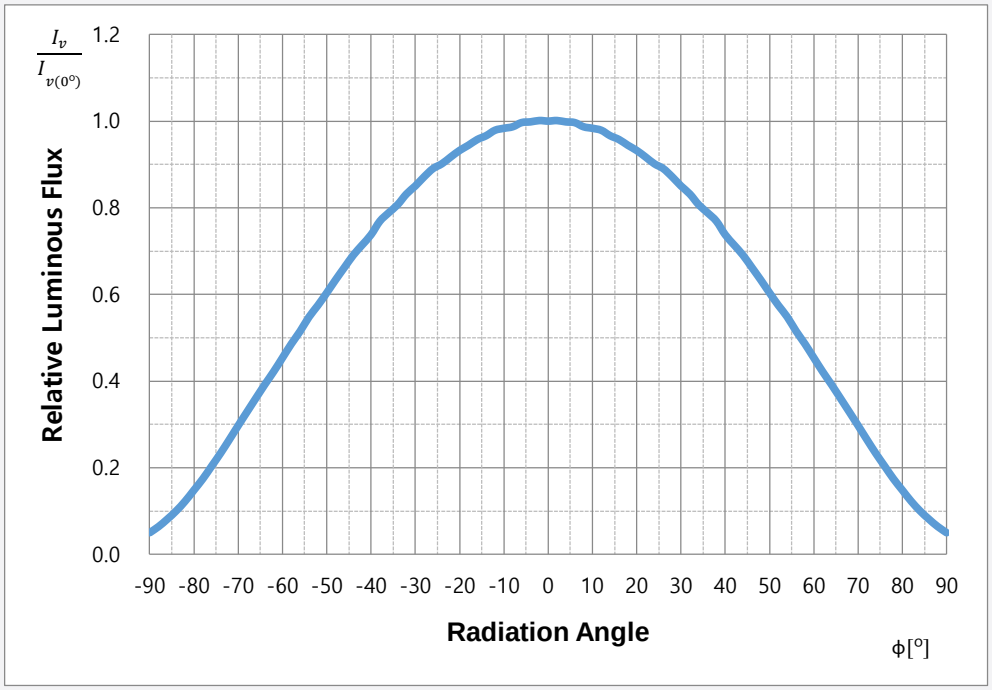
Note:

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

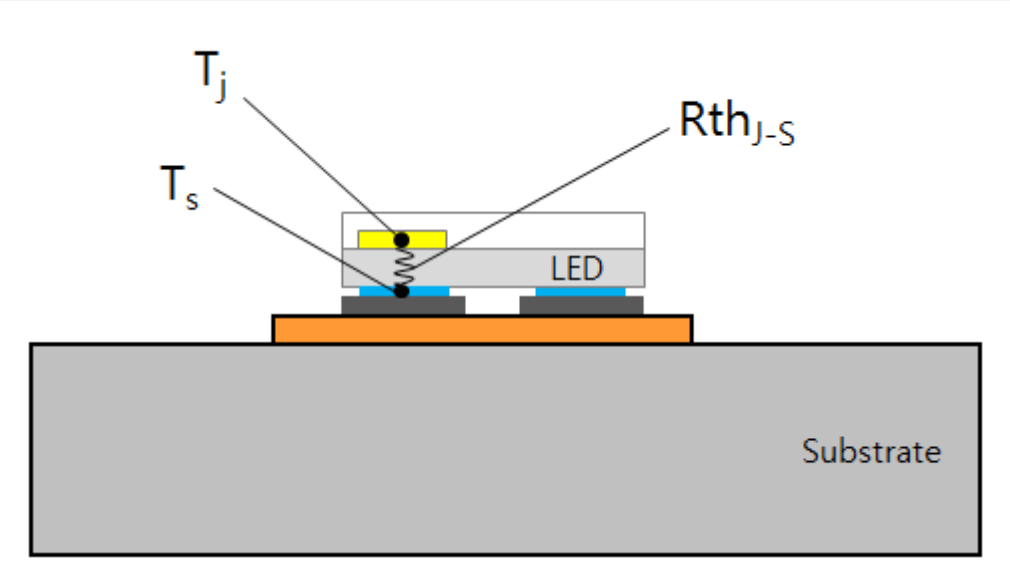
f) Permissible Pulse Handling Capacity ($I_F=f(t_p)$; D : Duty cycle, Ts=125 °C)



g) Beam Angle Characteristics (I_F = 350 mA, T_S = 25 ºC)



