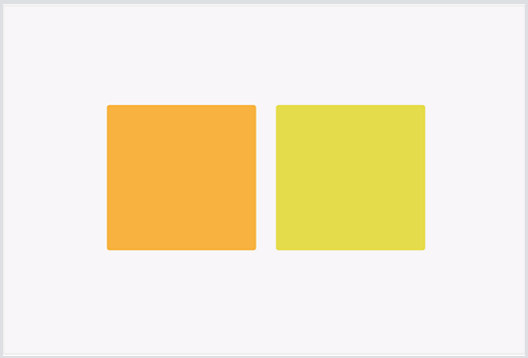
High Power LED C-Series

1W Bi-Color

SPHWATABN100



Features

- Package : Ceramic package
- Dimension : 3.00 mm x 2.00 mm
- Chip Technology : Flip Chip
- ESD : 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM)
- Qualifications : AEC-Q101 Qualified

SAMSUNG

Table of Contents

1. Characteristics

a) Typical Characteristics

[Ts = 25℃] [1]

Item	Symbol	Value(White)	Value(Amber)	Unit.
Luminous Flux (I_F = 350 mA)	Lm	Typ. 120	Typ. 75	lm
Forward Voltage (I_F = 350 mA)	V_F	Typ. 3.2	Typ. 3.2	V
Viewing Angle	φ	Typ. 120	Typ. 120	º
Reverse Current	I_R	Not designed for reverse operation	Not designed for reverse operation	
Real Thermal Resistance (Junction to Solder point)	$R_{th\_J\text{-}S\ (Real)}$	Typ. 6.4	Typ. 5.6	K/W
		Max. 8.4	Max. 7.6	
Electrical Thermal Resistance (Junction to Solder point)	$R_{th\_J\text{-}S\ (Elec.)}$	Typ. 4.2	Typ. 4.5	K/W
		Max. 6.2	Max. 6.5	
Radian Surface	A	0.69	0.69	mm^2

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	Condition
Ambient / Operating Temperature	T_a	-40 ~ +125	ºC	-
Storage Temperature	T_{stg}	-40 ~ +125	ºC	-
LED Junction Temperature	T_j	150	ºC	-
Maximum Forward current[2] (Ts:25℃) [3]	I_F	700	mA	
Minimum Forward current[2] (Ts:25℃) [3]	I_F	50	mA	
Maximum Reverse current		Do not apply for reverse current		
ESD Sensitivity[4]	-	±8 for 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 ms

[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	A	T	A	B	N	1	0	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 (WA for automotive white and amber color)
6	LED PKG version (T for initial version)
7 8	Product configuration and type (AB for automotive Bi color PKG type)
9	Lens configuration (N for no lens)
10	Max power (1 for 1W)
11	Special internal code (0 for initial version)
12	Specific property (0 for default)
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)

·**White**

Symbol	Flux Bin Code	Flux Range (lm)	
		Min	Max
Φ	H1	110	120
	J1	120	130
	K1	130	140

·**Amber**

Symbol	Flux Bin Code	Flux Range (lm)	
		Min	Max
Φ	D1	70	80
	E1	80	90

Note:

[5] Luminous flux measuring equipment : CAS140CT

Φ_V and V_F tolerances are ±10% and ±5 %, respectively.

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

Symbol	Voltage Bin Code	Voltage Range (V)	
		Min	Max
V_F	E3	2.7	3.0
	H3	3.0	3.3
	K3	3.3	3.5

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

·**White**

Symbol	Color Bin Code	Cx				Cy			
Cx, Cy	MB	0.3386	0.3386	0.3484	0.3484	0.3325	0.3516	0.3661	0.3478
	MC	0.3288	0.3288	0.3386	0.3386	0.3171	0.3372	0.3516	0.3325

·**Amber**

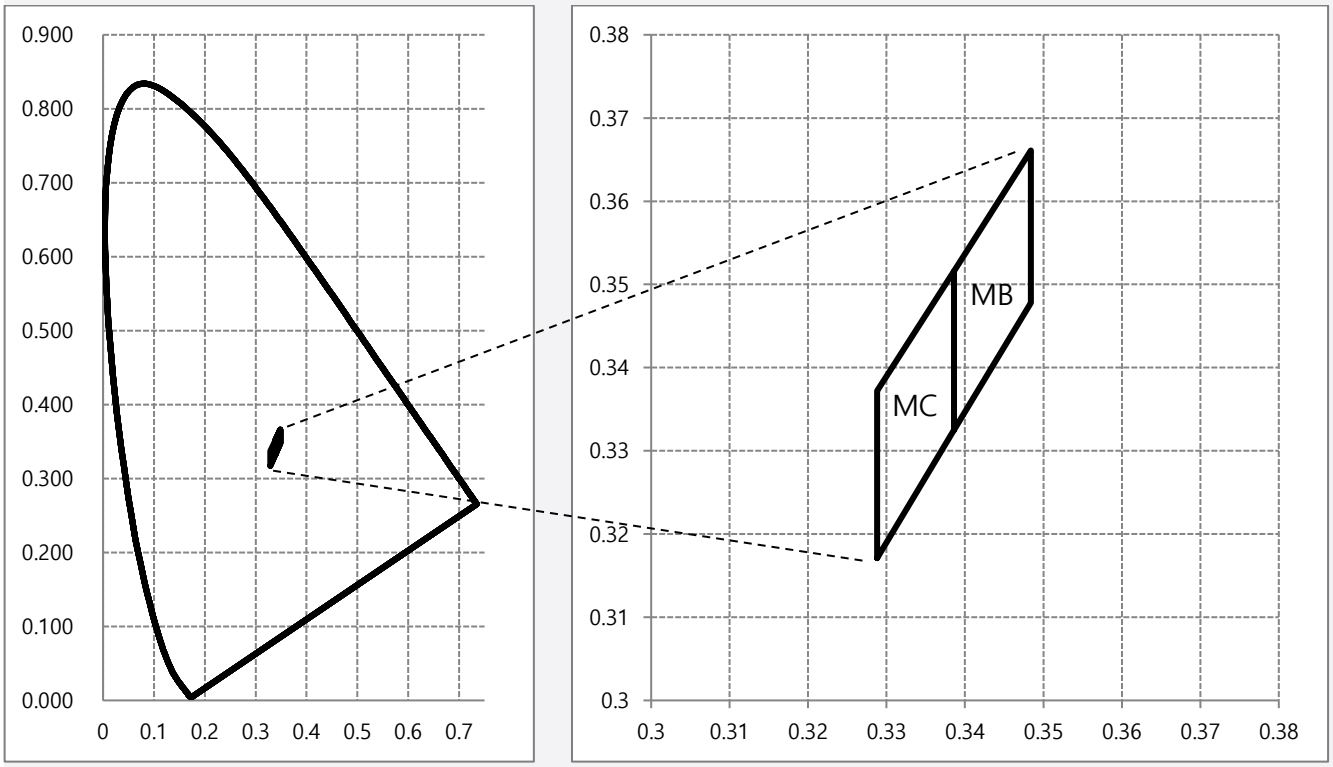
Symbol	Color Bin Code	Cx				Cy			
Cx, Cy	A0	0.5536	0.5765	0.5883	0.5705	0.4221	0.4075	0.4111	0.4289

Note

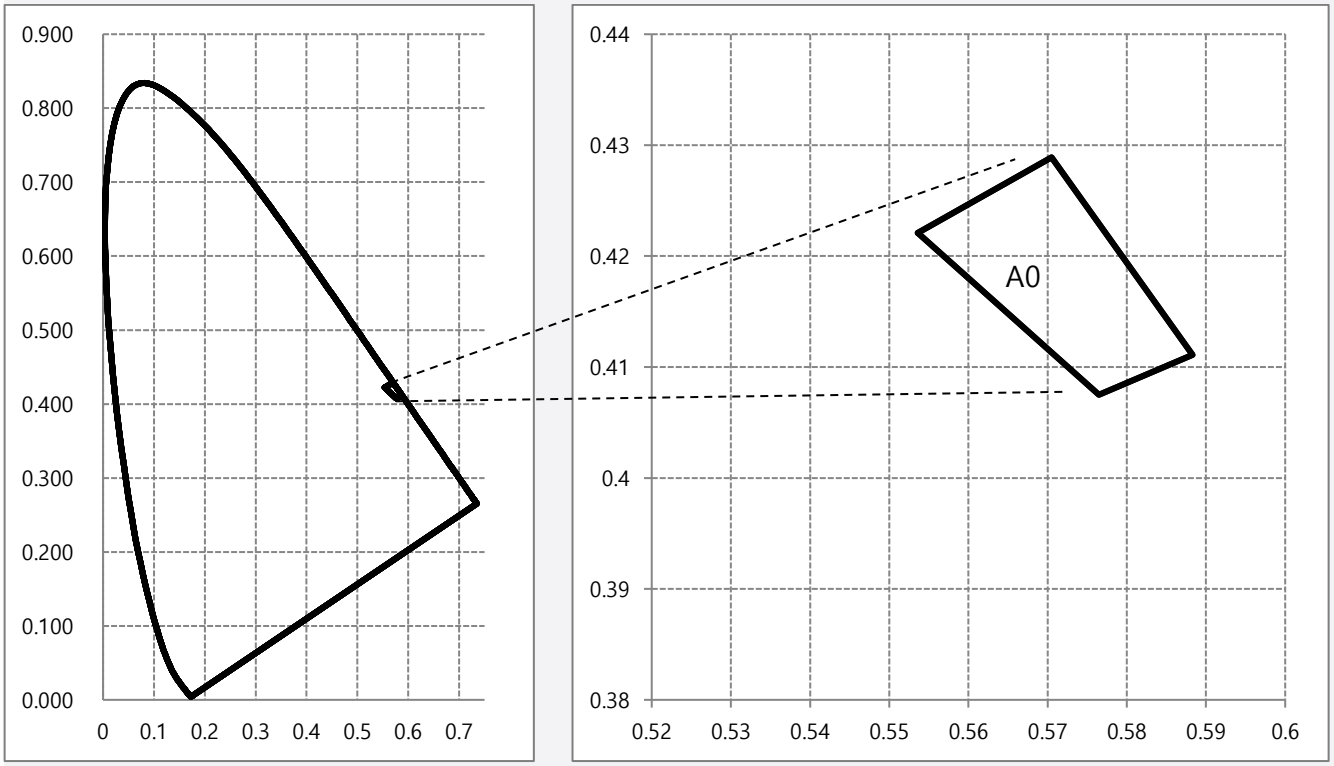
[6] Luminous flux measuring equipment : CAS140CT

