

High Voltage LED Series
Chip on Board

COB R - Series

Gen4

Vivid White



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

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1. Characteristics

a) Absolute Maximum Rating

Item	Symbol	Model	Rating	Unit	Condition
Ambient / Operating Temperature	T _a	-	-40 ~ +105	°C	-
Storage Temperature	T _{stg}	-	-40 ~ +120	°C	-
LED Junction Temperature	T _J	-	150	°C	-
Case Temperature	T _c	-	115	°C	-
Forward Current / Power Dissipation	I _F / P _D	LC013D	920 / 33.7	mA / W	-
		LC016D	1150 / 42.1		-
		LC019D	1380 / 50.5		-
		LC026D	1840 / 67.3		-
		LC033D	2300 / 84.2		-
		LC040D	2760 / 101.0		-
ESD (HBM)	-	-	±2	kV	-

b) Electro-optical Characteristics (I_F = Sorting Current, T_J = 85°C)

Item	Unit	Model	Rank	Min.	Typ.	Max.
Forward Voltage (V _F)	V	All Model	YH	30.6	33.6	36.6
Color Rendering Index (R _a)	-	All Model	-	95	-	-
Thermal Resistance (junction to case point)	°C/W	LC013D	-	-	0.81	-
		LC016D	-	-	0.64	-
		LC019D	-	-	0.57	-
		LC026D	-	-	0.45	-
		LC033D	-	-	0.38	-
		LC040D	-	-	0.30	-
Beam Angle	°	All Model	-	-	115	-
Nominal Power (Sorting Current)	W (mA)	LC013D	-	-	12.1 / 360	-
		LC016D	-	-	15.1 / 450	-
		LC019D	-	-	18.1 / 540	-
		LC026D	-	-	24.2 / 720	-
		LC033D	-	-	30.2 / 900	-
		LC040D	-	-	36.3 / 1080	-

Notes:

- 1) The COB is tested in pulsed condition at rated test current (10 ms pulse width) and rated temperature (T_J = T_C = 85 °C)
- 2) Samsung maintains measurement tolerance of: forward voltage = ±5 %, CRI = ±1
- 3) Refer to the derating curve, '3. Typical Characteristics Graph' designed within the range.

c) Luminous Flux Characteristics (I_F = Sorting Current)

Model	CRI (Ra) Min.	Nominal CCT (K)	Flux Rank	Flux@ $T_c = 85^\circ\text{C}$ (lm)		
				Min.	Typ.	Max.
LC013D	90	3000	D4	1621	1725	-
		3500	D4	1688	1795	-
		4000	D4	1740	1851	-
LC016D	90	3000	D4	2042	2172	-
		3500	D4	2128	2263	-
		4000	D4	2183	2322	-
LC019D	90	3000	D4	2439	2594	-
		3500	D4	2541	2703	-
		4000	D4	2607	2773	-
LC026D	90	3000	D4	3242	3449	-
		3500	D4	3378	3594	-
		4000	D4	3466	3687	-
LC033D	90	3000	D4	3988	4243	-
		3500	D4	4156	4421	-
		4000	D4	4264	4536	-
LC040D	90	3000	D4	4956	5273	-
		3500	D4	5138	5466	-
		4000	D4	5309	5648	-

Notes:

- 1) The COB is tested in pulsed operating condition at rated test current (10 ms pulse width) and rated temperature ($T_J = T_c = 85^\circ\text{C}$).
- 2) Samsung maintains measurement tolerance of: Luminous flux = $\pm 7\%$, 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	D	2	7	Y	Z	V	N	D	4

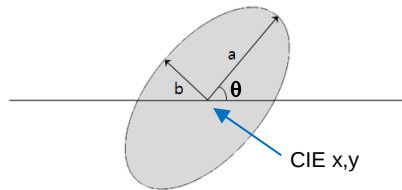
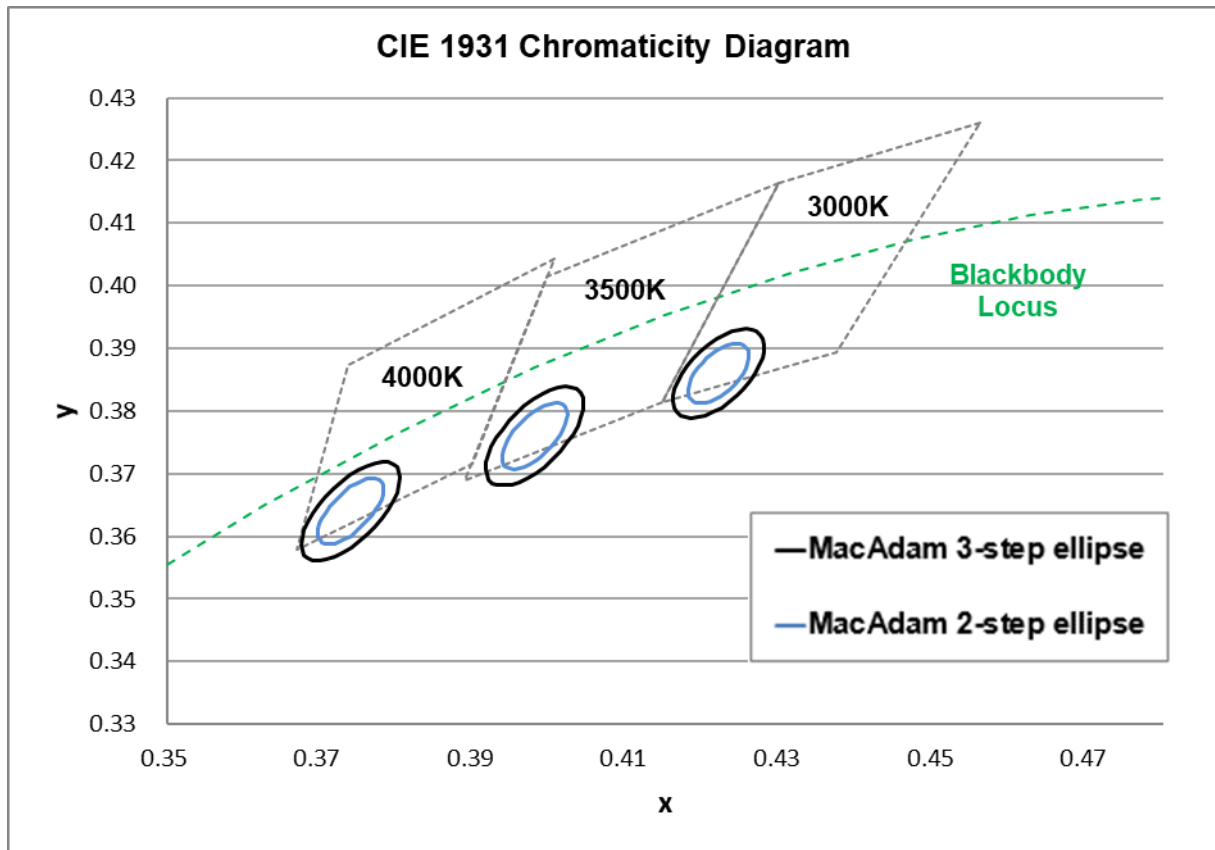
Digit	PKG Information	Code	Specification
1 2 3	Samsung Package High Power	SPH	
4 5	Color	WH	White
6	Product Version	A	
7 8	Form Factor	HD	COB
9	Lens Type	N	No lens
10	Wattage or Model	D E F G H K	LC013D LC016D LC019D LC026D LC033D LC040D
11	Internal Code	2	
12	CRI & Sorting Temperature	7	Vivid white, Min. 90 (85℃)
13 14	Forward Voltage (V)	YZ	30.6~36.6
15	CCT (K)	V U T	3000K 3500K 4000K
16	MacAdam Step	M N	Color Bin for Vivid color product(Mac2) Color Bin for Vivid color product(Mac3)
17 18	Luminous Flux (Lm)	D4	COB D-series Gen4 level

