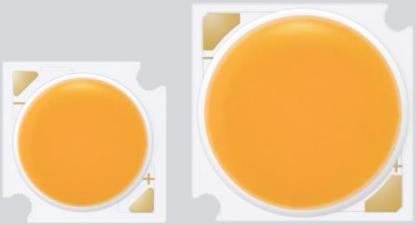
High Voltage LED Series
Chip on Board

COB R - Series Meat



High efficacy COB LED package well-suited for use in spotlight applications

Features & Benefits

- Chip on Board (COB) solution makes it easy to design in
- Simple assembly reduces manufacturing cost
- Low thermal resistance
- InGaN/GaN MQW LED with long time reliability

Applications

- Spotlight / Downlight
- LED Retrofit Bulbs
- Outdoor Illumination

SAMSUNG

Table of Contents

1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Model	Rating	Unit	Condition
Ambient / Operating Temperature	T_a		-40 ~ +105	ºC	-
Storage Temperature	T_{stg}		-40 ~ +120	ºC	-
LED Junction Temperature	T_J		130	ºC	-
Case Temperature	Tc		115	ºC	-
Forward Current / Power Dissipation	I_F / P_D	LC013D	920 / 34.5	mA / W	-
		LC016D	1150 / 43.1		-
		LC019D	1380 / 51.8		-
		LC026D	1840 / 69		-
		LC033D	2300 / 86		-
ESD (HBM)	-		±2	kV	-

b) Electro-optical Characteristics (I_F = Sorting Current, T_J = 65 ºC)

Item	Unit	Model	Rank	Min.	Typ.	Max.
Forward Voltage (V_F)	V		YZ	31.8	34.6	37.5
Thermal Resistance (junction to chip case)	ºC/W	LC013D	-	-	1.53	-
		LC016D	-	-	1.21	-
		LC019D	-	-	1.08	-
		LC026D	-	-	0.85	-
		LC033D	-	-	0.72	-
Beam Angle	º		-	-	115	-
Nominal Power (Sorting Current)	W (mA)	LC013D	-	-	12.5 (360)	-
		LC016D	-	-	15.6 (450)	-
		LC019D	-	-	18.7 (540)	-
		LC026D	-	-	24.9 (720)	-
		LC033D	-	-	31.1 (900)	-

Notes:

1) The COB is tested in pulsed condition at rated test current (10 ms pulse width) and rated temperature (T_J = T_C = T_a = 65 °C)
2) Samsungmaintains measurement tolerance of: forward voltage = ±5 %, CRI = ±1
3) Refer to the derating curve, ‘3. Typical Characteristics Graph’designed within the range.

c) Luminous FluxCharacteristics (I_F = Sorting Current)

Model	Nominal CCT (K)	Flux Rank	T_c = 65 °C (lm)		
			Min.	Typ.	Max.
LC013D	Meat	D2	868	914	-
LC016D	Meat	D2	1129	1188	-
LC019D	Meat	D2	1341	1412	-
LC026D	Meat	D2	1753	1845	-
LC033D	Meat	D2	2170	2284	-

Notes:

1) The COB is tested in pulsed operating condition at rated test current (10 ms pulse width) and rated temperature (T_j = T_c = 65 °C).
2) Samsungmaintains measurement tolerance of: Luminous flux = ±7 %, CRI = ±1

2. Product Code Information

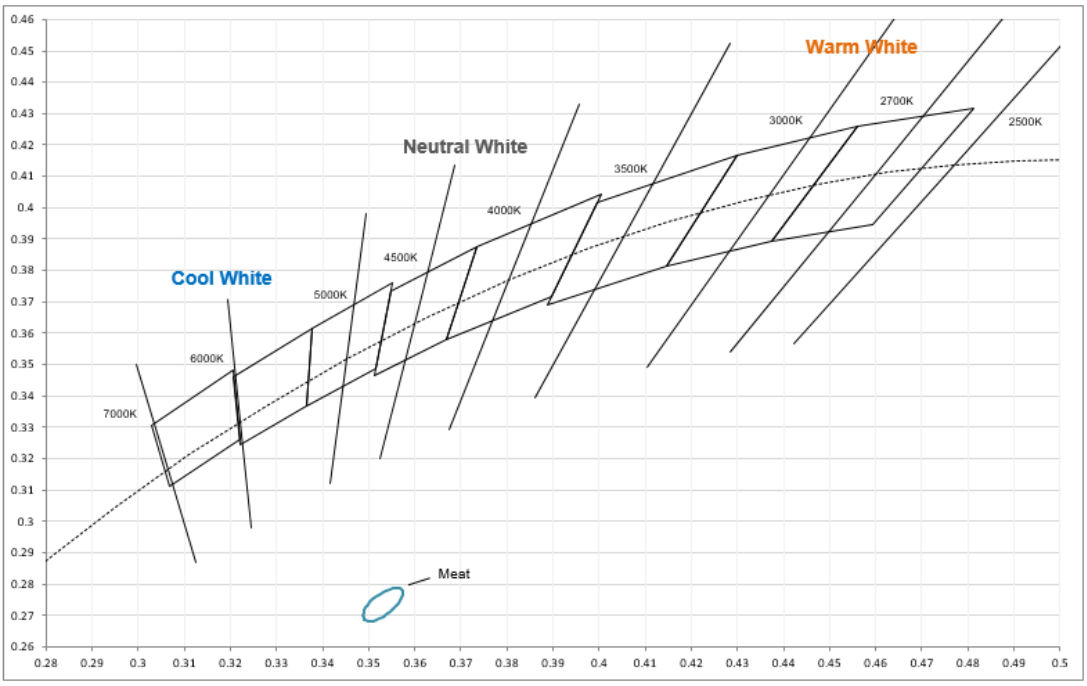
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
S	P	H	W	H	A	H	D	N	G	2	V	Y	Z	U	S	D	2