4. Soldering Temperature Location

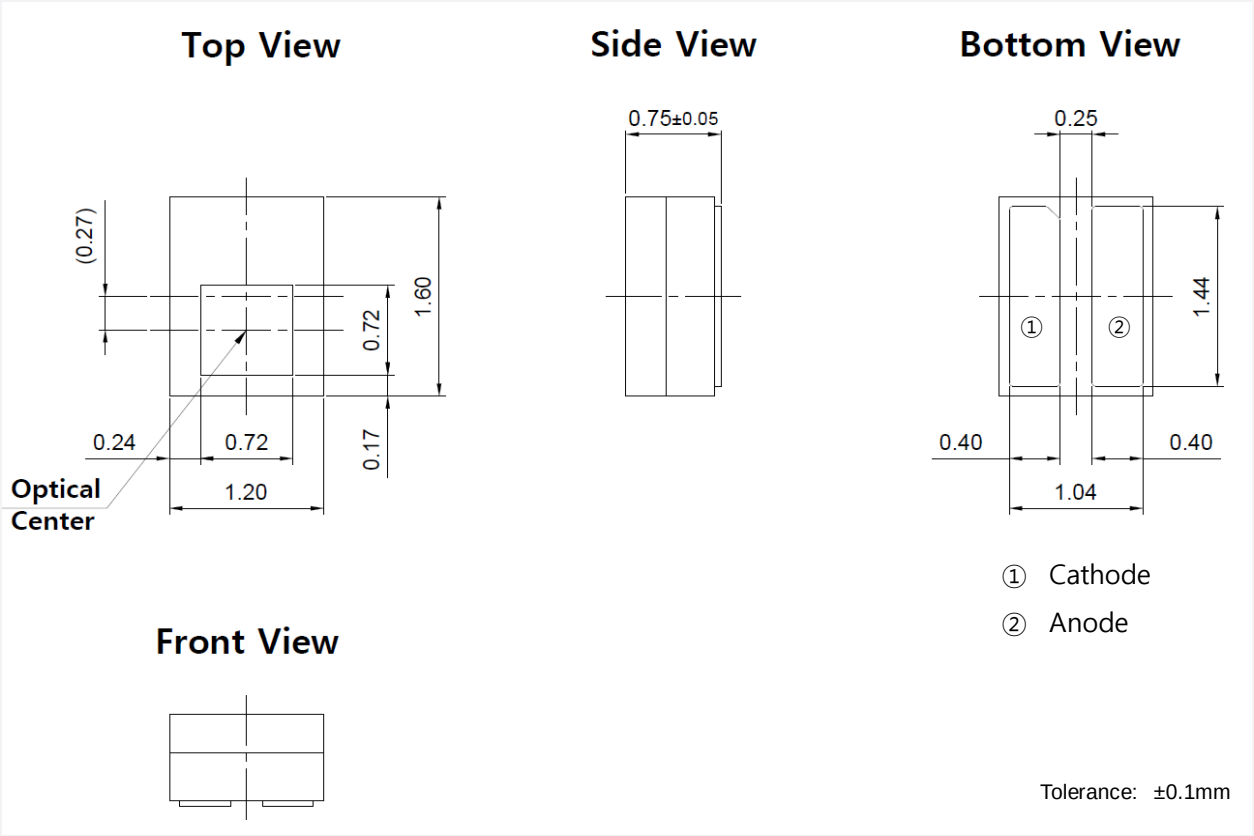


T_j : Temperature of Junction

T_s : Temperature of Solder Pad

$R_{th\ j\text{-}s}$: Thermal Resistance from Junction to Solder Pad

5. Mechanical Dimension



Note:

The dimensions in parentheses are for reference purposes.