a) Binning Structure (I_F = Sorting Current, T_J = 85 °C)

Model	CRI (R_a) Min.	Nominal CCT(K)	Product Code	V_F Rank	Color Rank	Flux Rank	Flux Range (Φ_v , lm)
LC013D	90	3000	SPHWAHDND27YZVMD4	YZ	VM	D4	1621 ~
			SPHWAHDND27YZVND4		VN		
		3500	SPHWAHDND27YZUMD4	YZ	UM	D4	1688 ~
			SPHWAHDND27YZUND4		UN		
		4000	SPHWAHDND27YZTMD4	YZ	TM	D4	1720 ~
			SPHWAHDND27YZTND4		TN		
LC016D	90	3000	SPHWAHDNE27YZVMD4	YZ	VM	D4	2042 ~
			SPHWAHDNE27YZVND4		VN		
		3500	SPHWAHDNE27YZUMD4	YZ	UM	D4	2128 ~
			SPHWAHDNE27YZUND4		UN		
		4000	SPHWAHDNE27YZTMD4	YZ	TM	D4	2183 ~
			SPHWAHDNE27YZTND4		TN		
LC019D	90	3000	SPHWAHDNF27YZVMD4	YZ	VM	D4	2439 ~
			SPHWAHDNF27YZVND4		VN		
		3500	SPHWAHDNF27YZUMD4	YZ	UM	D4	2541 ~
			SPHWAHDNF27YZUND4		UN		
		4000	SPHWAHDNF27YZTMD4	YZ	TM	D4	2607 ~
			SPHWAHDNF27YZTND4		TN		
LC026D	90	3000	SPHWAHDNG27YZVMD4	YZ	VM	D4	3242 ~
			SPHWAHDNG27YZVND4		VN		
		3500	SPHWAHDNG27YZUMD4	YZ	UM	D4	3378 ~
			SPHWAHDNG27YZUND4		UN		
		4000	SPHWAHDNG27YZTMD4	YZ	TM	D4	3466 ~
			SPHWAHDNG27YZTND4		TN		

LC033D	90	3000	SPHWAHDNH27YZVMD4	YZ	VM	D4	3988 ~
			SPHWAHDNH27YZVND4		VN		
		3500	SPHWAHDNH27YZUMD4	YZ	UM	D4	4156 ~
			SPHWAHDNH27YZUND4		UN		
		4000	SPHWAHDNH27YZTMD4	YZ	TM	D4	4264 ~
			SPHWAHDNH27YZTND4		TN		
		3000	SPHWAHDNK27YZVMD4	YZ	VM	D4	4956 ~
			SPHWAHDNK27YZVND4		VN		
LC040D	90	3500	SPHWAHDNK27YZUMD4	YZ	UM	D4	5138 ~
			SPHWAHDNK27YZUND4		UN		
		4000	SPHWAHDNK27YZTMD4	YZ	TM	D4	5309 ~
			SPHWAHDNK27YZTND4		TN		

b) Chromaticity Region & Coordinates (I_F = Sorting Current, $T_J = 85^\circ\text{C}$)



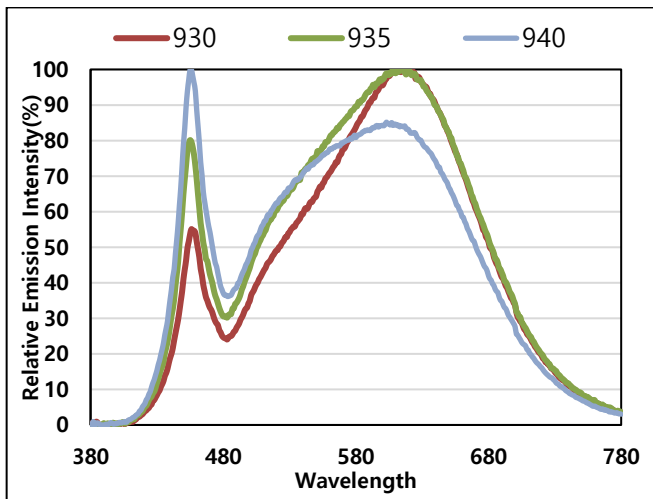
MacAdam Ellipse (VM, VN)					
Step	CIE x	CIE y	θ	a	b
2-step	0.4220	0.3860	53.22	0.0056	0.0027
3-step	0.4220	0.3860	53.22	0.0083	0.0041

MacAdam Ellipse (UN)					
Step	CIE x	CIE y	θ	a	b
2-step	0.3980	0.3760	54.00	0.0062	0.0028
3-step	0.3980	0.3760	54.00	0.0093	0.0041