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

·White


0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7
0.38
0.37
0.36
0.35
0.34
0.33
0.32
0.31
0.3
0.3 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38
MB
MC

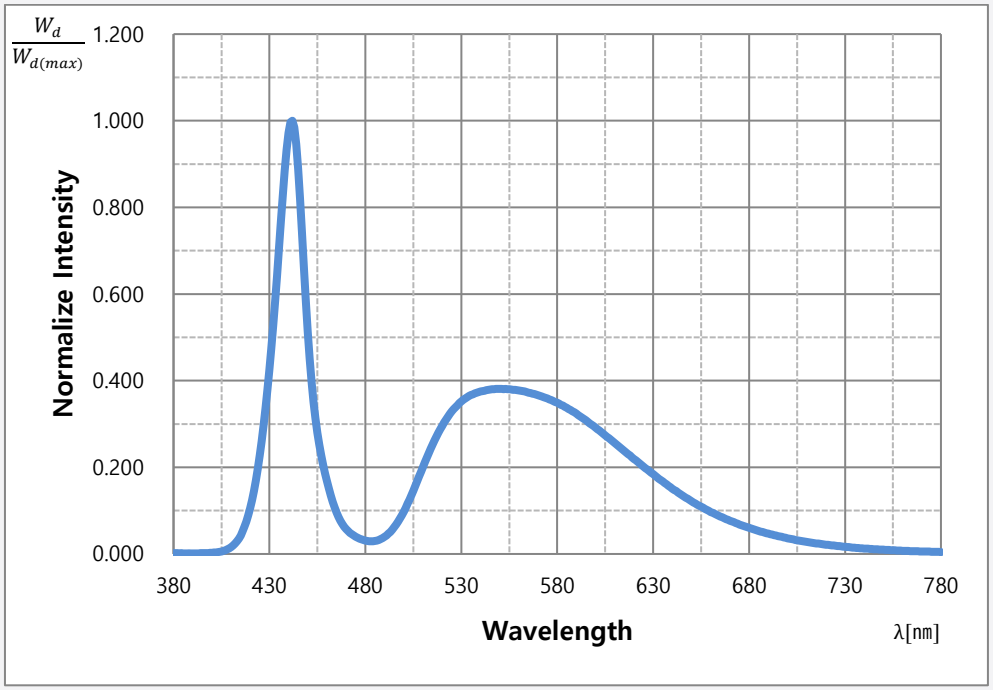
·Amber


0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7
0.44
0.43
0.42
0.41
0.4
0.39
0.38
0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.6
A0

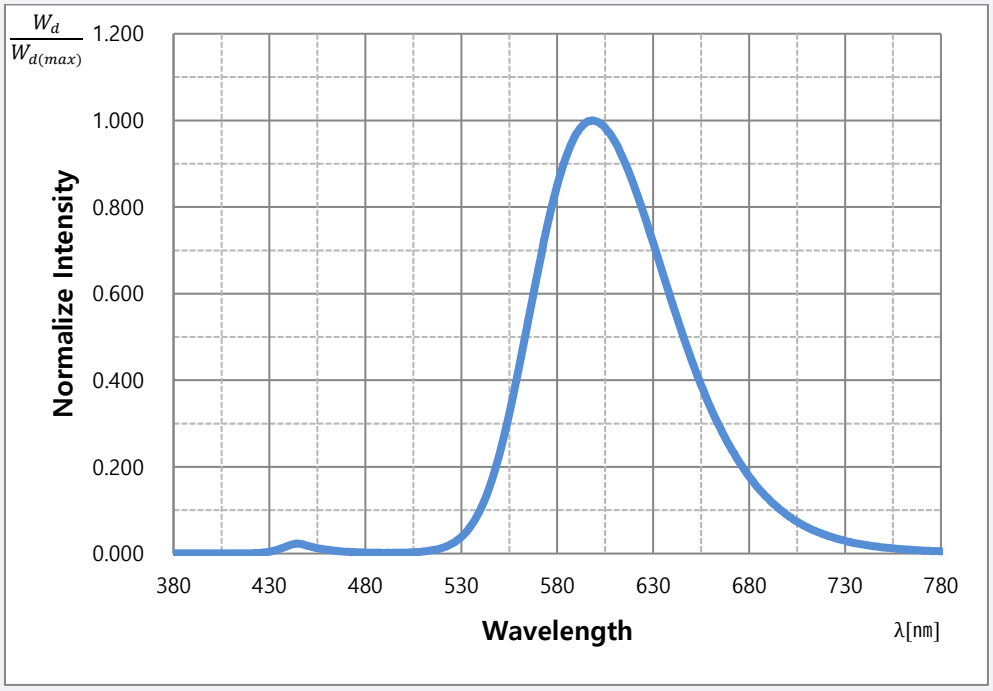
3. Typical Characteristics Graphs

a) Spectrum Distribution (I_F = 350 mA, T_s= 25 ºC)