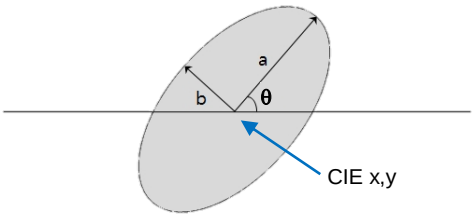
Digit	PKG Information	Code	Specification
1 2 3	Samsung Package High Power	SPH	
4 5	Color	WH	White color
6	Product Version	A	
7 8	Form Factor	HD	COB
9	Lens Type	N	No lens
10	Internal Code	D	LC013
		E	LC016
		F	LC019
		G	LC026
		H	LC033
11	Internal Code	2	
12	CRI & Sorting Temperature	V	VIVID 65 °C
13 14	Forward Voltage (V)	YZ	31.8~37.5
15	CCT (K)	T	Meat
16	MacAdam	S	Color Bin for Samsung Special Color
17 18	Luminous Flux	D2	COB D-series Gen.2 level

a) Binning Structure (I_F= Sorting Current, T_J =65 ºC)

Model	Nominal CCT (K)	Product Code	V_F Rank	Color Rank	Flux Rank	Flux Range (Φ_v, lm)
LC013D	Meat	SPHWHAHDND2VYZTSD2	YZ	TS	D2	868~
LC016D	Meat	SPHWHAHDNE2VYZTSD2	YZ	TS	D2	1129~
LC019D	Meat	SPHWHAHDNF2VYZTSD2	YZ	TS	D2	1341~
LC026D	Meat	SPHWHAHDNG2VYZTSD2	YZ	TS	D2	1753~
LC033D	Meat	SPHWHAHDNH2VYZTSD2	YZ	TS	D2	2170~

b) Chromaticity Region &Coordinates (I_F = Sorting Current, T_J = 65 ºC)

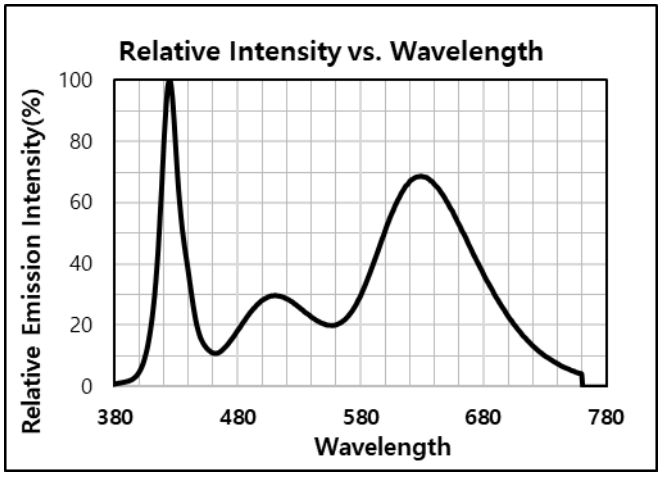




MacAdam Ellipse (Meat)					
Step	CIE x	CIE y	θ	a	b
2-step	0.3531	0.2735	53.72	0.0063	0.0027

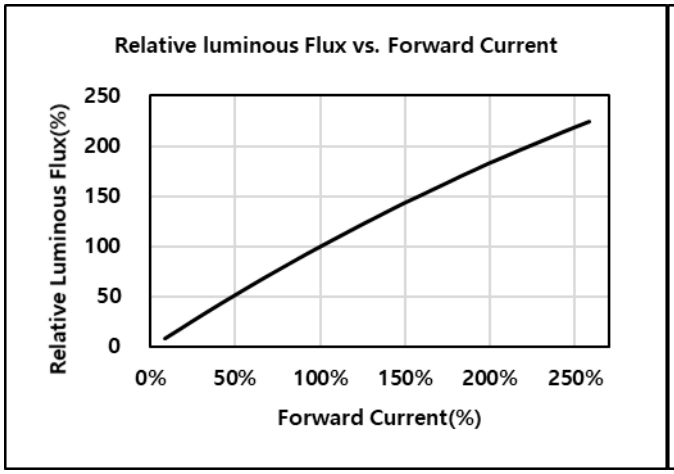
3. Typical Characteristics Graphs

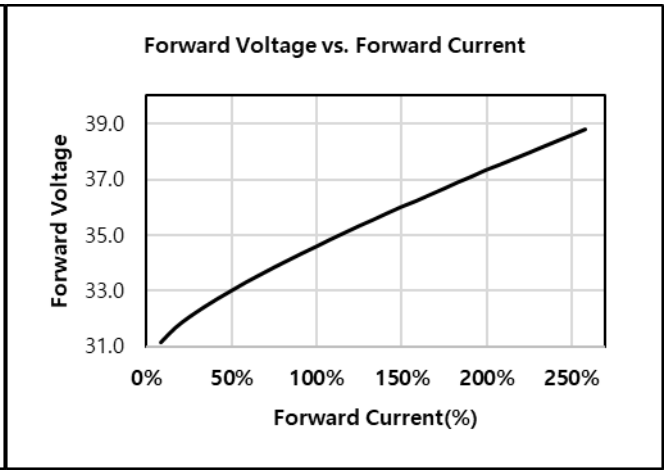
a) Spectrum Distribution (I_F = Sorting Current, T_J = 65 ºC)



b) Forward Current Characteristics (T_J = 65 ºC)