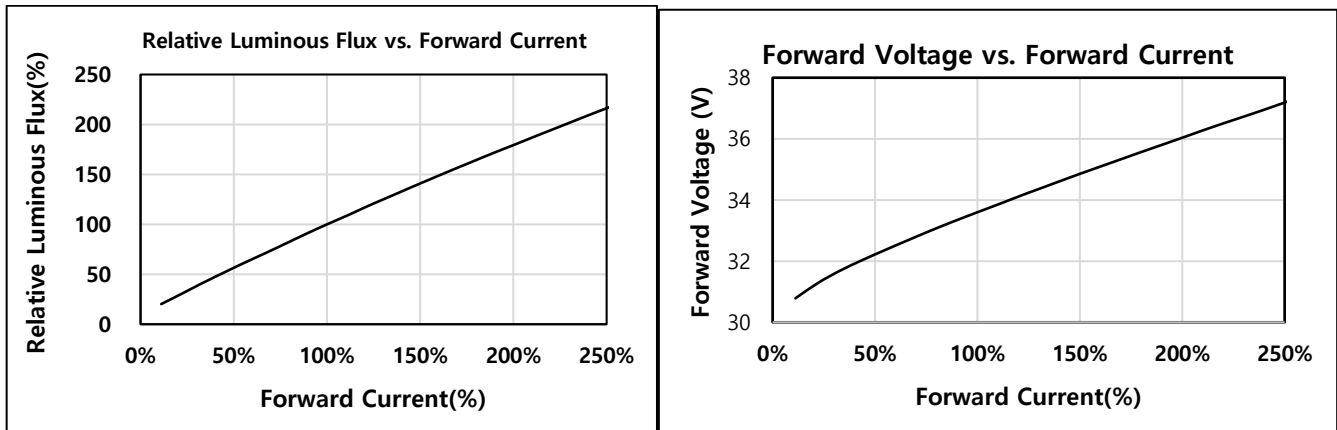
MacAdam Ellipse (TN)					
Step	CIE x	CIE y	θ	a	b
2-step	0.3740	0.3640	53.72	0.0063	0.0027
3-step	0.3740	0.3640	53.72	0.0094	0.0040

3. Typical Characteristics Graphs

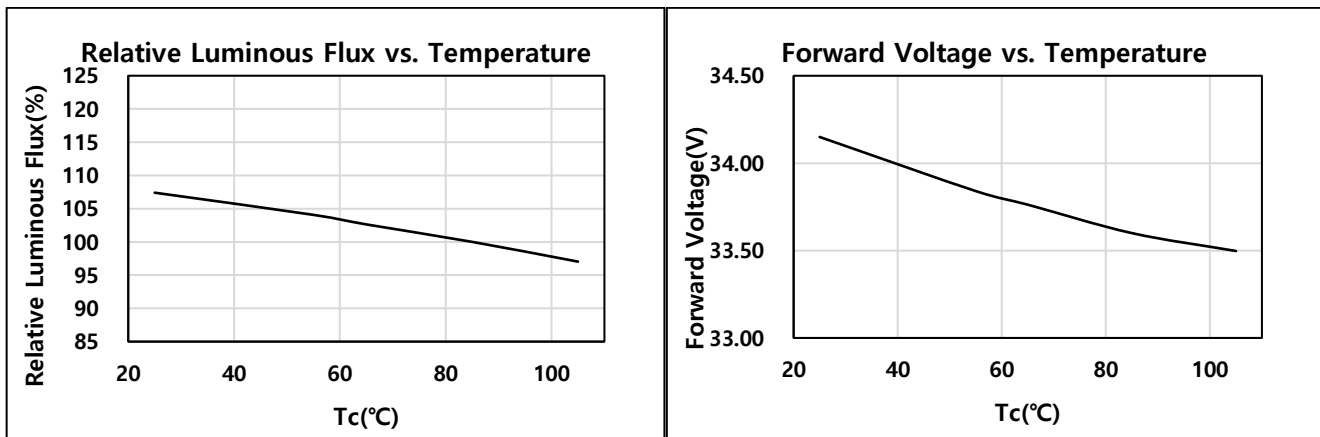
a) Spectrum Distribution (I_F = Sorting Current, $T_J = 85^\circ\text{C}$)



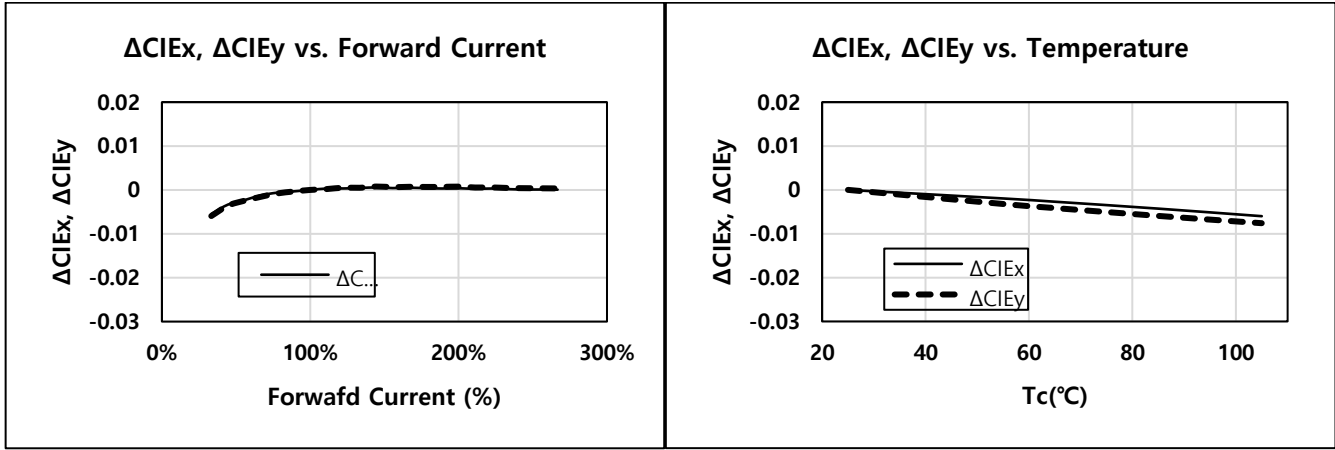
b) Forward Current Characteristics ($T_J = 85^\circ\text{C}$)



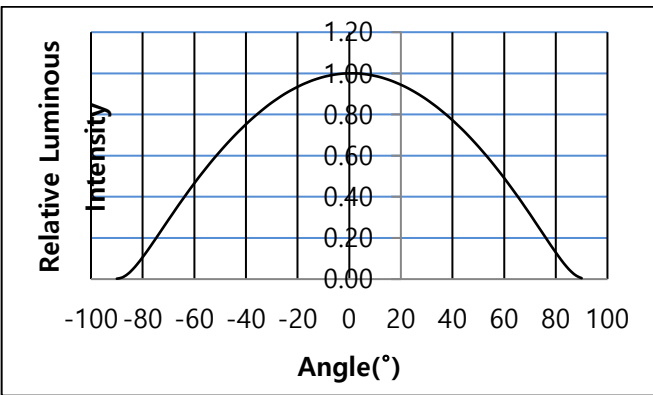
c) Temperature Characteristics (I_F = Sorting Current)



d) Color Shift Characteristics ($T_J = 85\text{ }^{\circ}\text{C}$, $I_F = \text{Sorting Current}$)