·White

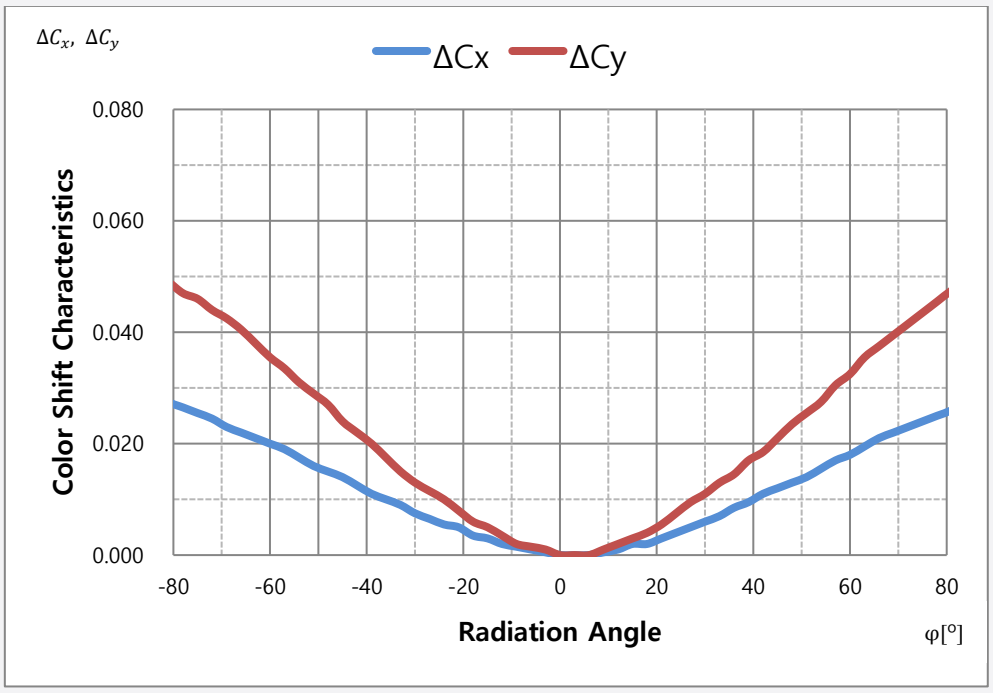


·Amber

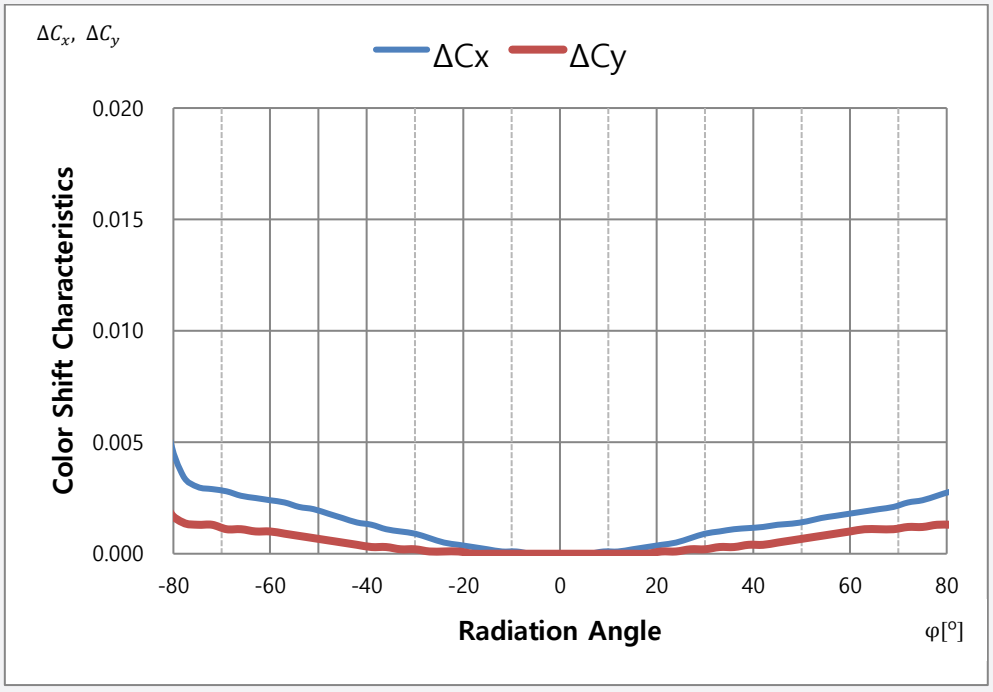


b) Typical Chromaticity Coordinate Shift vs Radiation Angle (I_F = 350mA, T_S = 25 ºC) [7]

·**White**



·**Amber**

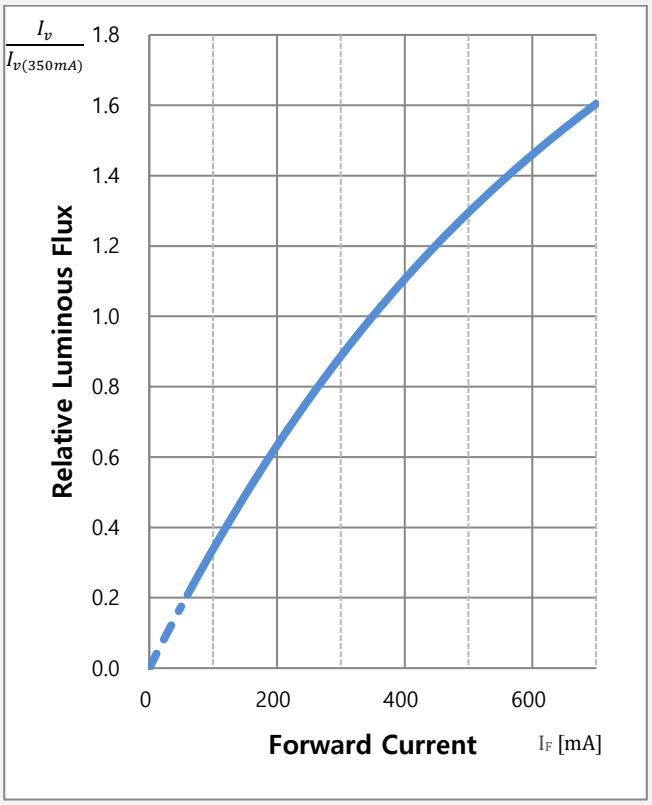


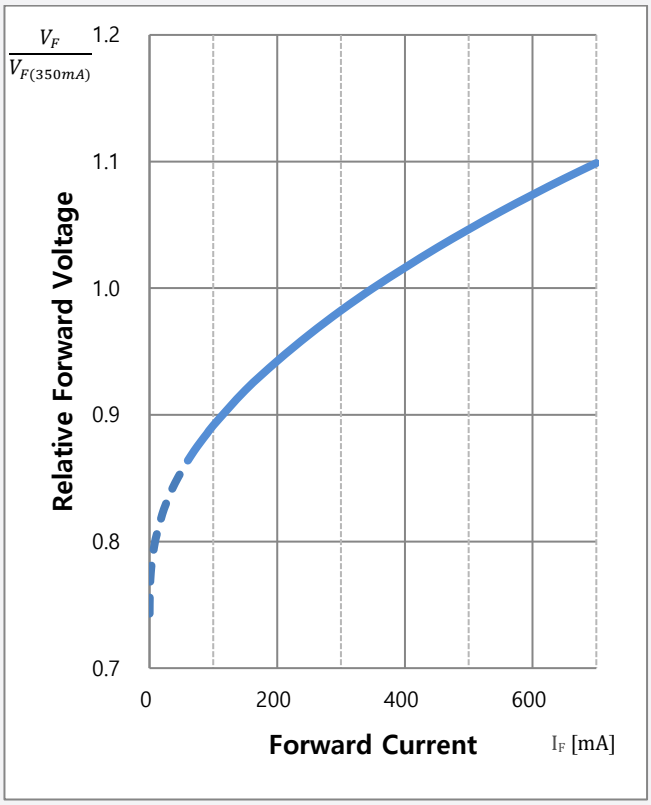
Note:

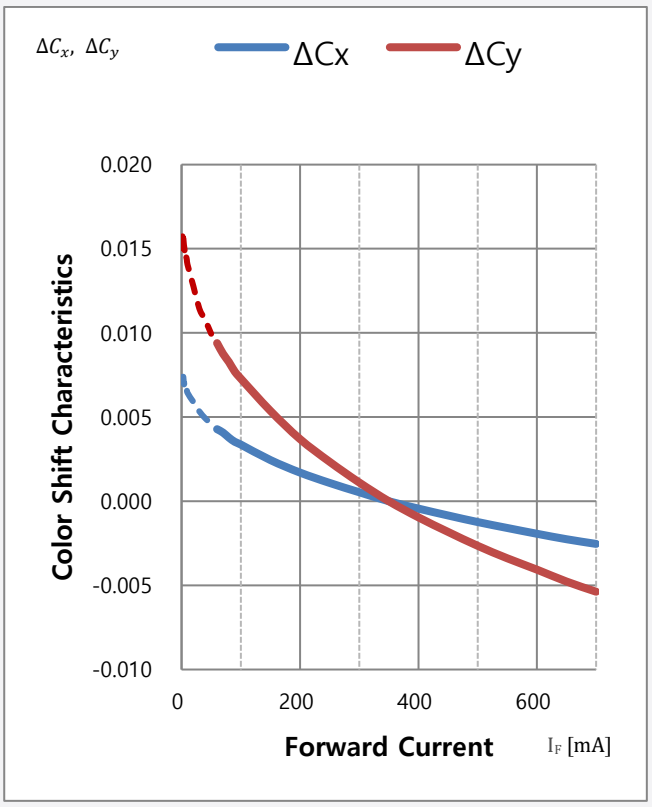
[7] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 25ms.