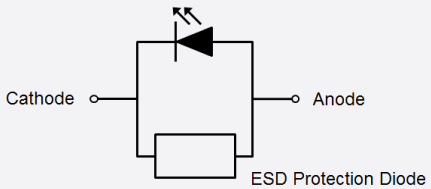
Unit: ㎜, Approximate weight : 4.6mg

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

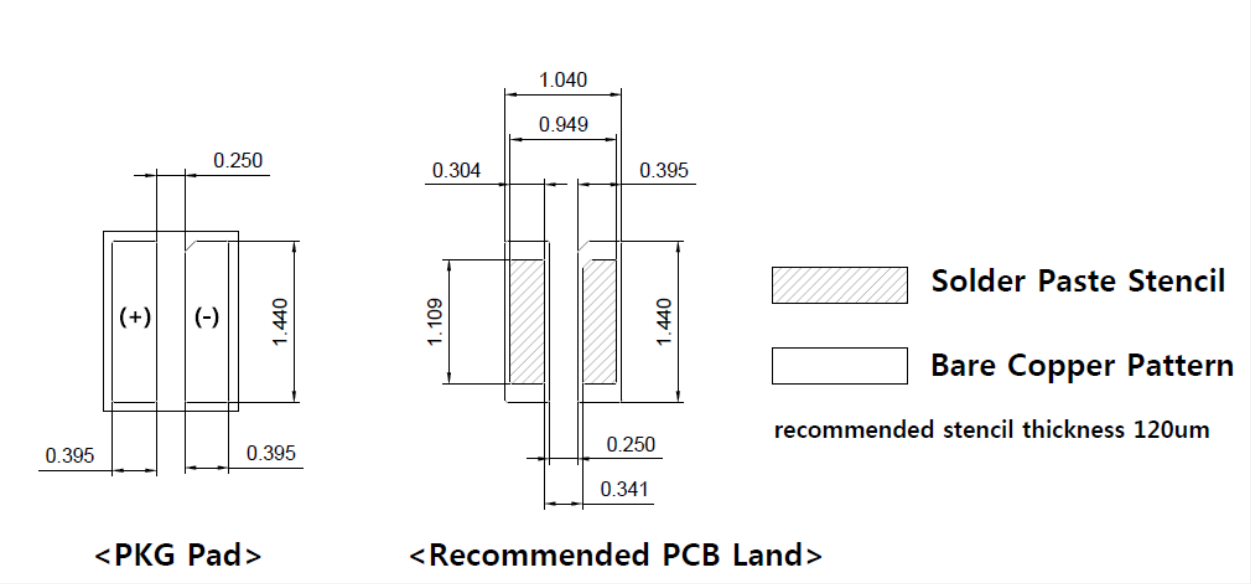


c) Material Information

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

6. Soldering Conditions

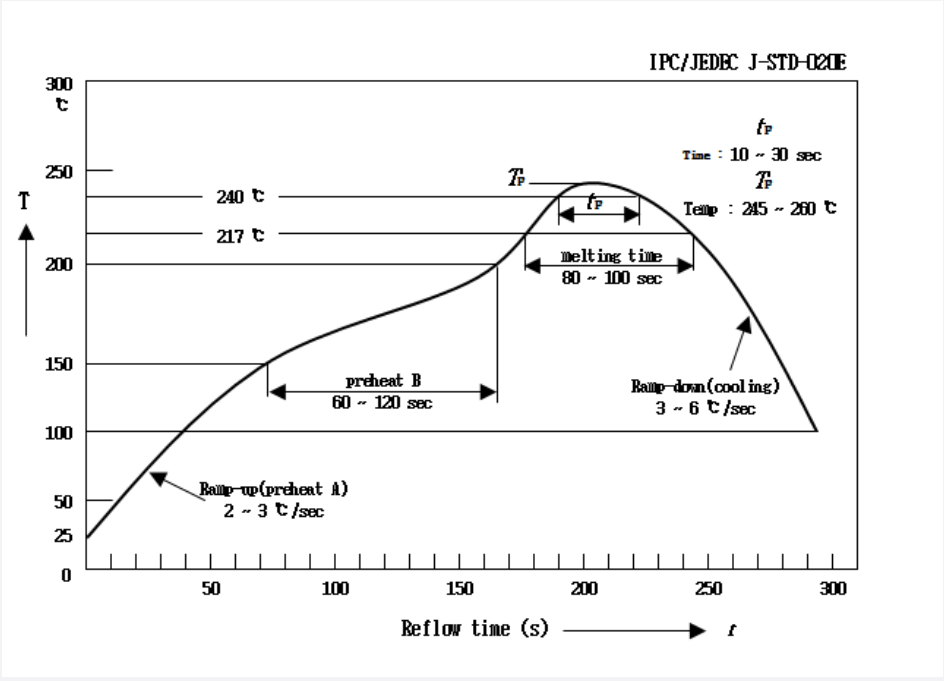