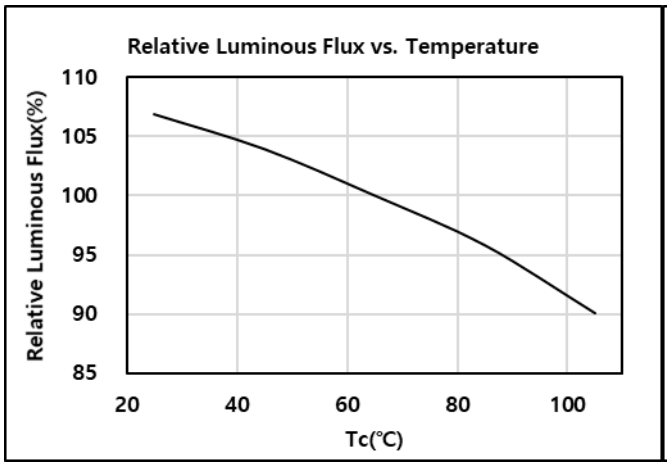
Meat

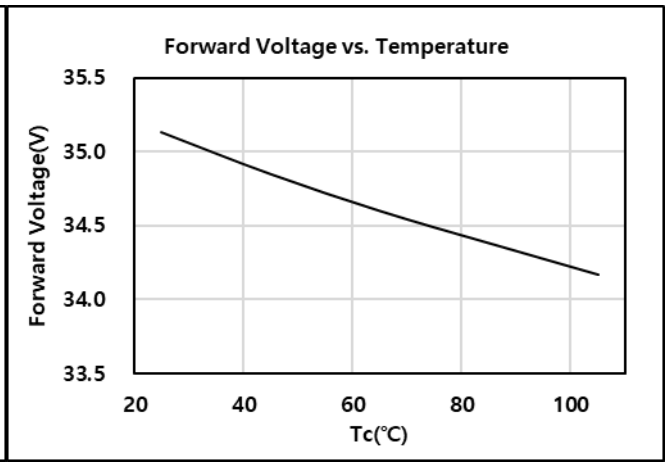




c) Temperature Characteristics(I_F = Sorting Current)