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

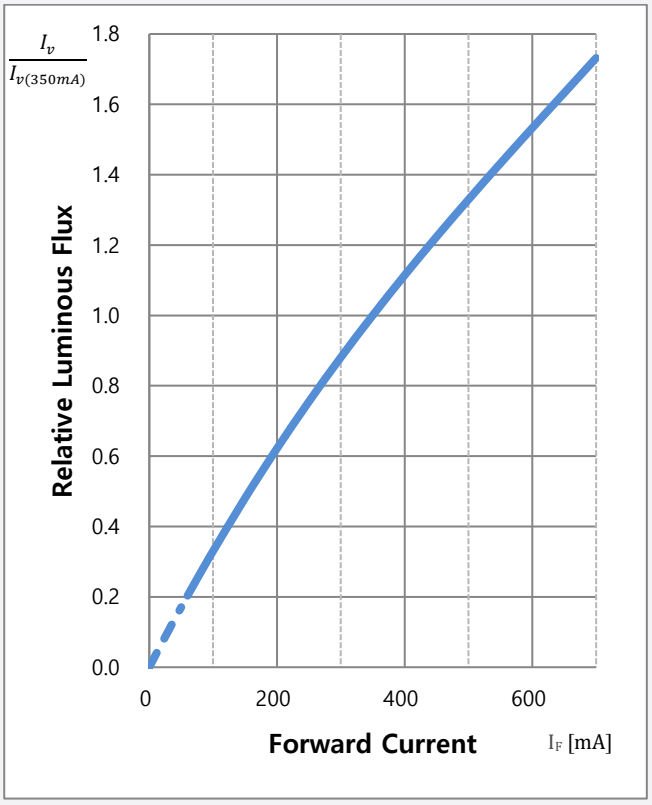
·White

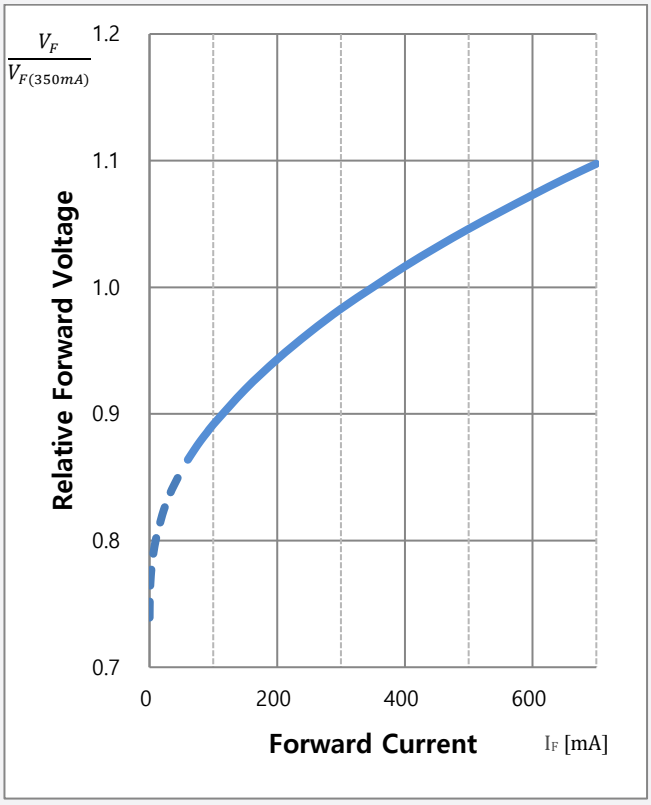


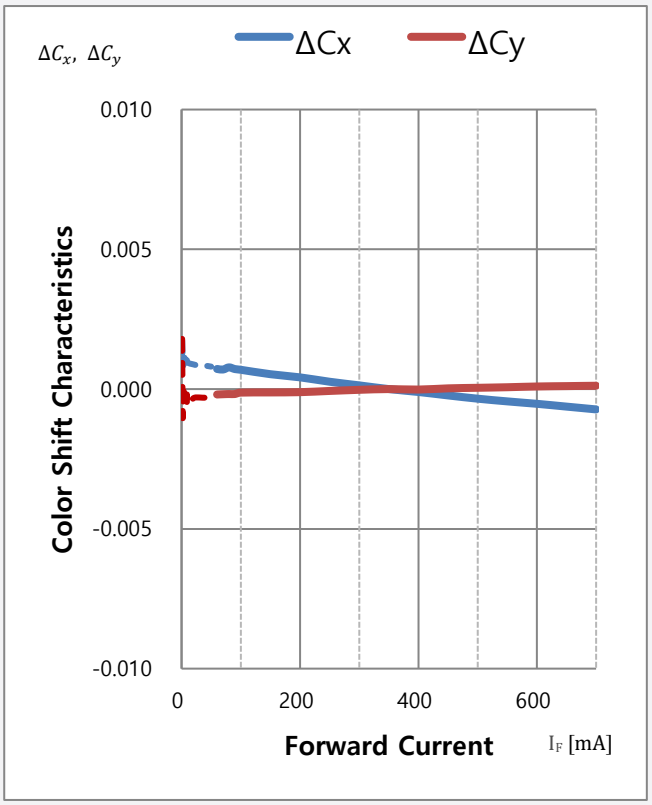




Amber





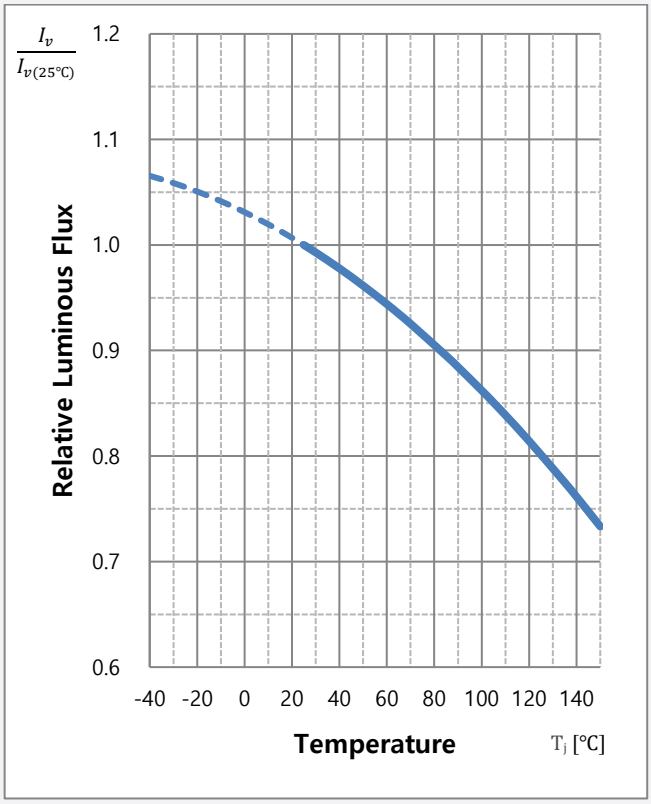


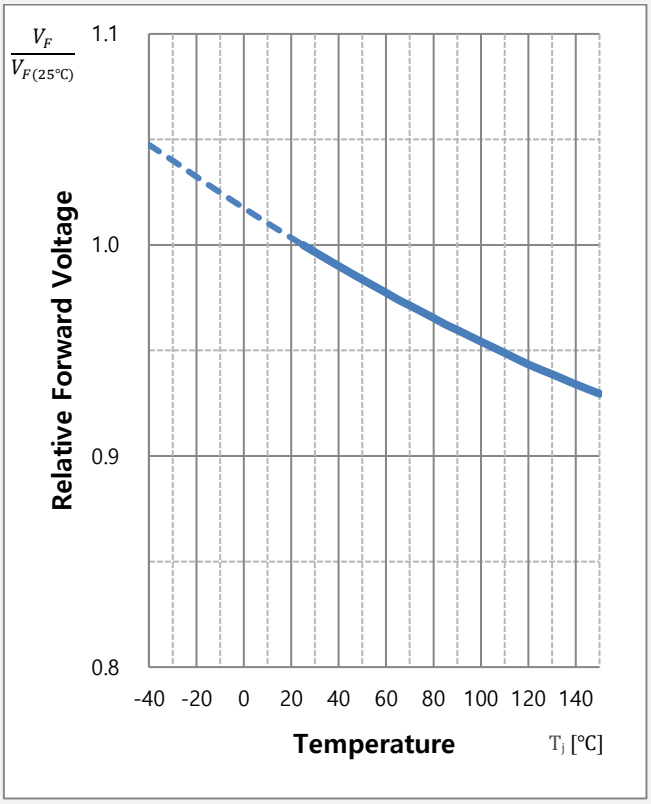
Note:

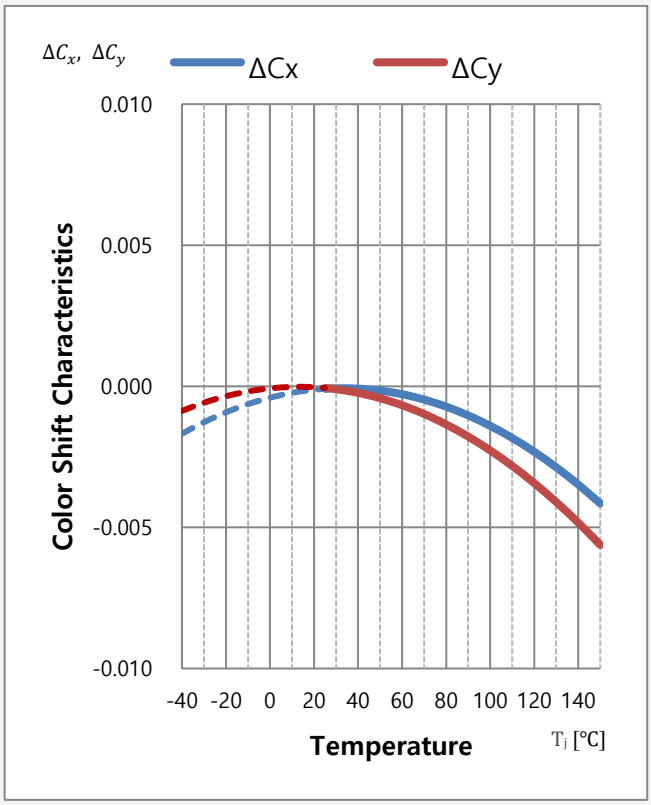
[8] The measurement condition means that temperature dependence is excluded by applying pulse current for typically 25ms.

d) Temperature Characteristics (I_F = 350 mA)