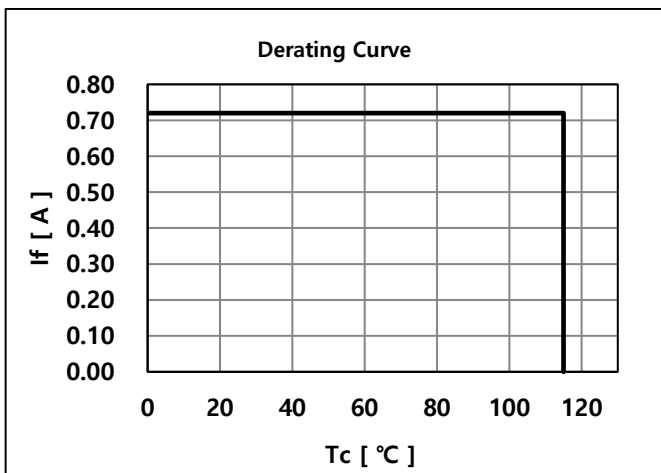


e) Beam Angle Characteristics ($I_F = \text{Sorting Current}$, $T_J = 85\text{ }^{\circ}\text{C}$)

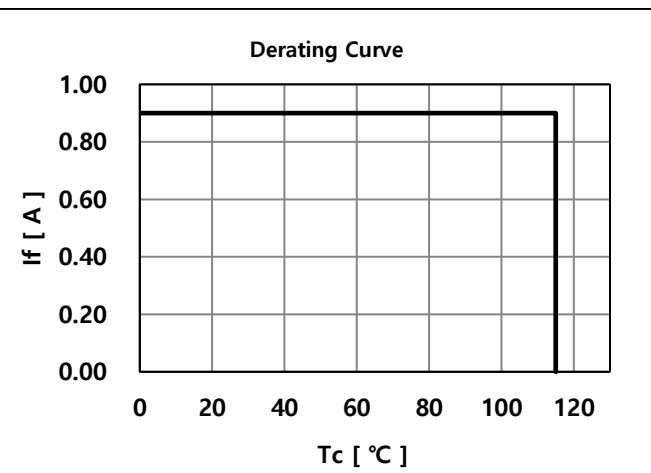


f) Derating Characteristics

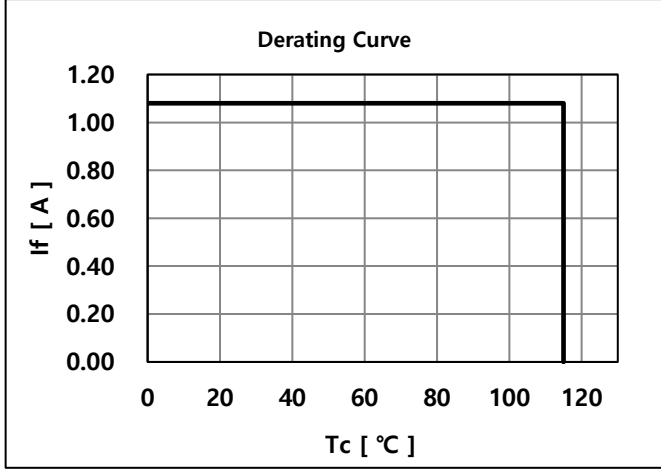
LC013D



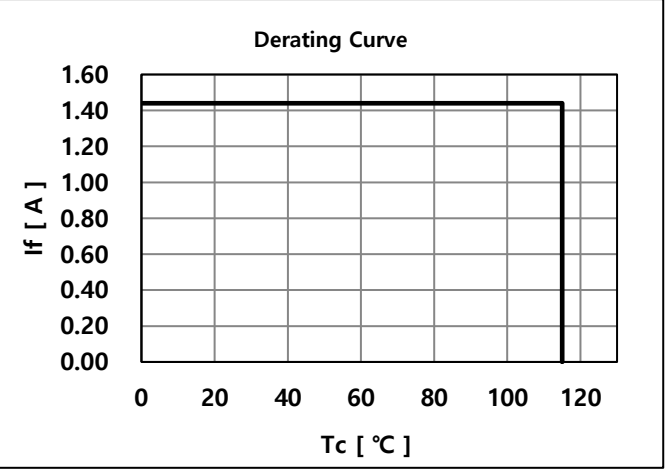
LC016D



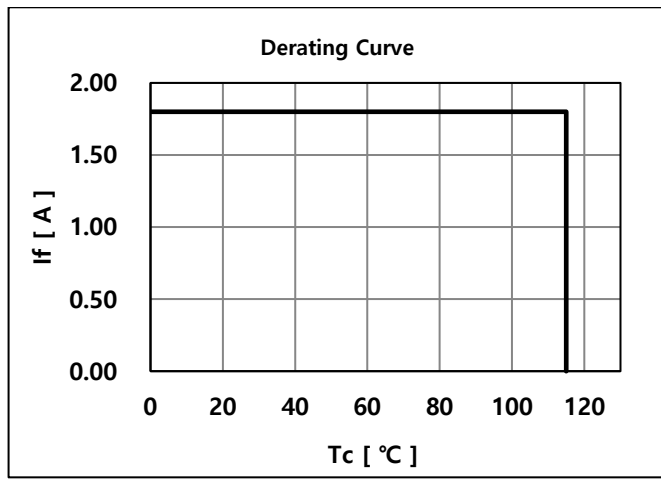
LC019D



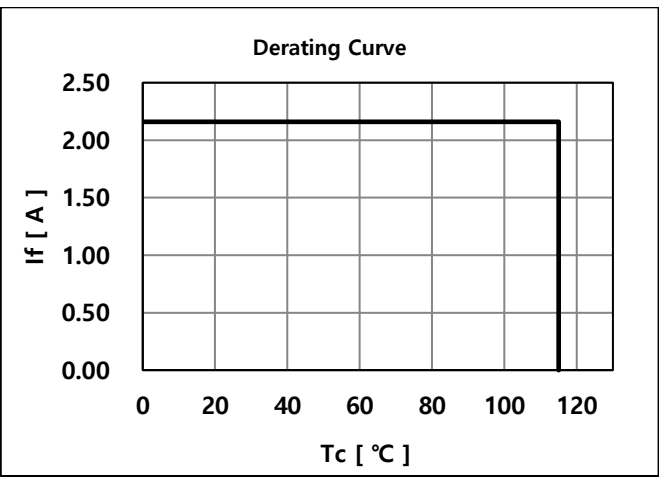
LC026D



LC033D

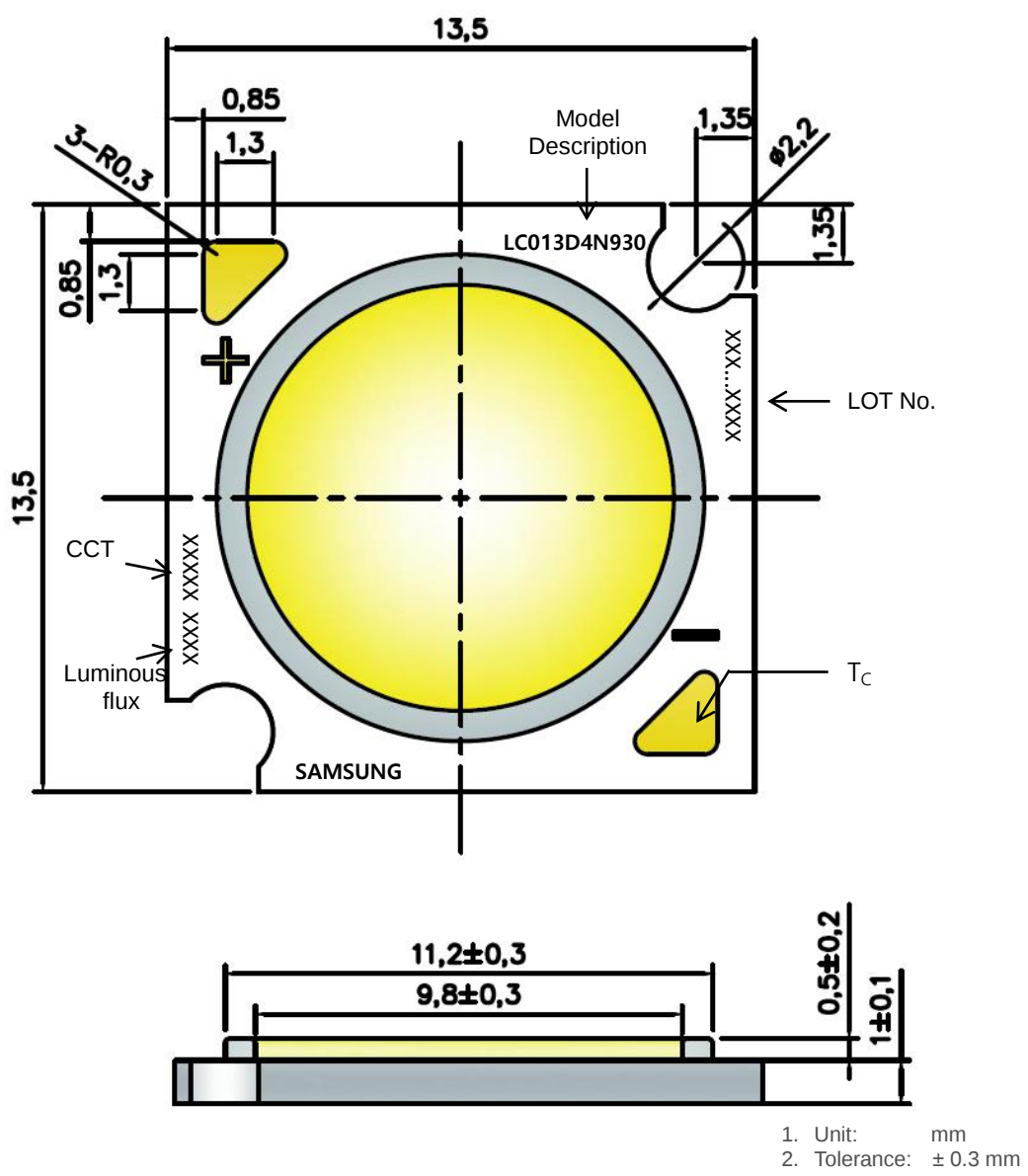


LC040D



4. Outline Drawing & Dimension

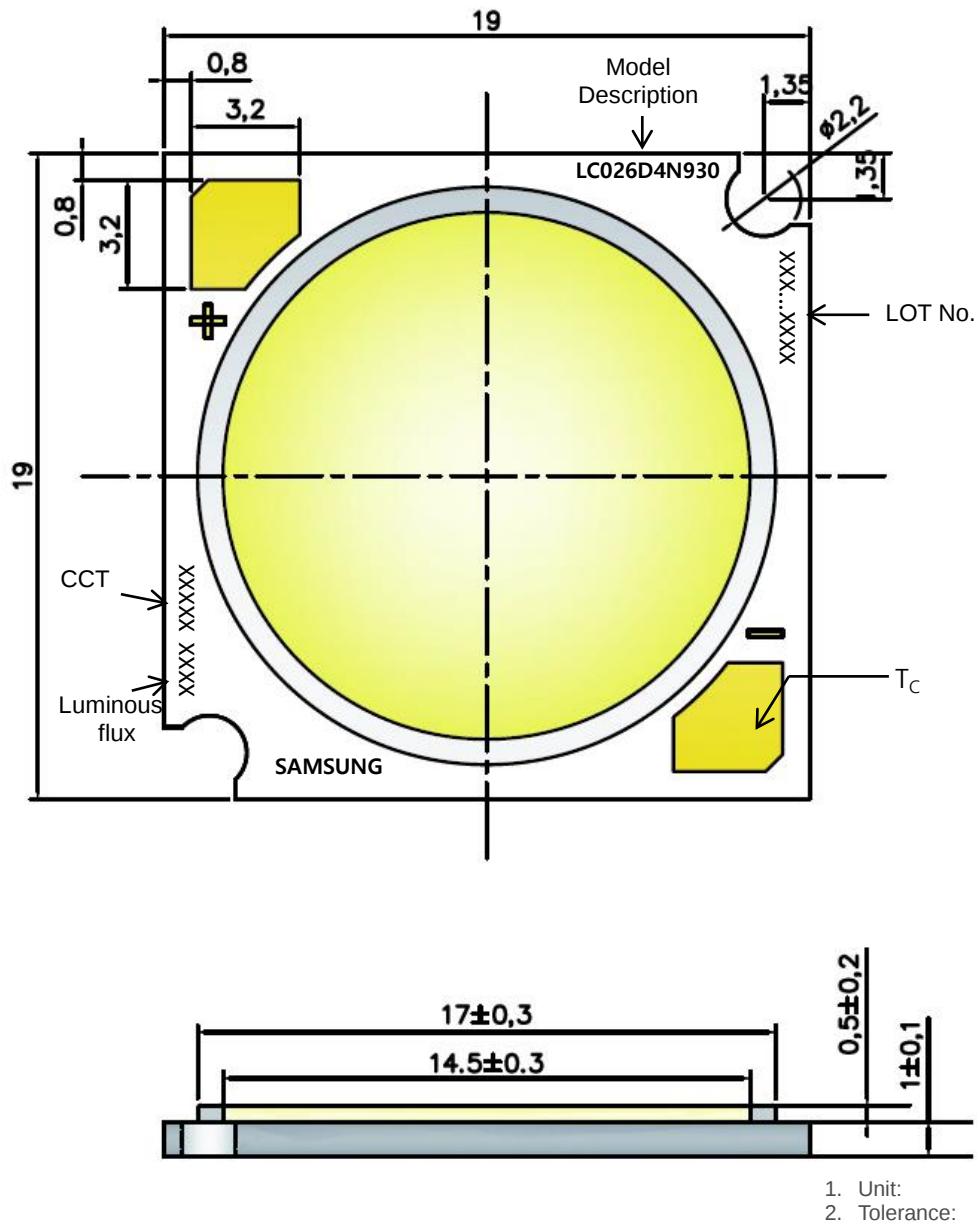
※ Model : LC013D



Item		Dimension	Tolerance	Unit
Length		13.5	± 0.15	mm
Width		13.5	± 0.15	mm
Height	Dam	0.65	± 0.15	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