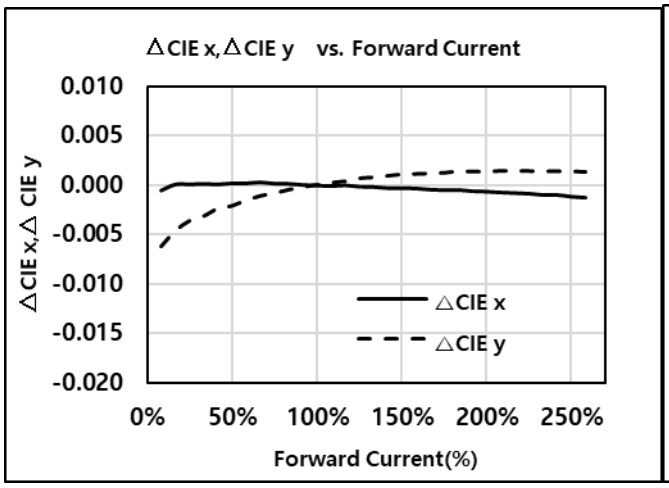
Meat

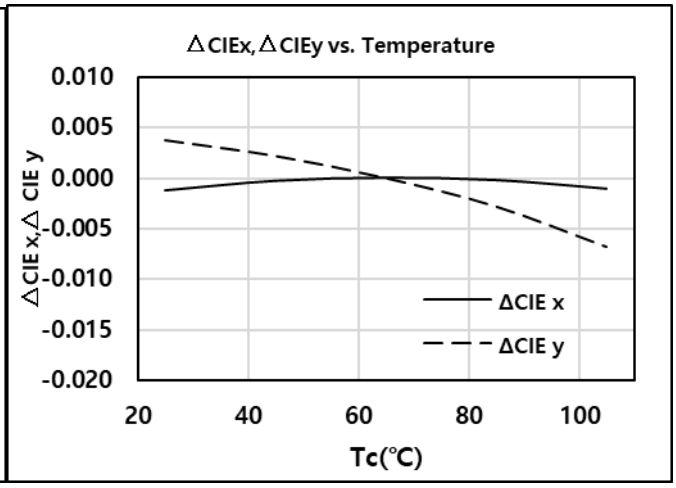




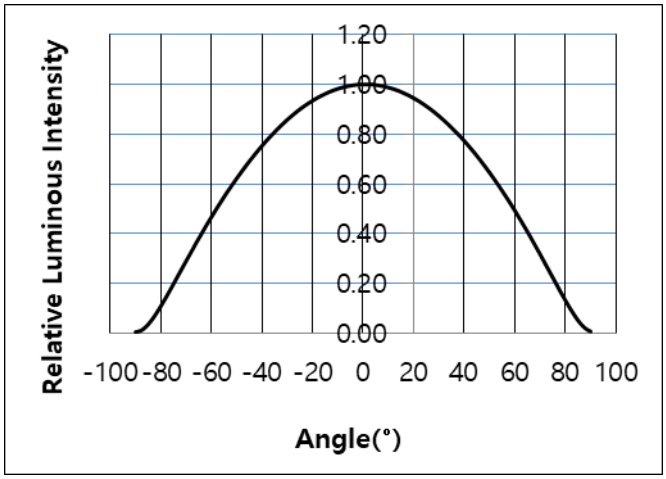
d) Color Shift Characteristics (I_F =Sorting Current, T_J = 65 ºC)

Meat

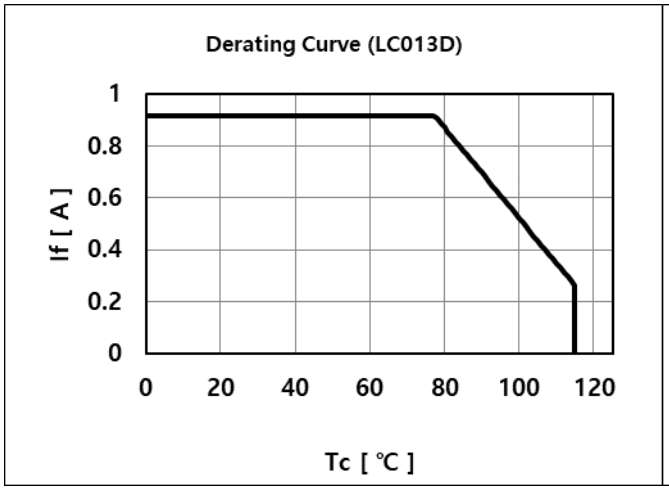


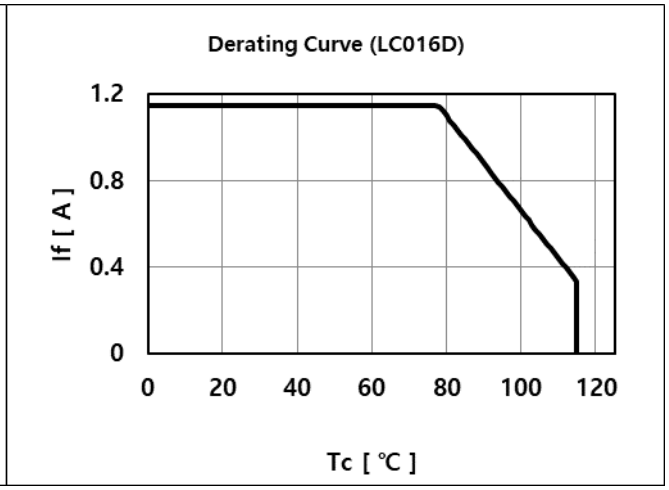


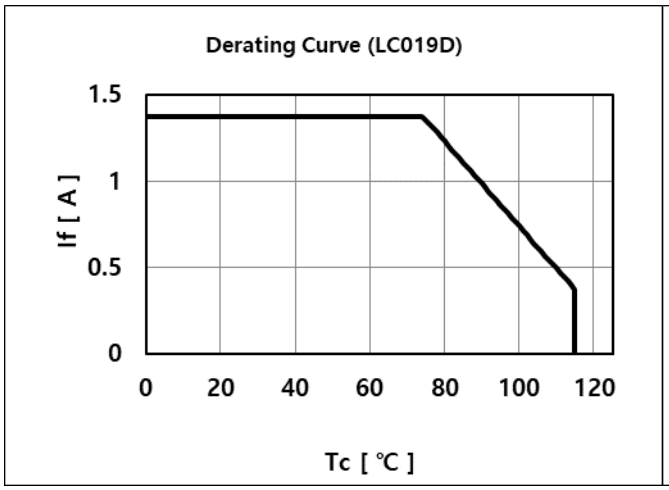
e) Beam Angle Characteristics (I_F = Sorting Current, T_J = 65 ºC)