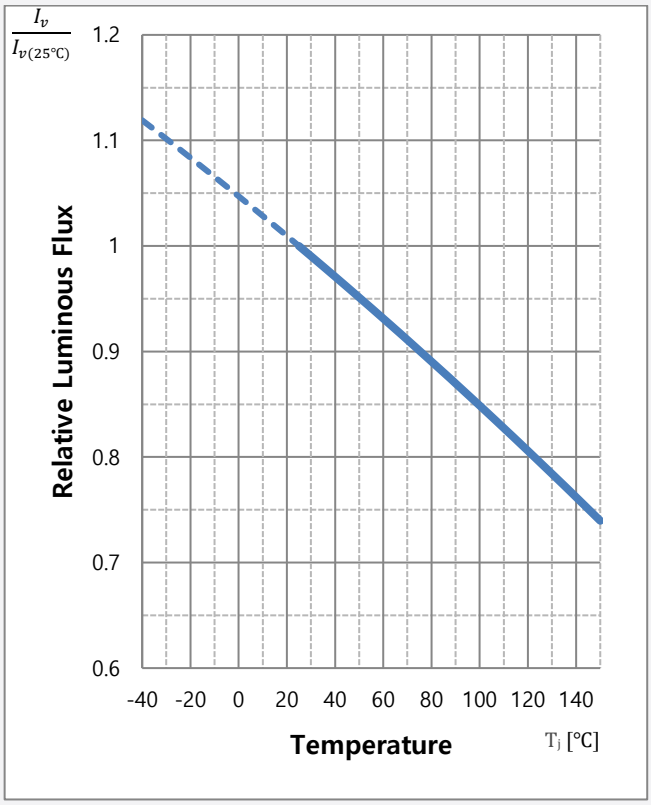
·White

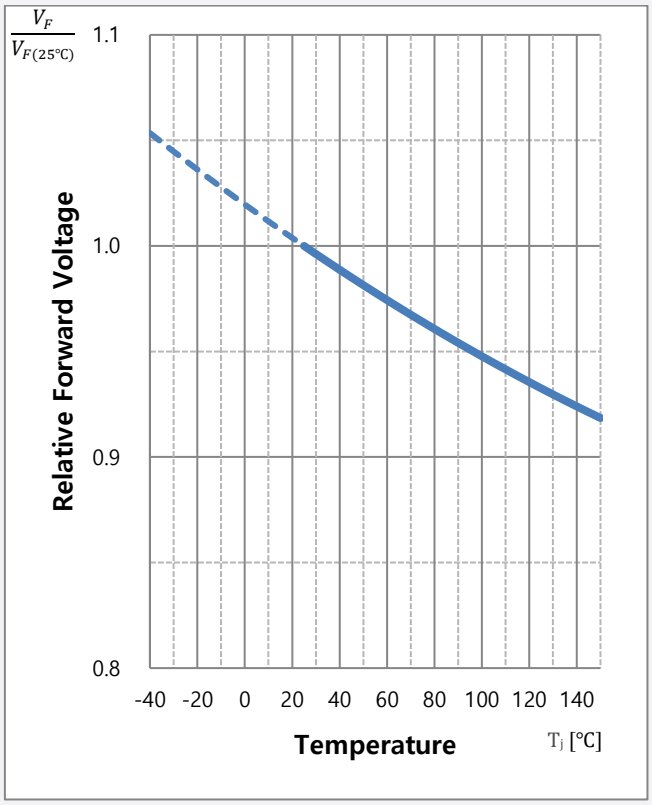


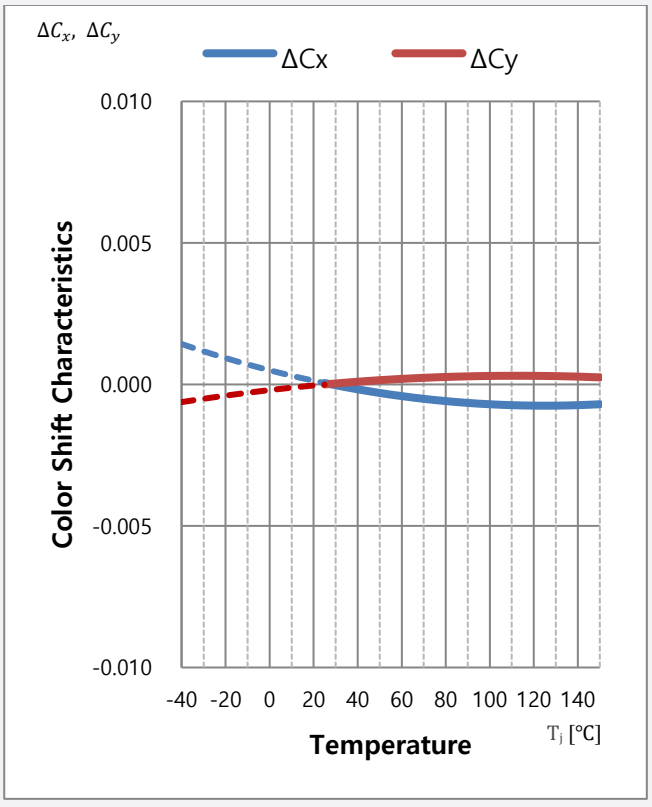




·Amber

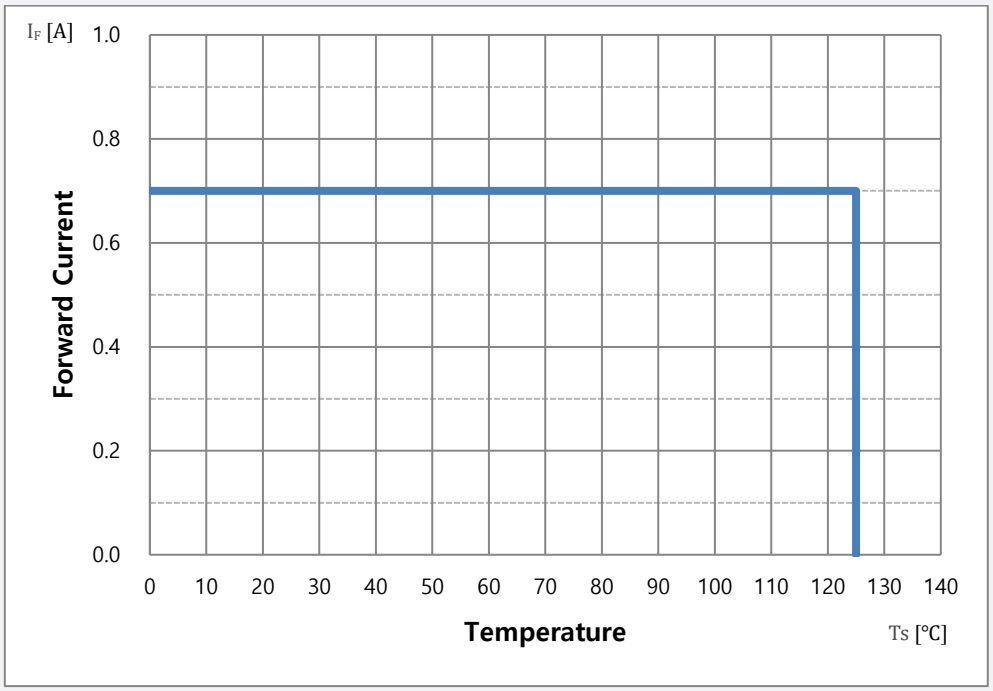

$\frac{I_v}{I_{v(25℃)}}$
Relative Luminous Flux
1.2
1.1
1
0.9
0.8
0.7
0.6
-40 -20 0 20 40 60 80 100 120 140
Temperature
Tj [℃]


$\frac{V_F}{V_{F(25℃)}}$
Relative Forward Voltage
1.1
1.0
0.9
0.8
-40 -20 0 20 40 60 80 100 120 140
Temperature
Tj [℃]

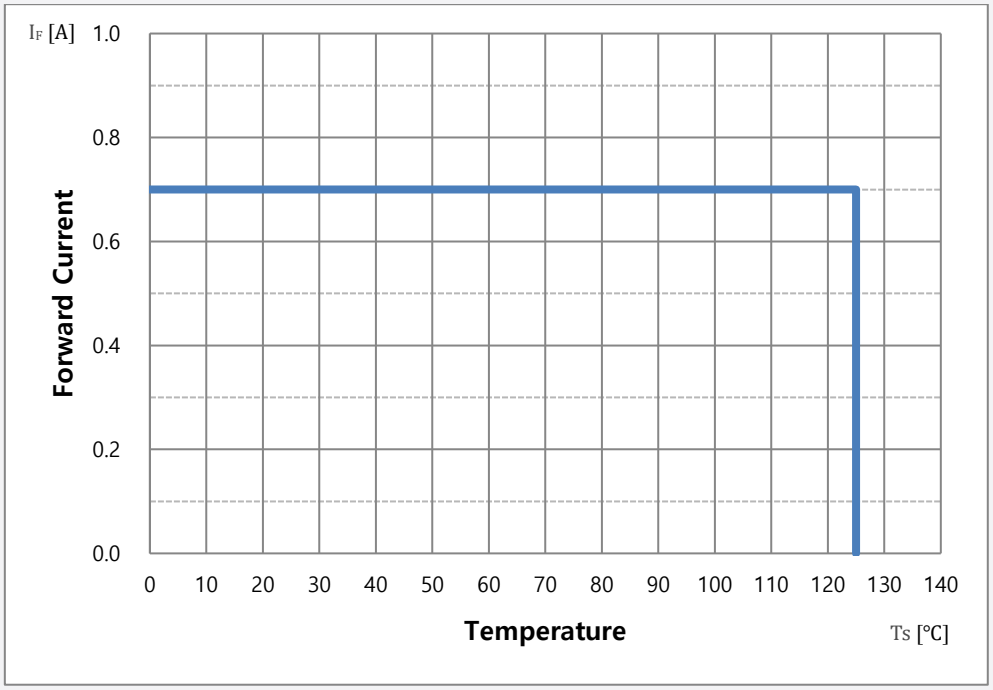

ΔC_x, ΔC_y
ΔCx
ΔCy
Color Shift Characteristics
0.010
0.005
0.000
-0.005
-0.010
-40 -20 0 20 40 60 80 100 120 140
Temperature
Tj [℃]

e) Derating Curve [9]

