

COB APPLICATION NOTE

Chip on board For Lighting

COB Application Note
Ver. 2.3 Release Date : 13-Jun.-17




SAMSUNG

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0. Introduction

■ General

| Model | LC003D LC006D LC009D LC013D | LC016D LC019D LC026D LC033D | LC040D LC060D LC080D |
|--------|---|--|---|
| Shape |  |  |  |
| Remark | 13.5 x 13.5 mm Ø9.8 mm | 19.0 x 19.0 mm Ø14.5 mm | 28.0 x 28.0 mm Ø22.0 mm |

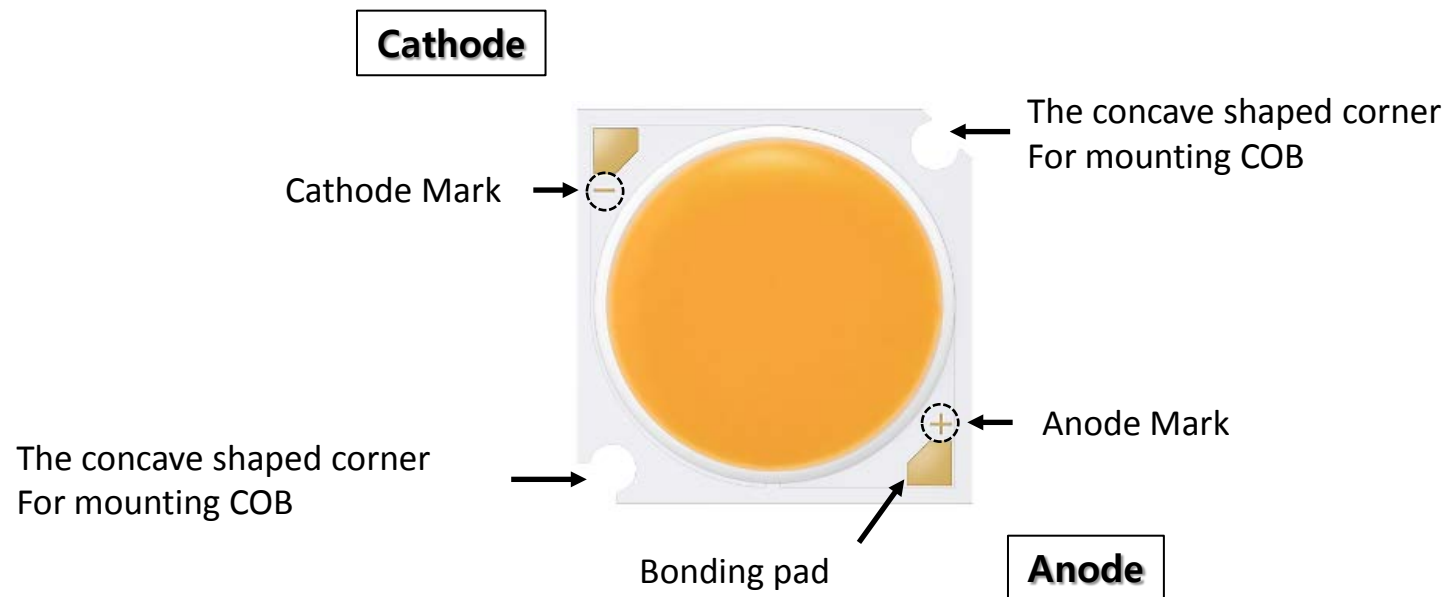
■ Application

| | LC003D LC006D LC009D LC013D | LC016D LC019D LC026D LC033D | LC040D LC060D LC080D |
|-----------------|--------------------------------------|--------------------------------------|----------------------------|
| Bulbs/MR/PAR | ○ | ○ | |
| Down/Spot Light | ○ | ○ | ○ |
| High/Low bay | | | ○ |

1. Component

■ Appearance Features


- Efficient LES area over product size
 - Uniform Chip arrangement
 - Concave shaped corner for Screw fixation
 - Aluminum metal substrate
- : Metal substrate basically make the low thermal resistance



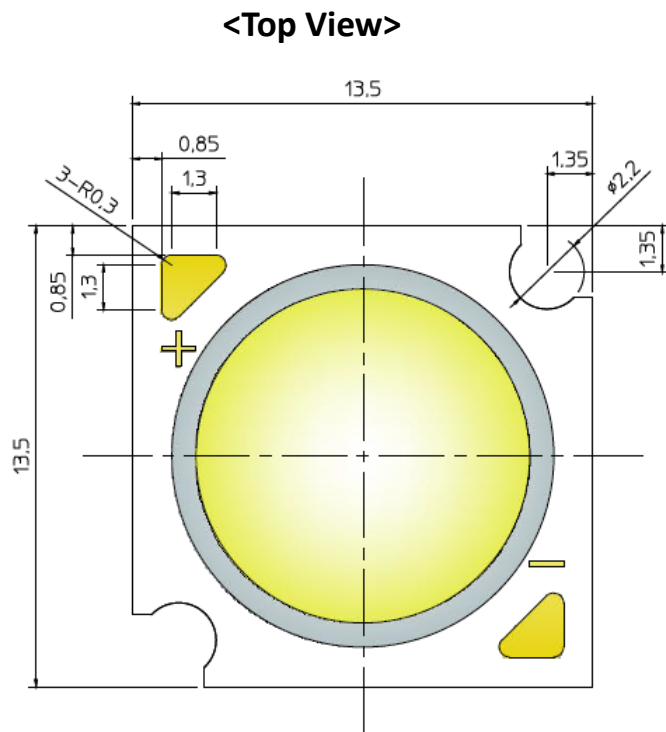
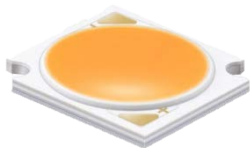
1.1 Package information