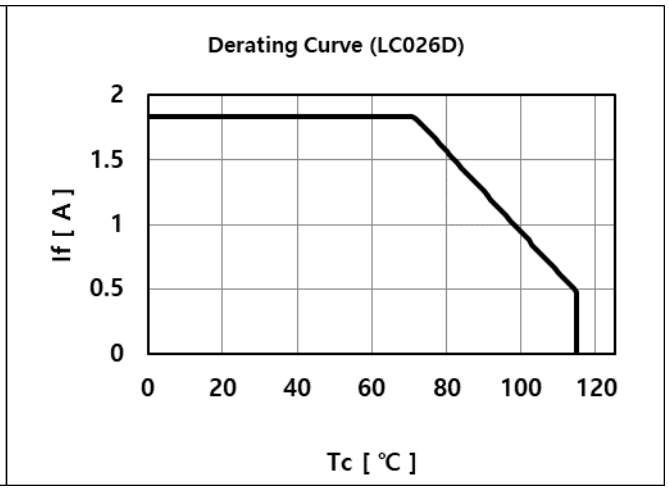


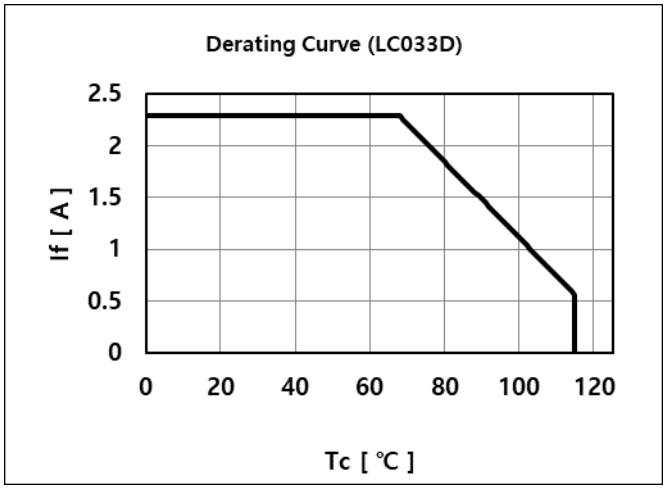
f) Derating Characteristics





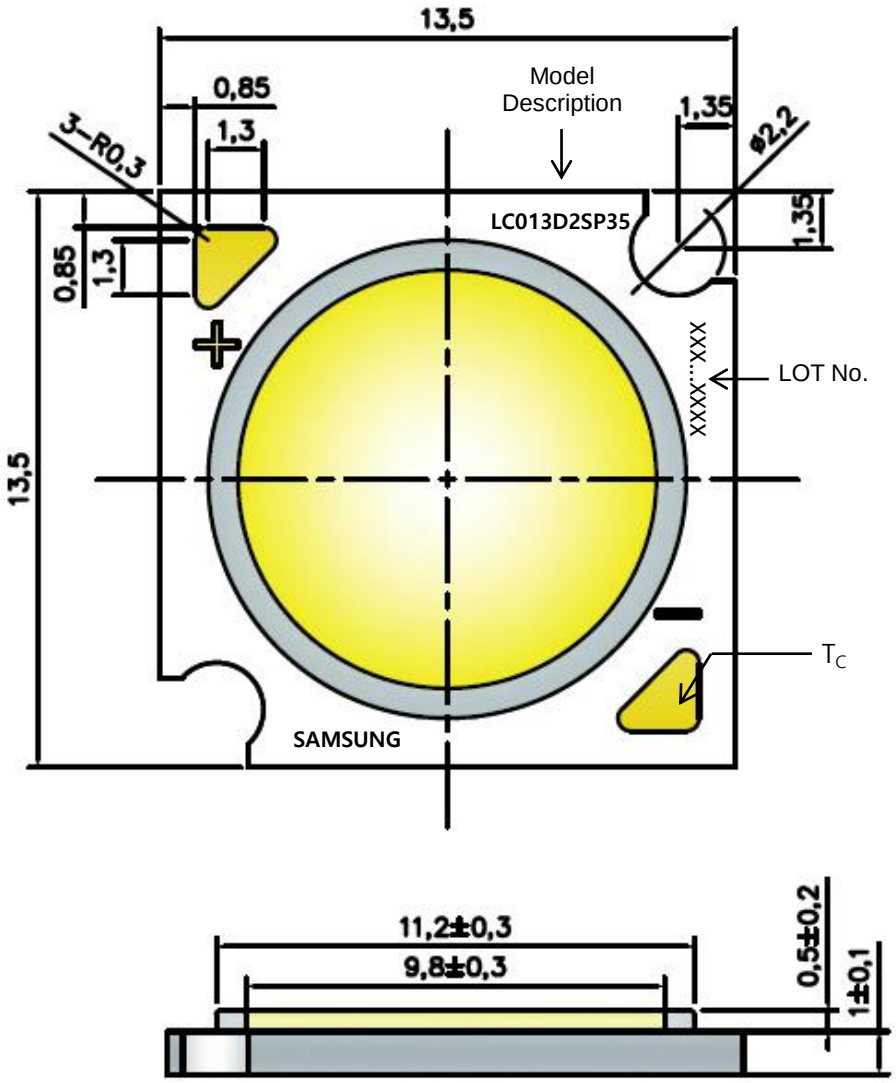






4. Outline Drawing & Dimension

1) LC013D

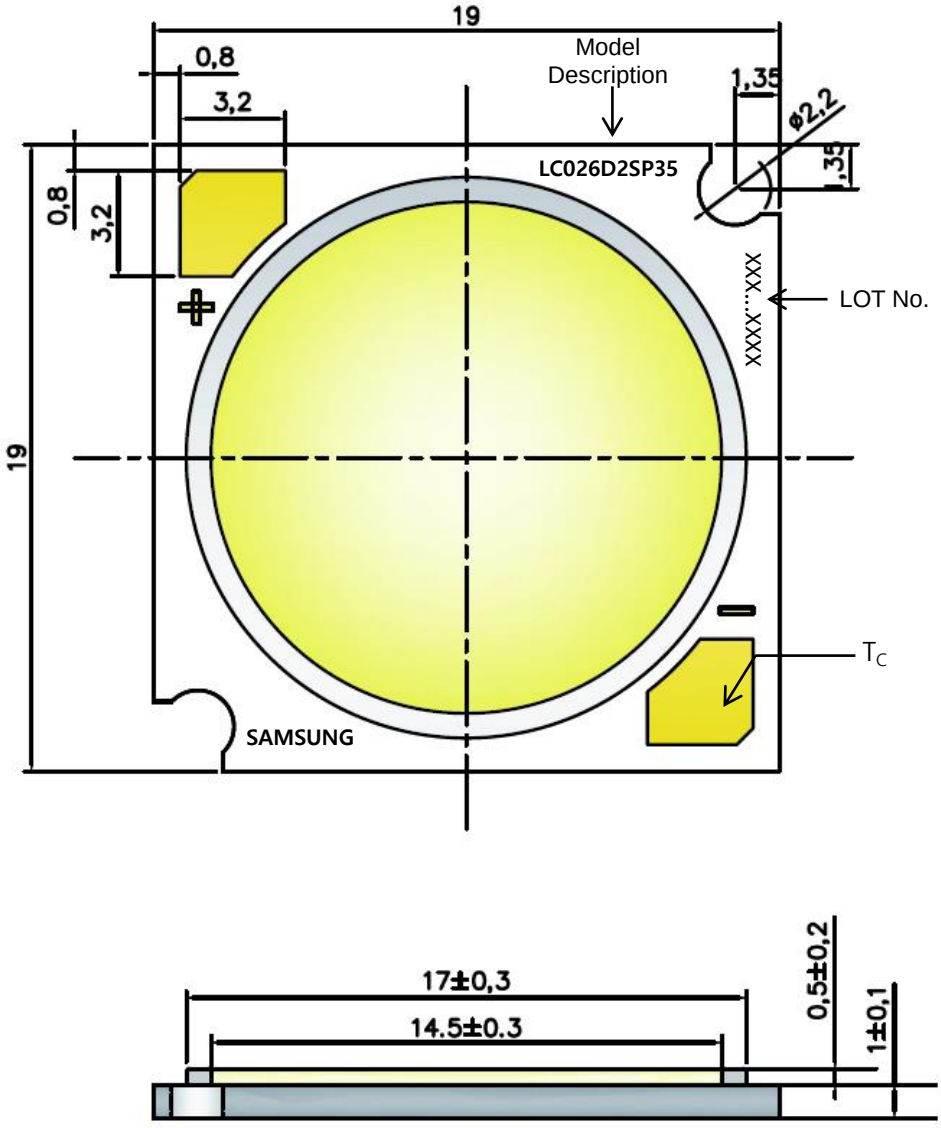


1. Unit: mm
2. Tolerance: ± 0.30 mm

Item		Dimension	Tolerance	Unit
Length		13.5	±0.15	mm
Width		13.5	±0.15	mm
Height	Dam	0.5	±0.20	mm
	Substrate	1.0	±0.10	mm
LES Diameter	Light Emitting Surface	9.8	±0.30	mm

Note: Denoted product information above is only an example
(LC013D2SP35 :13W, Special Color, Fashion)

2) LC016D, LC019D, LC026D, LC033D



1. Unit: mm
2. Tolerance: ± 0.3 mm

Item		Dimension	Tolerance	Unit
Length		19.0	±0.15	mm
Width		19.0	±0.15	mm
Height	Dam	0.5	±0.20	mm
	Substrate	1.0	±0.10	mm
LES Diameter	Light Emitting Surface	14.5	±0.30	mm

Note: Denoted product information above is only an example