·White



·Amber



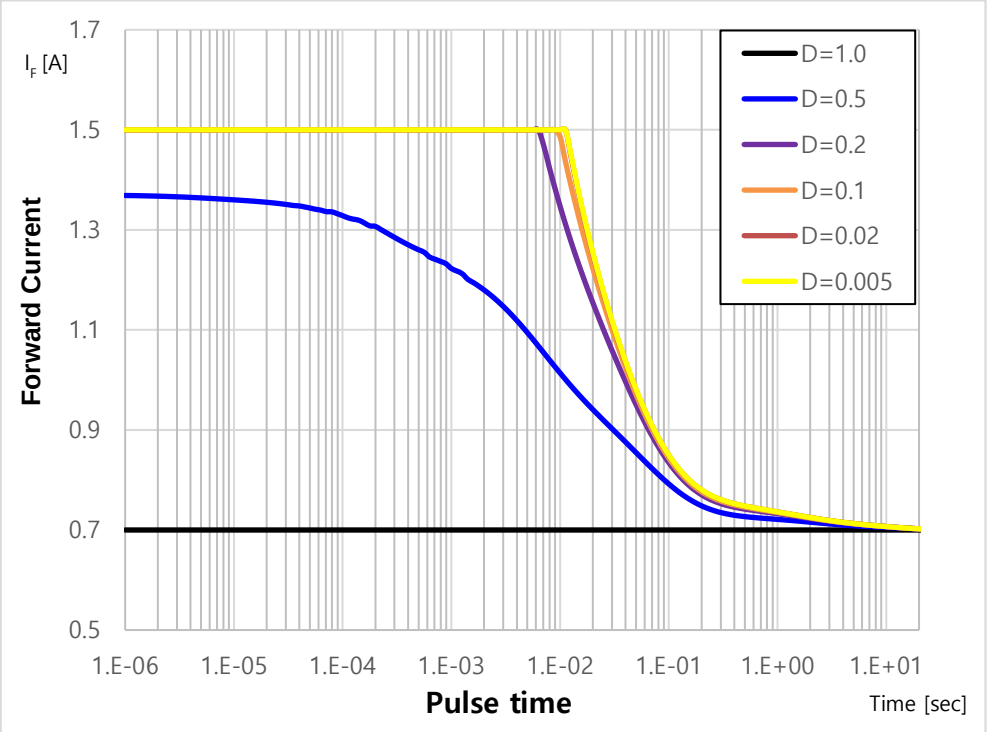
Note:

[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)

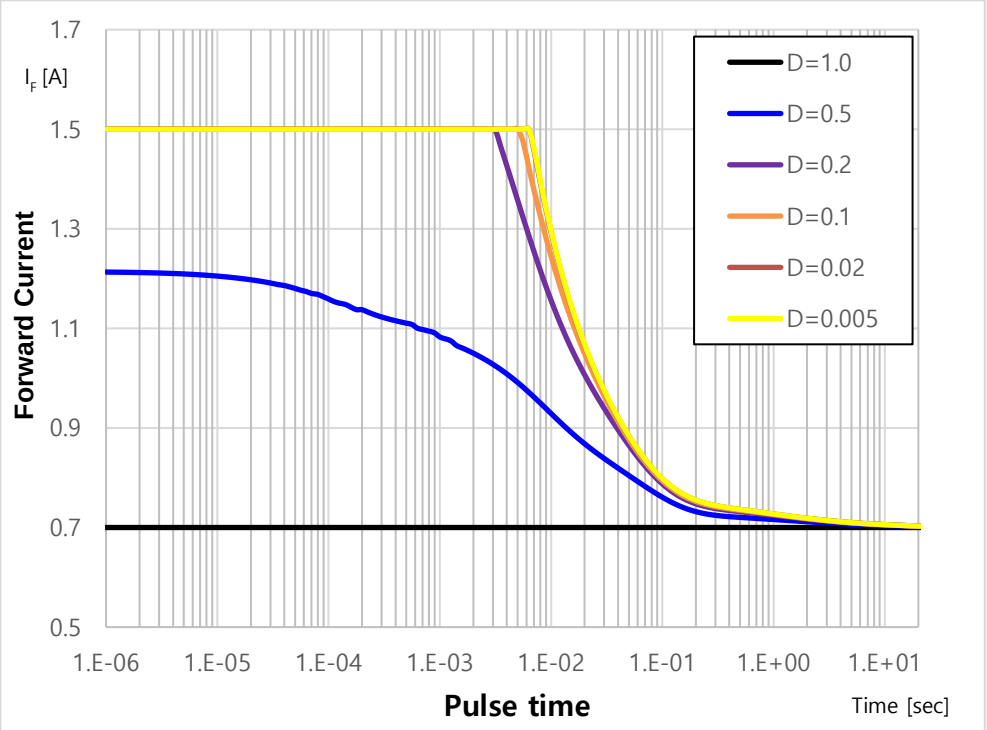
·White

Tj = 0℃- 150℃



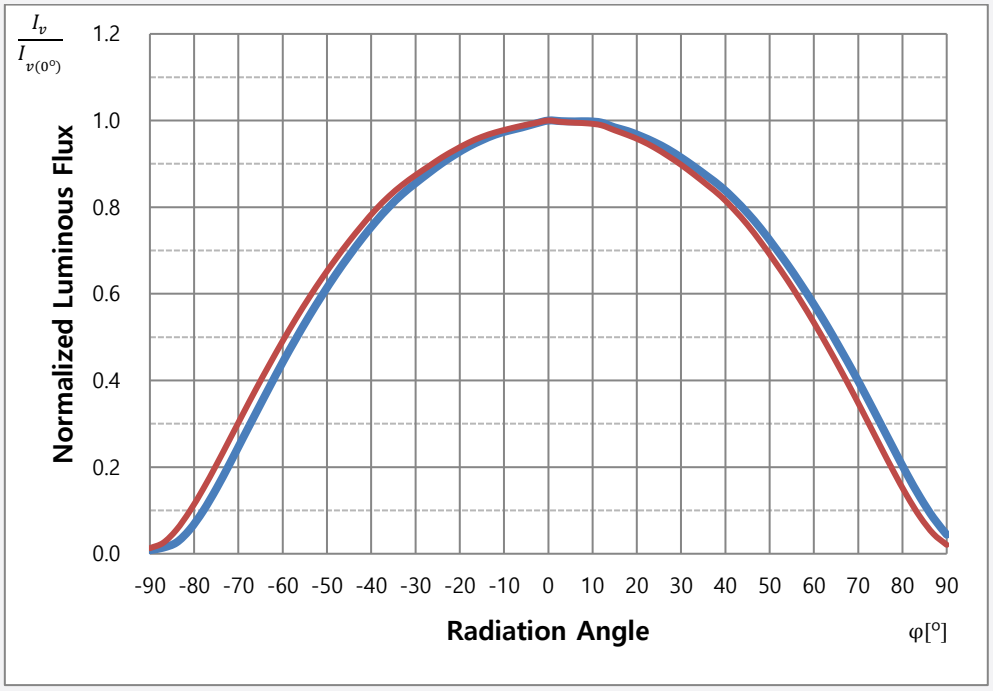
·Amber

Tj = 0℃- 150℃

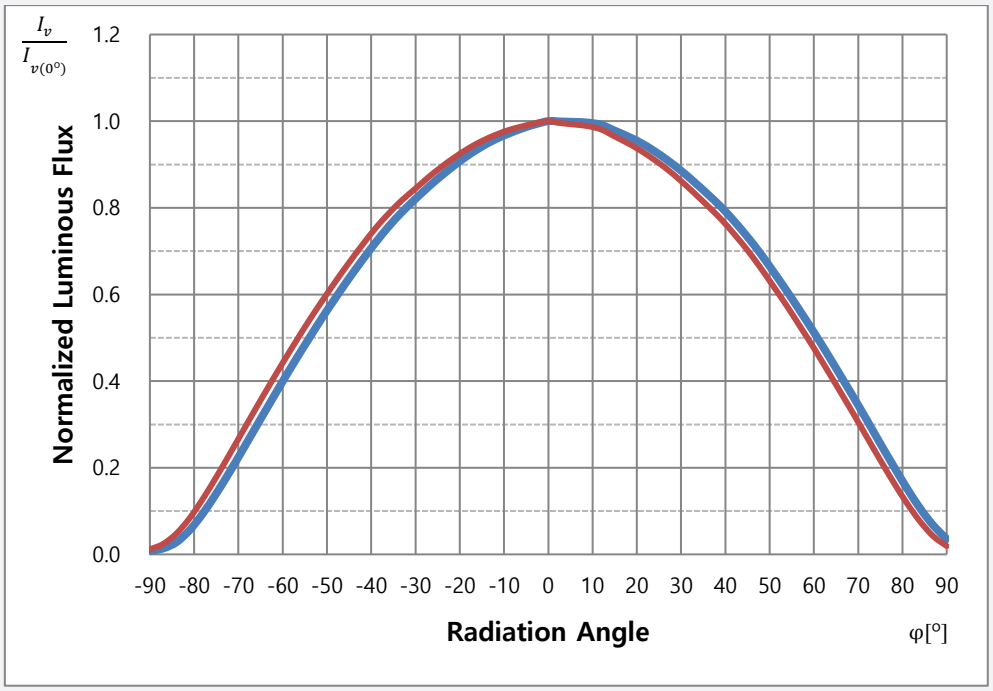


g) Beam Angle Characteristics (I_F = 350 mA, T_s = 25 ºC)