a) Pad Configuration



Notes: ㎜, Tolerance : ±0.10 ㎜, recommended stencil thickness 120 ㎛

b) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.

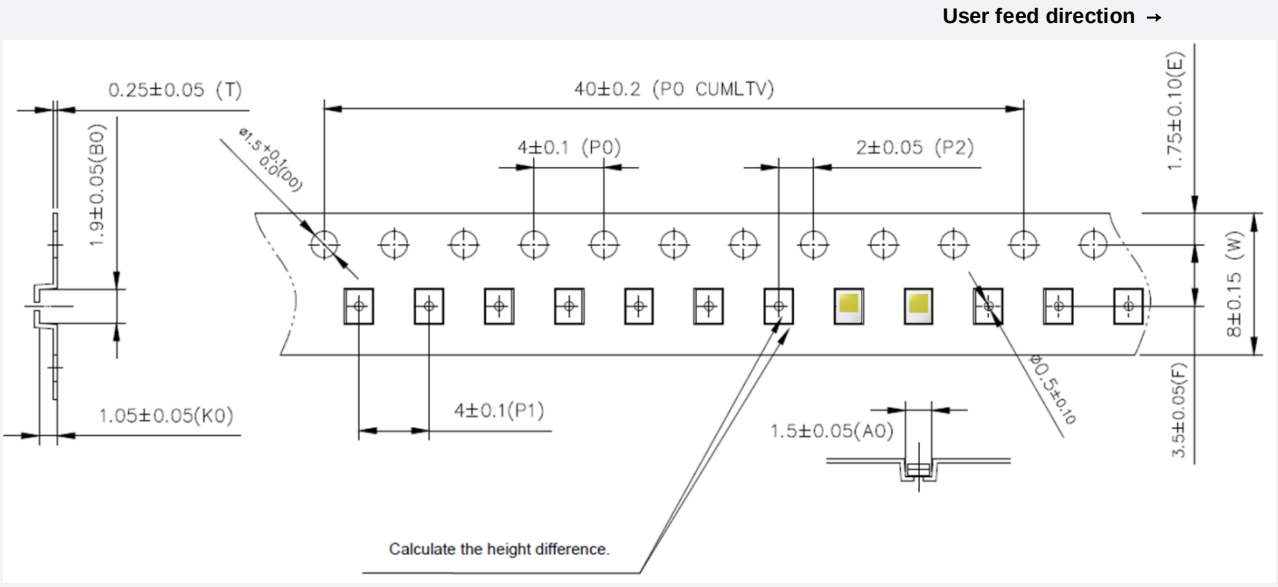


c) Manual Soldering Conditions

Not more than 5 seconds @ max. 300 ºC, under soldering iron.(one time only)