(LC026D2SP35 : 26W, Special Color, Fashion)

5. Reliability Test Items & Conditions

a) Test Items

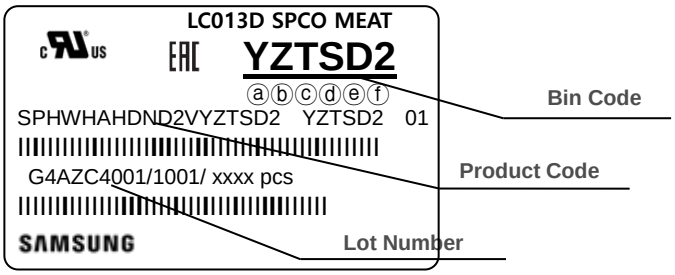
Test Item	Test Condition	Test Hour / Cycle
High Temperature Life Test	85 ºC, DC Derating, I_F	1000 h
Low Temperature Life Test	-40 ºC, DC, Derating I_F	1000 h
High Temperature Storage	120 ºC	1000 h
Low Temperature Storage	-40 ºC	1000 h
TemperatureCycle On/Off Test	-40 ºC/ 85 ºC each 20 min, 30 min transfer power on/off each 5 min, DC Derating, I_F = max	100 cycles
ESD (HBM)	R_1: 10 MΩ R_2: 1.5 kΩ C: 100 pF V: ±2 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
Sulfur Resistance	25 °C, 75%, H2S 15 ppm	504h

b) Criteria for Judging the Damage

Item	Symbol	Test Condition (T_c = 25 ºC)	Limit	
			Min.	Max.
Forward Voltage	V_F	I_F = Sorting Current	L.S.L. * 0.9	U.S.L. * 1.1
Luminous Flux	Φ_v	I_F =Sorting Current	L.S.L * 0.7	U.S.L * 1.3