■ Samsung COB Line-up

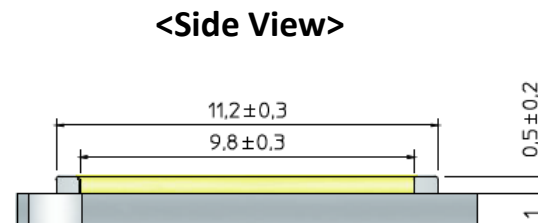
- D series is targeting main stream in general lighting and it has leading efficacy.

| Platform | Model | Wattage | | | | | | | | | | |
|---|---------|----------------------------|----|----|---------------------|-----|-----|-----|---------------------|-----|-----|-----|
| | | 3W | 6W | 9W | 13W | 16W | 19W | 26W | 33W | 40W | 60W | 80W |
| | | LES 9.8mm (13.5x13.5mm) | | | 14.5mm (19x19mm) | | | | 22.0mm (28x28mm) | | | |
| COB D-series Gen.2  | CRI 70+ | | | | | | | | | ● | ● | ● |
| | CRI 80+ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | CRI 90+ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | CRI 95+ | | | | ○ | ○ | ○ | ○ | ○ | | | |
| | Vivid | | | | ● | ● | ● | ● | ● | | | |
| Gen.1 | CRI 70+ | | | | | | | | | | ● | ● |
| | CRI 80+ | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● |
| | CRI 90+ | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● |

● : MP ○ : Under Develop.