(LC013D4N930 :LC013D, Gen4, Ra90+, 3000K)

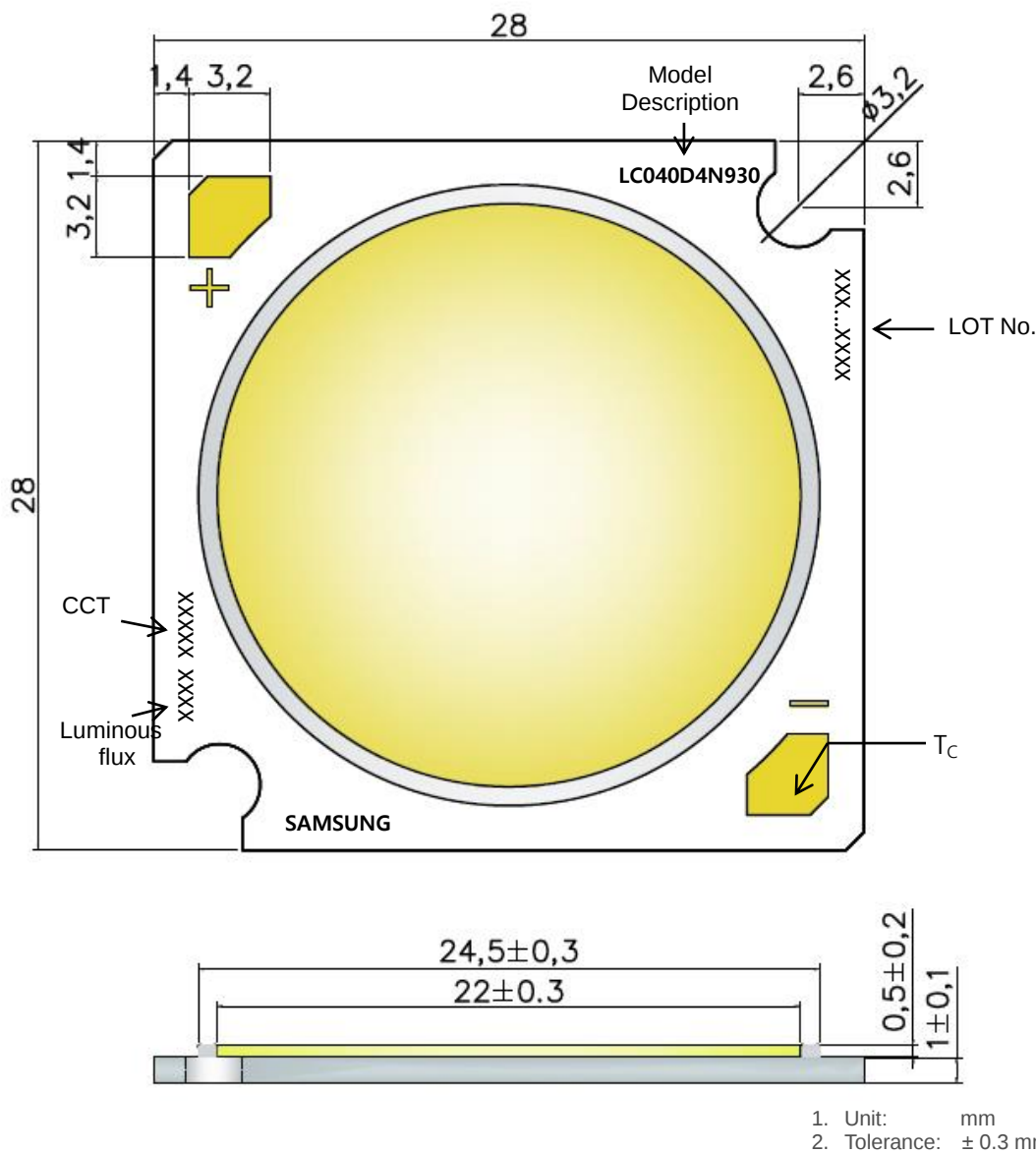
※ Model : LC016D, LC019D, LC026D, LC033D



Item		Dimension	Tolerance	Unit
Length		19.0	±0.15	mm
Width		19.0	±0.15	mm
Height	Dam	0.7	±0.15	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
(LC026D4N930 : LC026D, Gen4, CRI90+, 3000K)

※ Model : LC040D



Item		Dimension	Tolerance	Unit
Length		28.0	± 0.15	mm
Width		28.0	± 0.15	mm
Height	Dam	0.7	± 0.15	mm
	Substrate	1.0	± 0.10	mm
LES Diameter	Light Emitting Surface	22.0	± 0.30	mm

Note: Denoted product information above is only an example
(LC040D4N930 : LC040D, Gen4, CRI90+, 3000K)

5. Reliability Test Items & Conditions

a) Test Items

Test Item	Test Condition	Test Hour / Cycle
High Temperature Humidity Life Test	60 °C, 90 % RH., DC Derating, I_F	1000 h
High Temperature Life Test	85 °C, DC Derating, I_F	1000 h
Low Temperature Life Test	-40 °C, DC, Derating I_F	1000 h
High Temperature Storage	120 °C	1000 h
Low Temperature Storage	-40 °C	1000 h
Temperature Humidity Storage	60 °C, 90% RH	1000h
Temperature Cycle On/Off Test	-40 °C/ 85 °C 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%, H ₂ S 15 ppm	504h

b) Criteria for Judging the Damage

Item	Symbol	Test Condition ($T_c = 25\text{ °C}$)	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 bin code and product code above is only an example (see description on page 5)

Bin Code:

- ⒶⒷ : Forward Voltage bin (refer to page 9)
- ⒸⒹ : Chromaticity bin (refer to page 21)
- ⒺⒻ : Luminous Flux bin (refer to page 5-8)

b) Lot Number

The lot number is composed of the following characters:



① ③④⑤⑥⑦⑧⑨ / IⒶⒷⒸ / xxx pcs

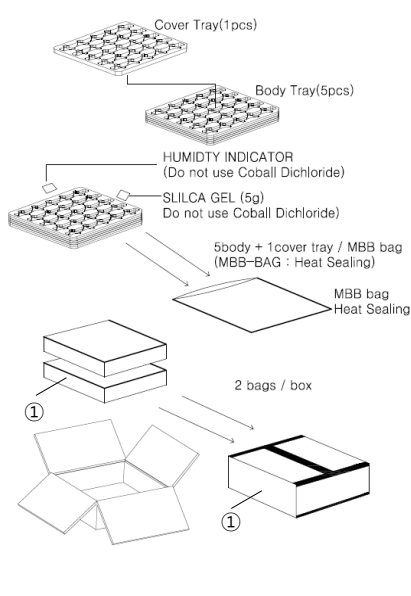
- ① : Production site (G: China)
- ② : 4 (LED)
- ③ : Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
- ④ : Year (G: 2022, H: 2023, I: 2024...)
- ⑤ : Month (1~9, A, B, C)
- ⑥⑦⑧⑨ : Day (1~9, A, B~V)
- ⒶⒷⒸ : Product serial number (001 ~ 999)

7. Packing Structure

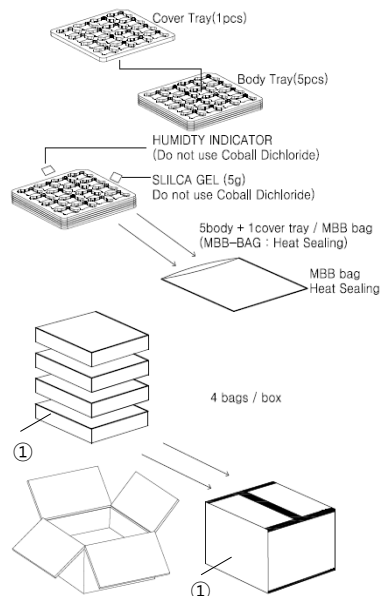
※ Model : LC013D

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



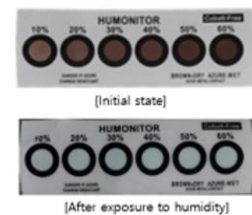
※ Small Box



※ Middle Box



[MBB BAG drawing]



[Silica GEL (5g)]



① Side Label

LC013D RA90 3000K
YZV3D4

SPHWAHDND28YZVND4 YZVND4 01

|||||

G4AZC4001/1001/ xxx pcs

|||||

SAMSUNG

(1P) Supplier Part Number : SPHWAHDND28YZVND4



(33P) Bin Code / YZVND4



(1T) Lot Number / 1001



(Q) Quantity : XXX



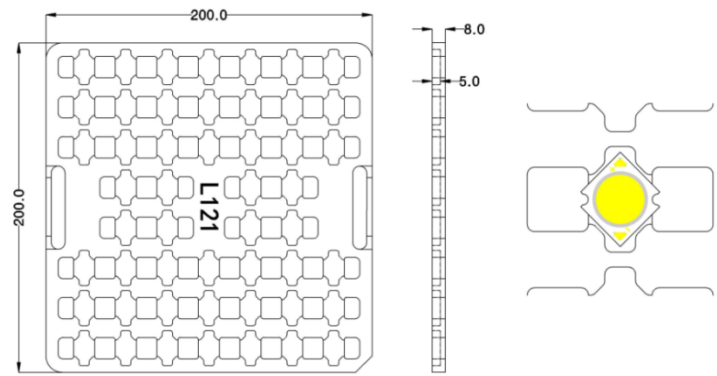
(100) Data Code : 2109



(4L) Country of Origin : CN



b) Tray

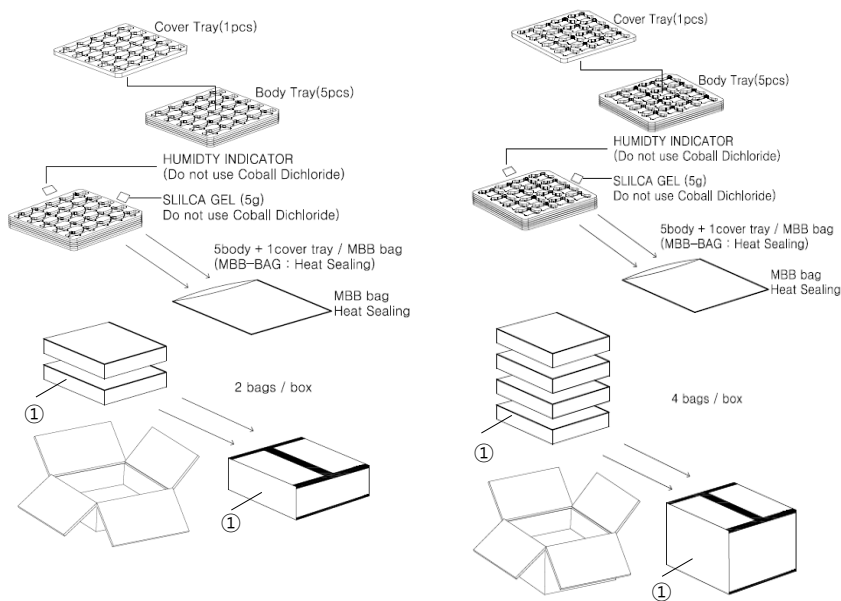


※ Model : LC016D, LC019D, LC026D, LC033D

a) Packing Structure

Packing material	Max. quantity in pcs of COB	Dimension(mm)			
		Length	Width	Height	Tolerance
Tray	25	200	200	8	1
Anti-Static Bag	125 (5 trays)	320	270	-	+/- 0.5
Outer Box (Small)	250 (2 bags)	225	225	65	5
Outer Box (Middle)	500 (4 bags)	225	225	130	5

a) Packing Structure

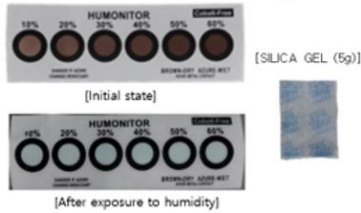


※ Small Box

※ Middle Box



[MBB BAG drawing]