6. Label Structure

a) Label Structure



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

Bin Code:

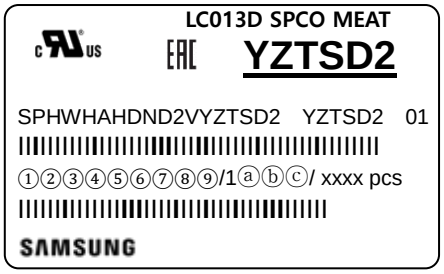
ⓐⓑ: Forward Voltagebin (refer to page 3)

ⓒⓓ: Chromaticitybin (refer to page 6)

ⓔⓕ: Luminous Fluxbin (refer to page 4)

b) Lot Number

The lot number is composed of the following characters:



① ③④⑤⑥⑦⑧⑨ / 1ⓐⓑⓒ / xxxx pcs

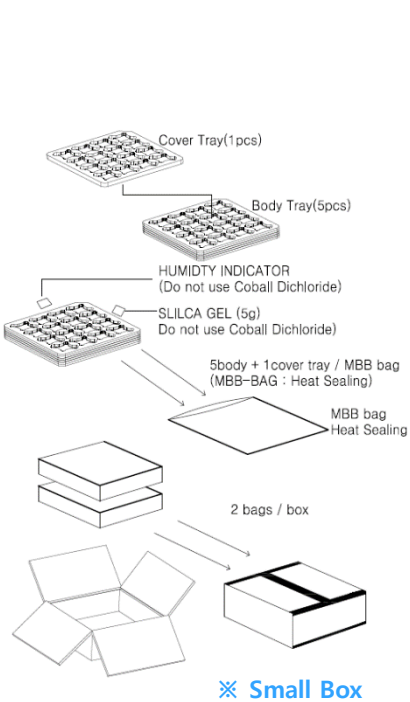
①	:	Production site (S: Giheung, Korea, G: Tianjin, China)
②	:	4(LED)
③	:	Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
④	:	Year (Z: 2015, A: 2016, B: 2017…)
⑤	:	Month (1~9, A, B, C)
⑥⑦⑧⑨	:	Day (1~9, A, B~V)
ⓐⓑⓒ	:	Product serial number (001 ~ 999)

7. Packing Structure

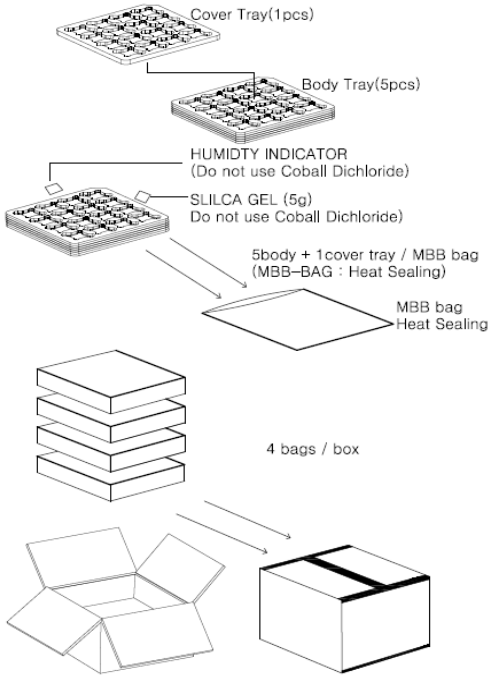
1) LC013D

Packing material	Max. quantity in pcs of COB	Dimension(mm)			
		Length	Width	Height	Tolerance
Tray	50	200	200	8	1
Anti-Static Bag	250 (5 trays)	320	270	-	+/- 0.5
Outer Box (Small)	500 (2 bags)	225	225	65	5
Outer Box (Middle)	1000 (4 bags)	225	225	130	5