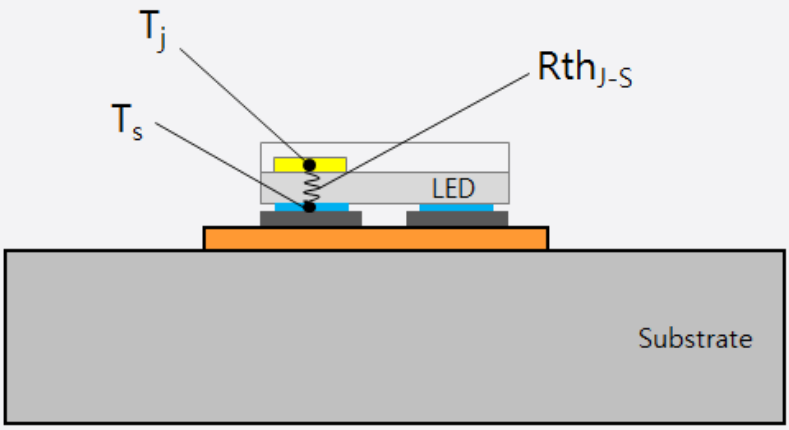
·White



·Amber



4. Soldering Temperature Location



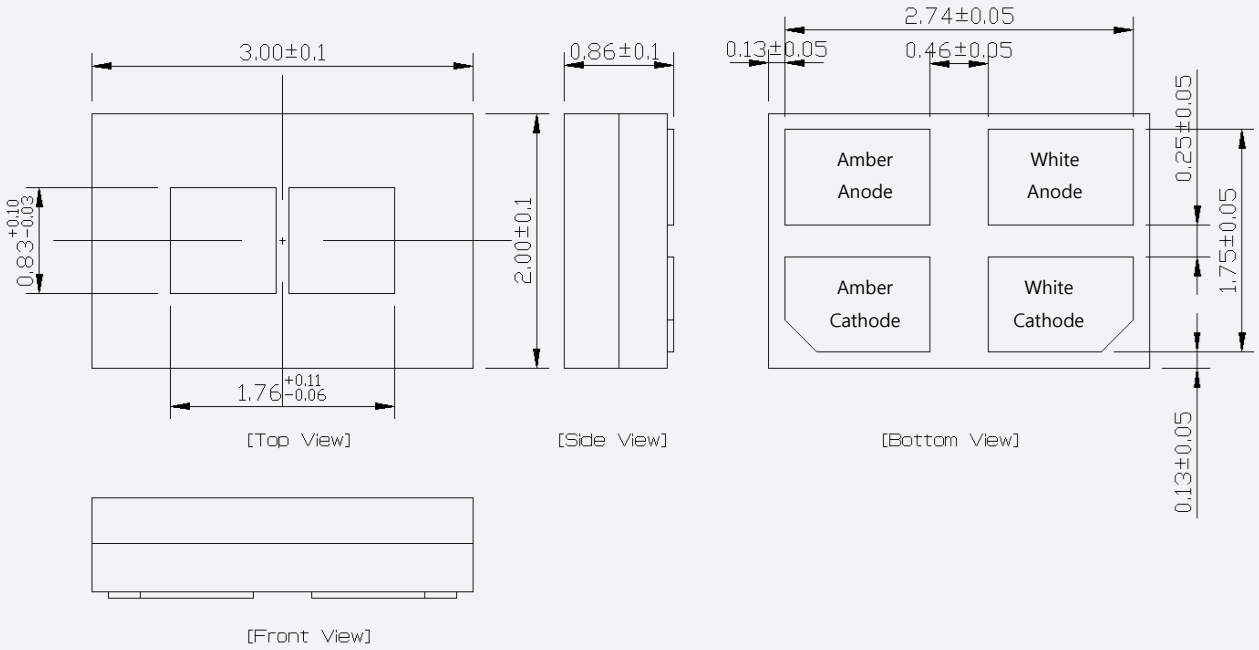
T_j : Temperature of Junction

T_s : Temperature of Solder Pad

Rth_{j-s} : Thermal Resistance from Junction to Solder Pad

5. Mechanical Dimension

Tolerance: ±0.1mm



Note:

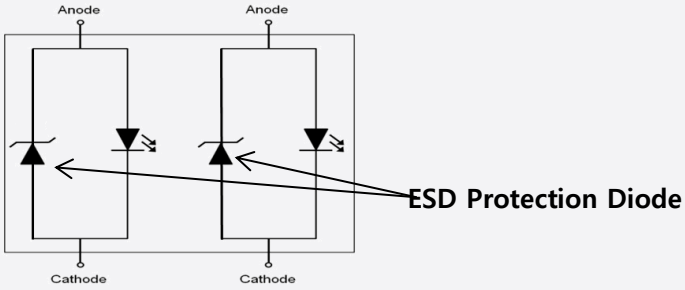
The thermal pad is electrically isolated from the anode and cathode contact pads.

a) Pick and Place

Do not place pressure on the resin molded part

It is recommended to use a pick & place nozzle CNT 3X5, etc.

b) Electric Schematic Diagram

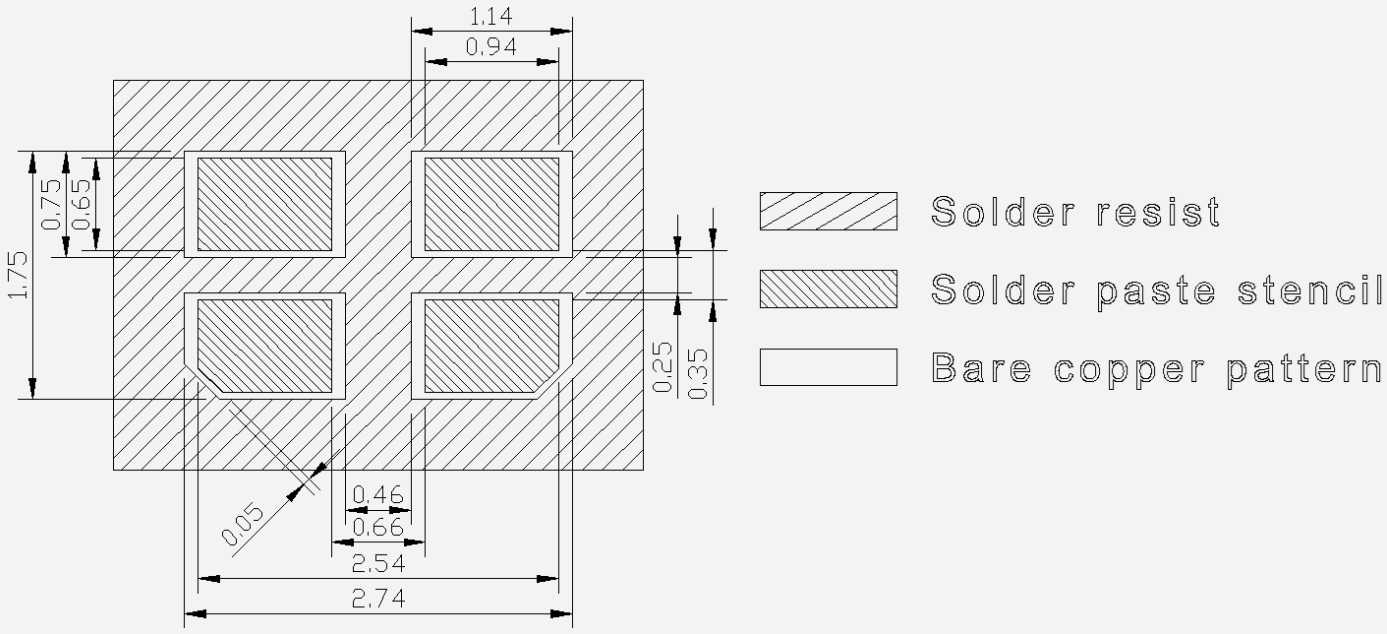


c) Material Information

Description	Material
Substrate	AlN Substrate
Plating	Au
LED Die	Flip Chip
Phosphor sheet	Glass with Phosphor
Zener Diode	Silicon
Wire	Au
Resin Mold	Silicone