7. Tape & Reel

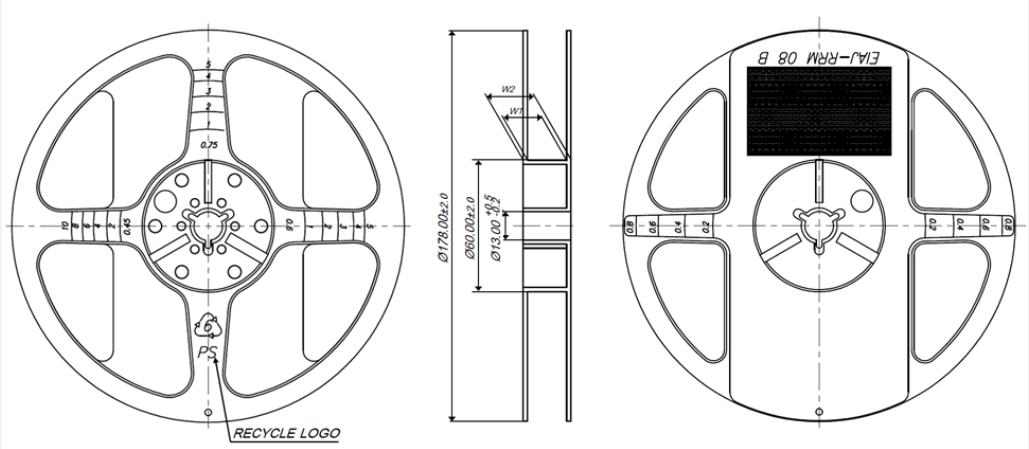
a) Taping Dimension



Notes:

Unit: ㎜, LED taping quantity: 3,000EA / Reel

b) Reel Dimension



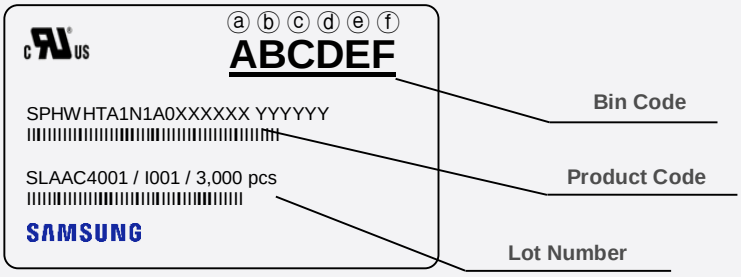
Width	W1	W2
8mm	9 ±0.3	11.9 ±1.0

Notes:

Unit: mm, Tolerance: ±0.2mm

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:

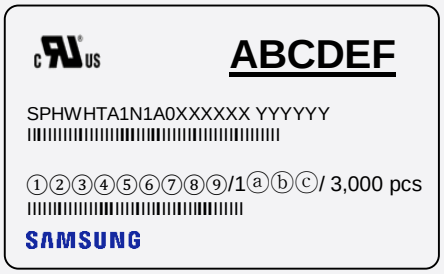
ⓐⓑ: Forward Voltage bin (refer to page 5)

ⓒⓓ: Chromaticity bin (refer to page 6)