a) Packing Structure



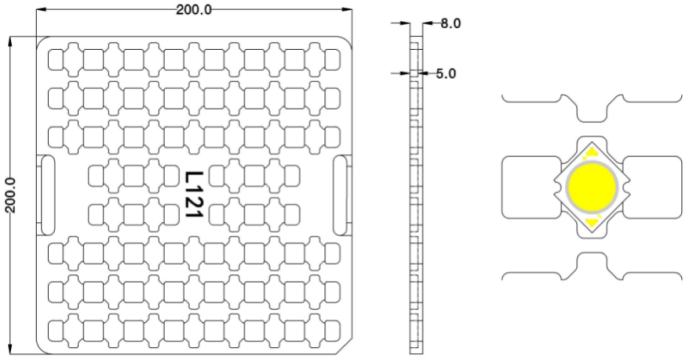
※ Small Box



※ Middle Box

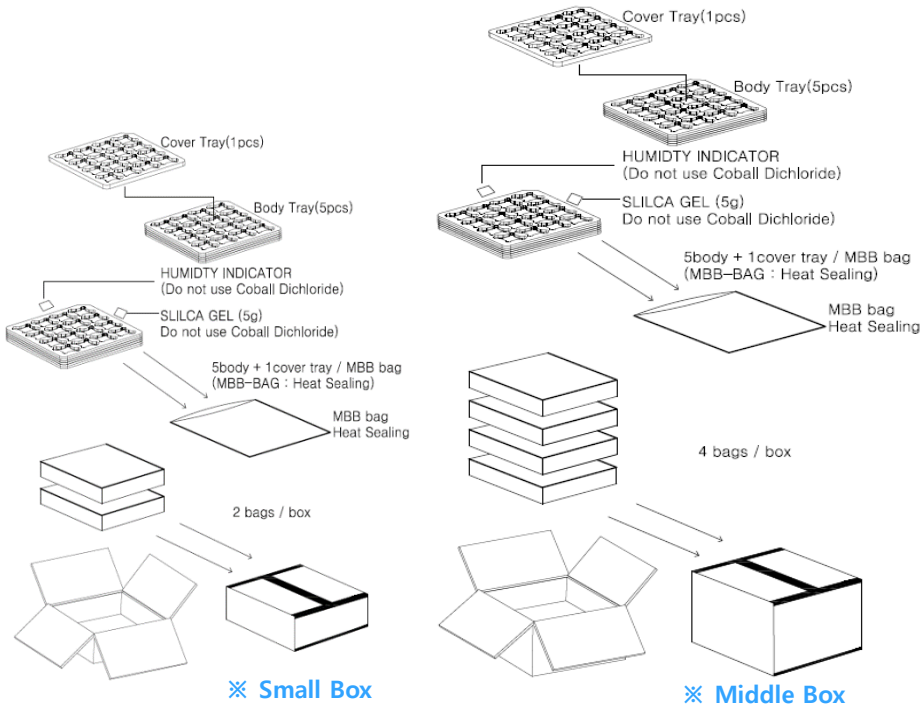
[MBB BAG drawing]

b) Tray



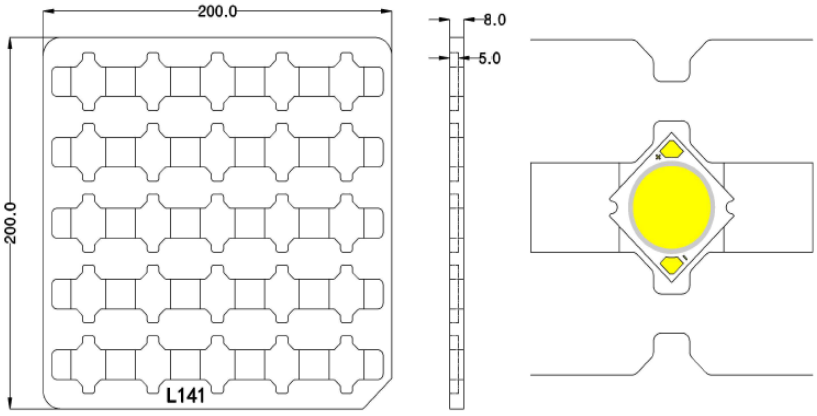
2) LC016D, LC019D, LC026D, LC033D

a) Packing Structure




[MBB BAG drawing]

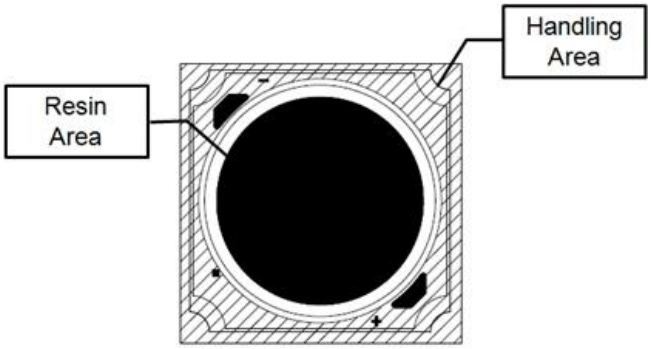
b) Tray



8. Precautions in Handling & Use

1) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. Some solvent-based cleaning agent may damage the silicone resins used in the device.
2) LEDs must be stored in a clean environment. Shelf life of sealed bags is 12 months at temperature 0~40 ºC, 0~90 % RH.
3) After storage bag is opened, device subjected to soldering (wiring), 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 ºC / 60 % RH, or
   b. Stored at <10 % RH
4) Repack unused products with anti-moisture packing, fold to close any opening and then store in a dry place.
5) Devices require baking before mounting, if humidity card reading is >60 % at 23 ± 5 ºC.
6) Devices must be baked for 1 hour at 60 ± 5 ºC, if baking is required.
7) 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.
8) The thermal management is one of the most critical factors for the LED lighting system. Especially the LED junction temperature should not exceed the absolute maximum rating while operation of LED lighting system.

   For more information, please refer to Application Note ‘Mechanical & Thermal Guide for COB’.
9) In case of driving LEDs around the minimum current level (If_min), chips might exhibit different brightness due to the variation in I-V characteristics of each one. This is normal and does not adversely affect the performance of product.
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) The resin area is very sensitive, please do not handle, press, touch, rub, clean, or pick by with tweezers on it. Instead, please pick at the handling area as indicated below.



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 and our official blog at global.samsungtomorrow.com.

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