6. Soldering Conditions

a) Pad Configuration

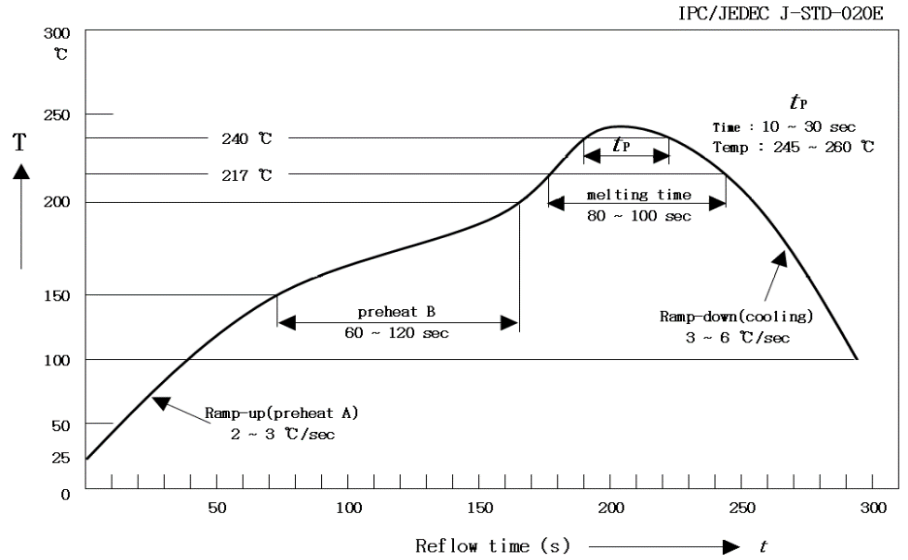


Notes:

mm, Tolerance : ±0.10mm

b) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



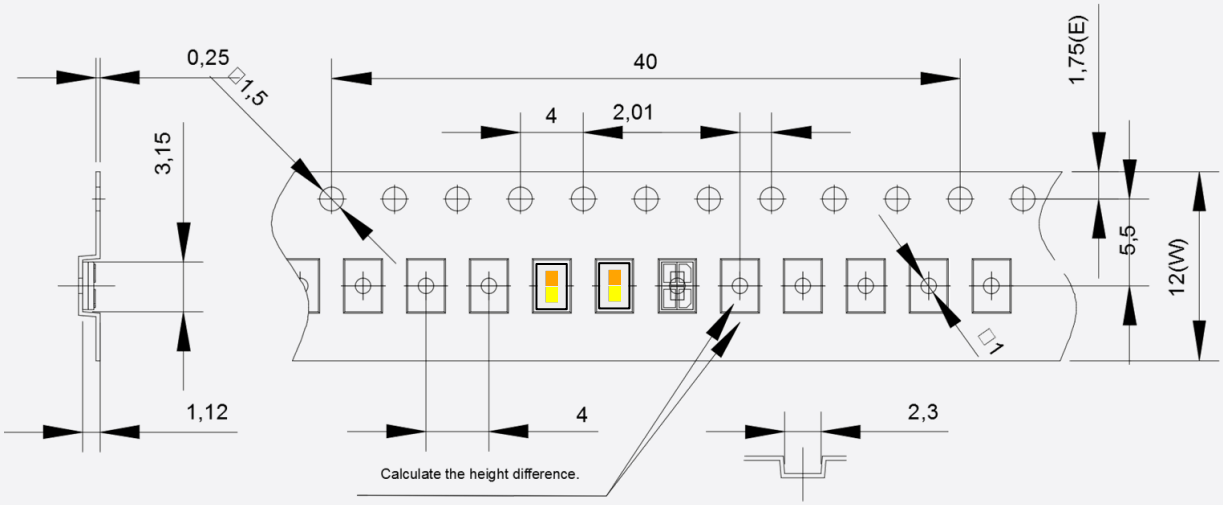
c) Manual Soldering Conditions

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

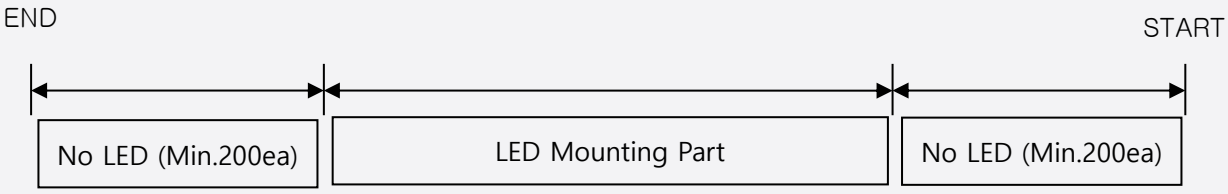
7. Tape & Reel

a) Taping Dimension

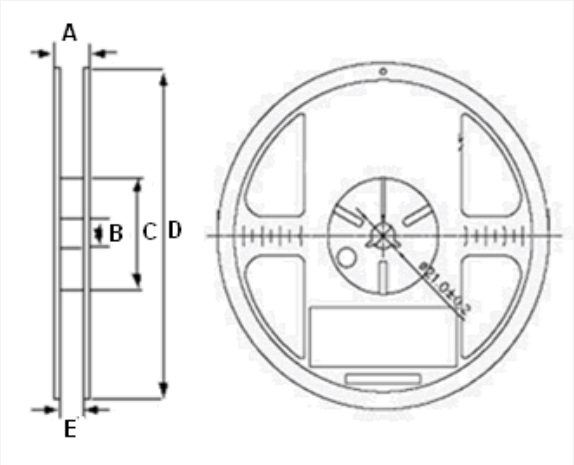
※Package Taping direction



[Unit:mm]



b) Reel Dimension



(Unit:mm)

Symbol	A	B	C	D	E
Spec.	19.4±0.5	13.0±0.5	60.0+ 1	180 - 3	17.0±0.5

8. Label Structure

a) Product Labeling Information

N.B) Denoted rank is the only example.

b) Bin Code Structure

AB : White _Forward Voltage(VF) Bin (refer to page. 5)

CD : White _Color bin (Cx,Cy) (refer to page. 6)

EF : White _Luminous Flux(IV) Bin (refer to page. 5)

GH : Amber _Forward Voltage(VF) Bin (refer to page. 5)

IJ : Amber _Color bin (Cx,Cy) (refer to page. 6)

KL : Amber _Luminous Flux(IV) Bin (refer to page. 5)

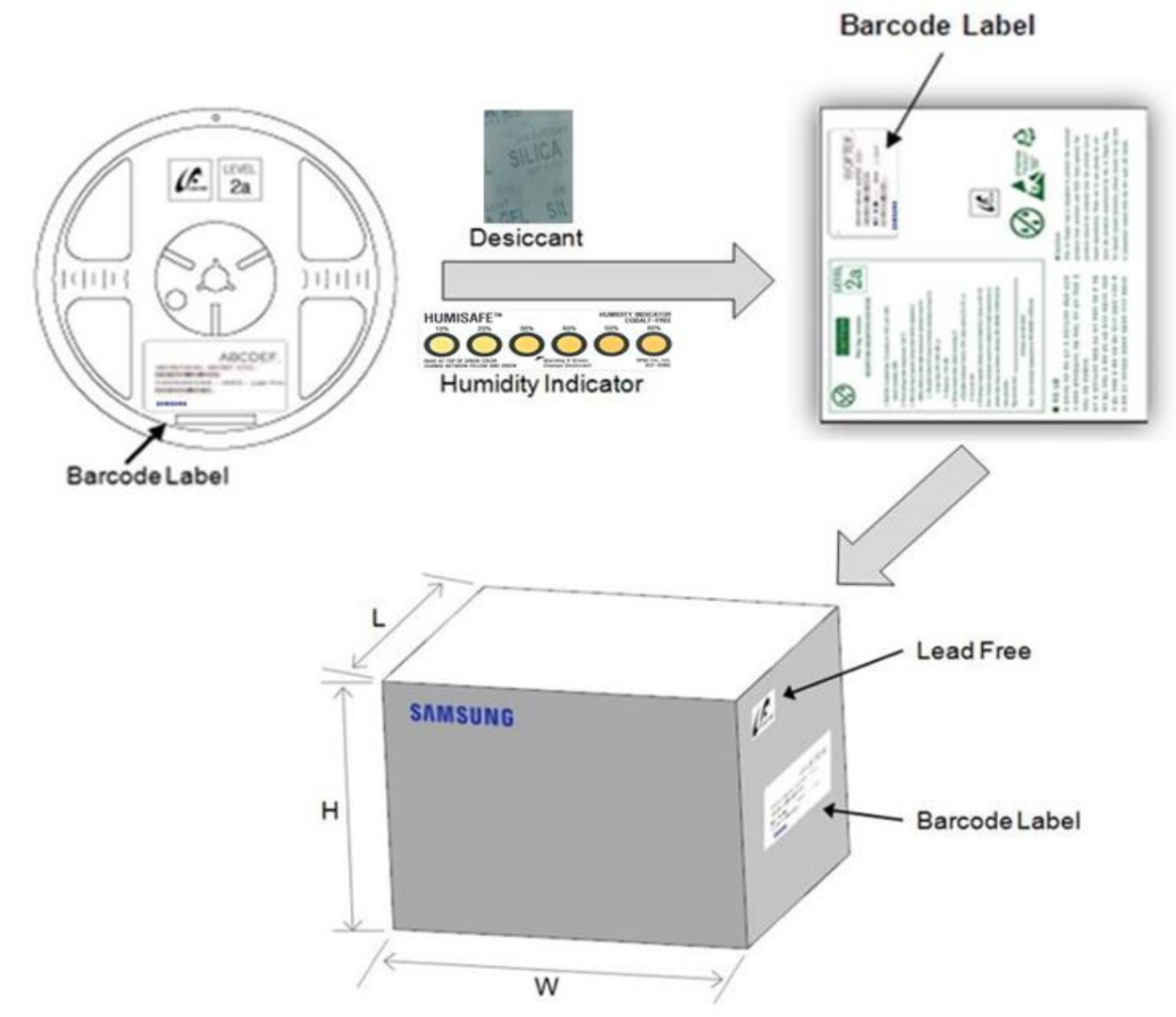
c) Lot Number Structure

The lot number is composed of the following characters:

No.	Information
①②	: Production site (Giheung)
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



Dimension of Transportation Box in mm

Width	Length	Height
220	245	182

10. 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.

11. Company Information

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About Samsung Electronics Co., Ltd.

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