ⓔⓕ: Luminous Flux bin (refer to page 5)

b) Lot Number

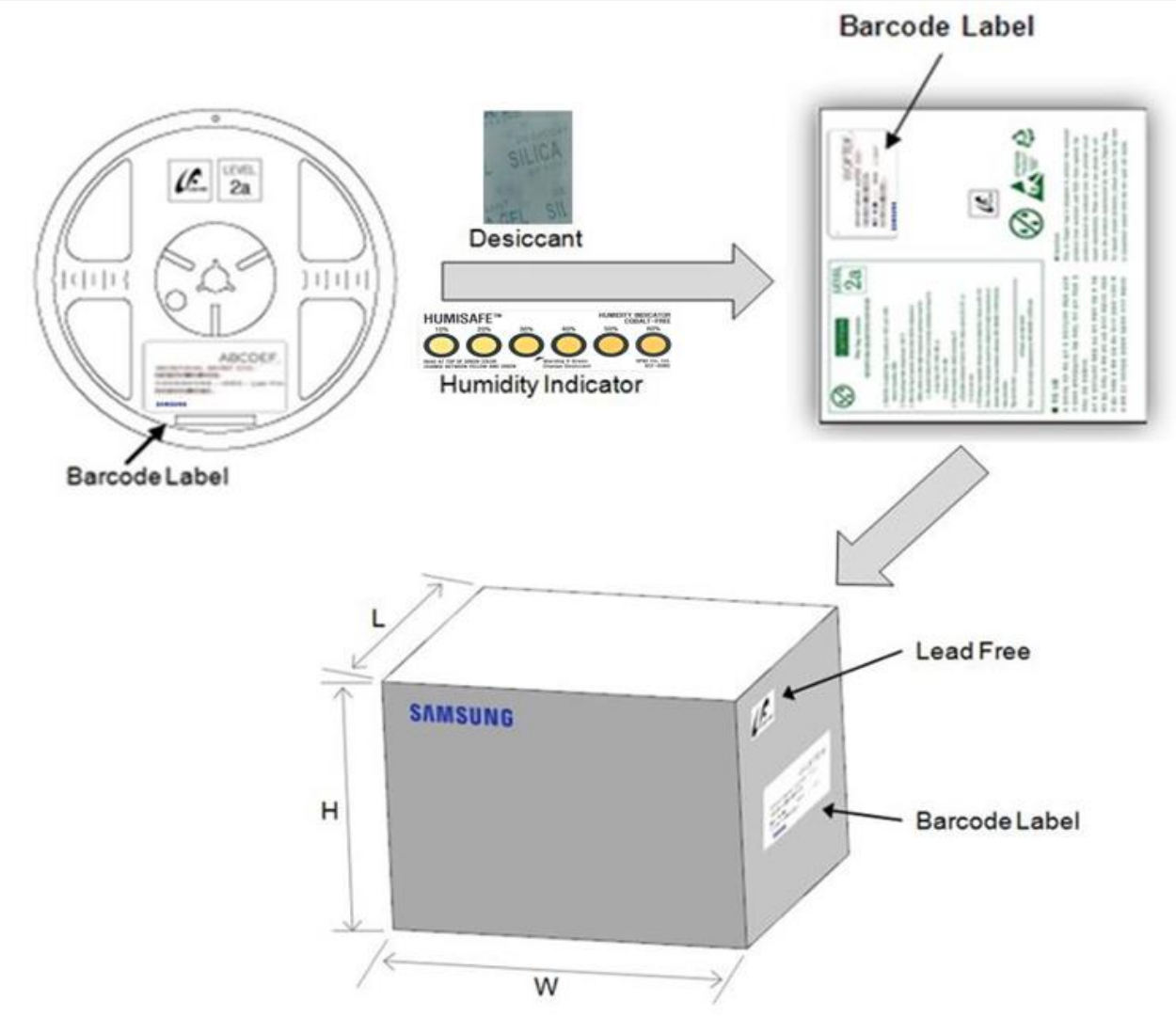
The lot number is composed of the following characters:



①②③③②③④⑤⑥⑦⑧⑨ / Ⅰⓐⓑⓒ / 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 (The quantity of PKG on the Reel to be Max 3,000pcs)



Dimension of Transportation Box in ㎜

Width	Length	Height
220	245	182

10. Handling and use precautions

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.

11. Company Information

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Legal and additional information.

About Samsung Electronics Co., Ltd.

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