① Side Label



LC026D RA90 3000K
YZVND4

SPHWAHDNG28YZVND4 YZVND4 01
G4AZC4001/1001/ xxx pcs

SAMSUNG  **ERC**

(1P) Supplier Part Number : SPHWAHDNG28YZVND4


(33P) Bin Code / YZVND4

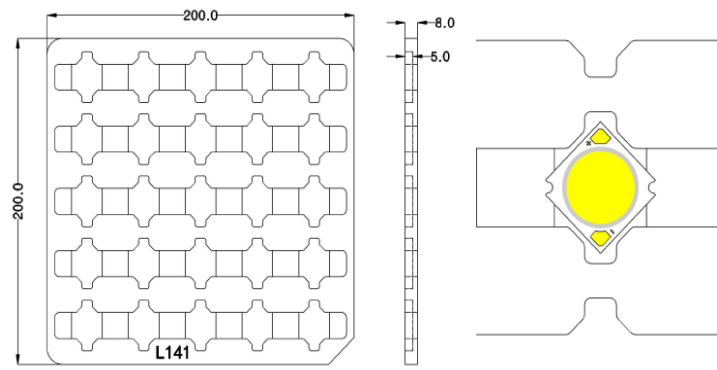

(1T) Lot Number / 1001


(Q) Quantity : XXX


(100) Data Code : 2109


(4L) Country of Origin : CN

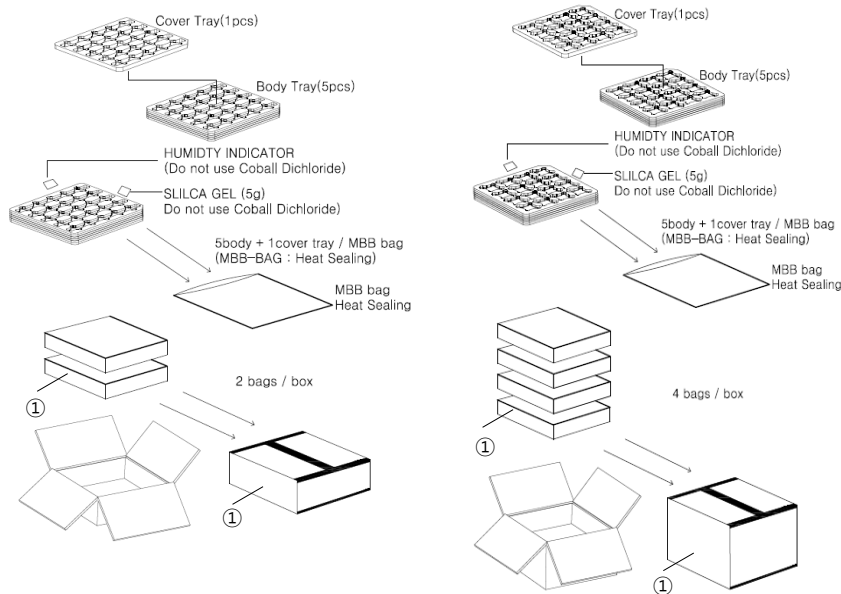

b) Tray



※ Model : LC040D

Packing material	Max. quantity in pcs of COB	Dimension(mm)			
		Length	Width	Height	Tolerance
Tray	16	200	200	8	1
Anti-Static Bag	80 (5 trays)	320	270	-	+/- 0.5
Outer Box (Small)	160 (2 bags)	225	225	65	5
Outer Box (Middle)	320 (4 bags)	225	225	130	5

a) Packing Structure



※ Small Box

※ Middle Box



[MBB BAG drawing]



① Side Label

LC040D RA90 3000K
YZVND4

SPHWHAHDNK28YZVND4 YZVND4 01
G4AZC4001/1001/ xxx pcs

SAMSUNG

(1P) Supplier Part Number : SPHWHAHDNK28YZVND4

(33P) Bin Code / YZVND4

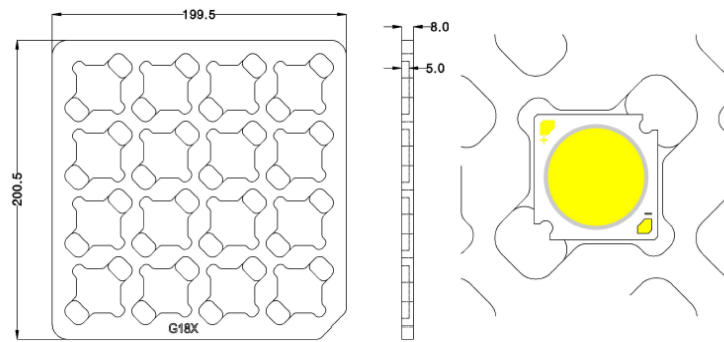
(1T) Lot Number / 1001

(Q) Quantity : XXX

(100) Data Code : 2109

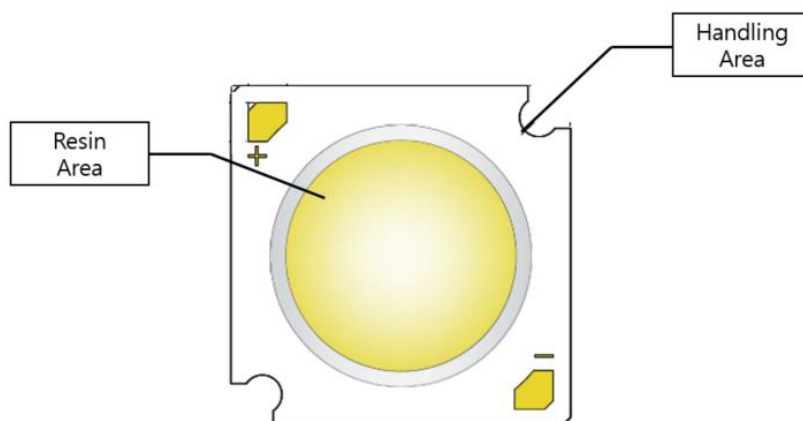
(4L) Country of Origin : CN

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. 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.
- 2) LEDs must be stored in a clean environment. If the LEDs are to be stored for three months or more after being shipped from Samsung, they should be packed with a nitrogen-filled container (shelf life of sealed bags is 12 months at temperature 0~40 °C, 0~90 % RH).
- 3) 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
- 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 °C.
- 6) Devices must be baked for 1 hour at 60 ± 5 °C, 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 (I_{f_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.
- 12) The LED from Samsung uses an Aluminum MCPCB with Ag thin layer 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 Al-MCPCB may cause intensity degradation, change of chromaticity coordinates and, in extreme cases, open circuit. It requires caution. Due to possible sulfurization of Al-MCPCB, 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 and our official blog at global.samsungtomorrow.com.

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

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The Samsung logo, consisting of the word "SAMSUNG" in a bold, blue, sans-serif typeface.