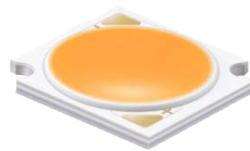


12S x 1P

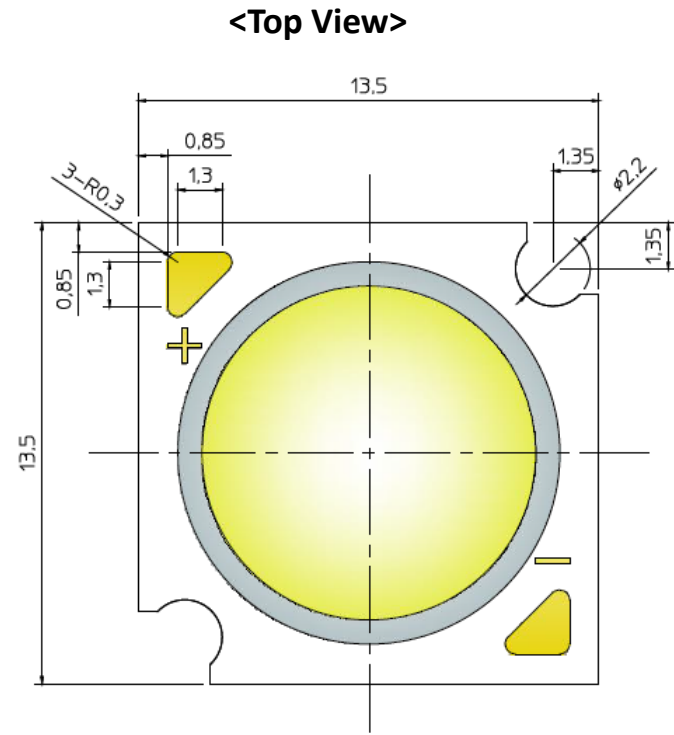


1.1.1 Package Circuit & Dimension_LC006D

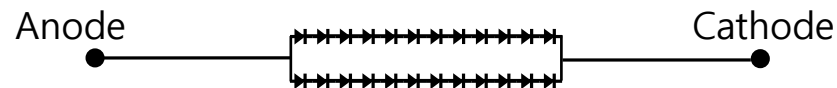
■ Package



■ Dimension

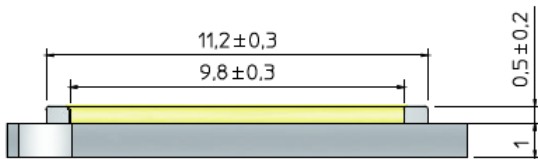


■ Circuit Array



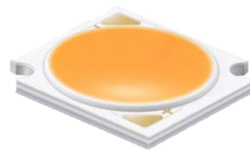
12S x 2P

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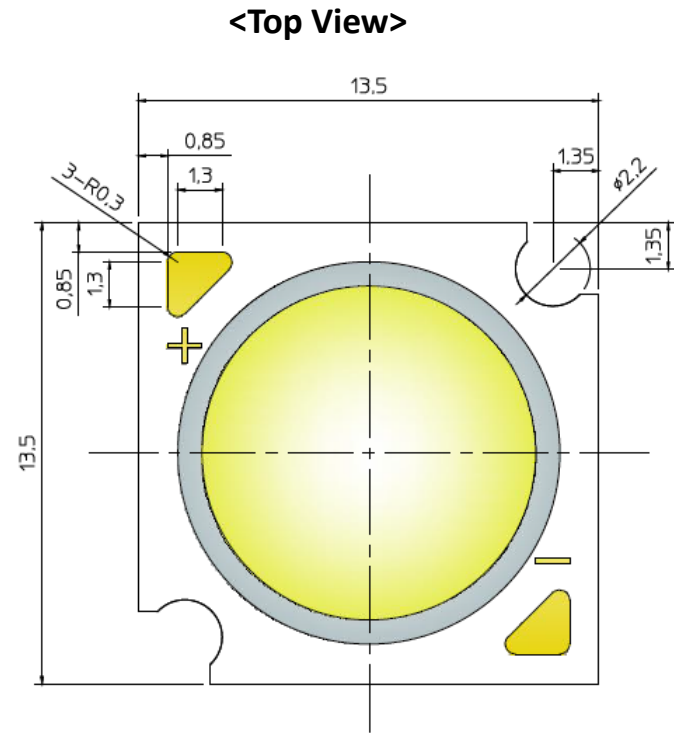


1.1.1 Package Circuit & Dimension_LC009D

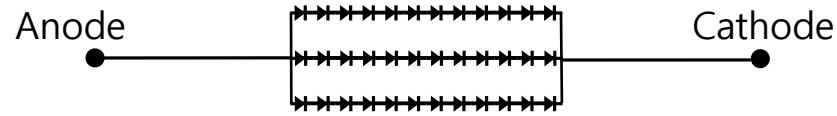
■ Package



■ Dimension

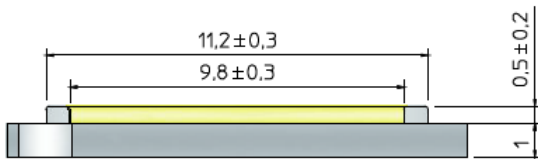


■ Circuit Array



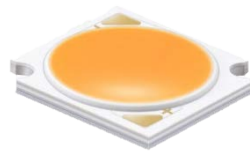
12S x 3P

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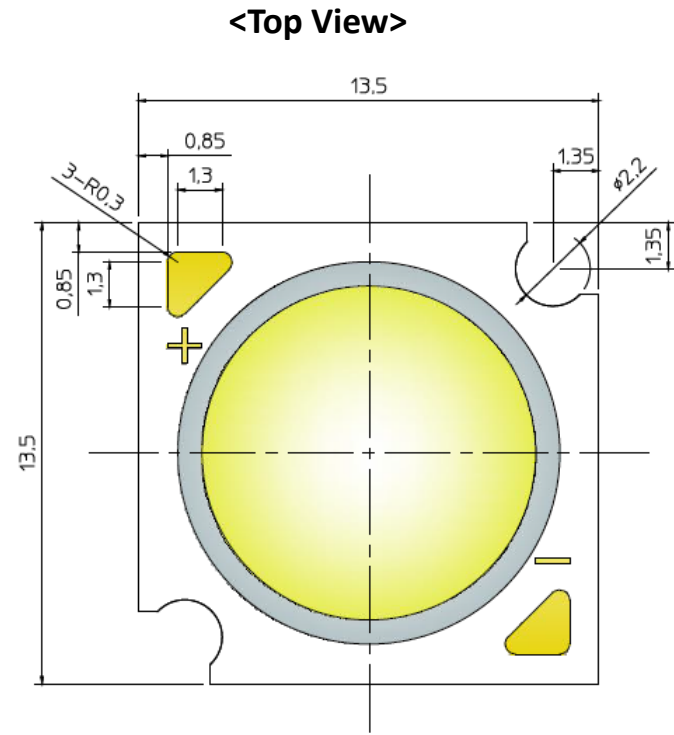


1.1.1 Package Circuit & Dimension_LC013D

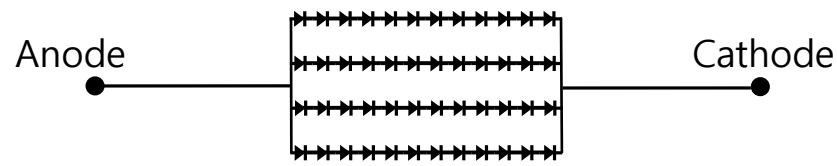
■ Package



■ Dimension

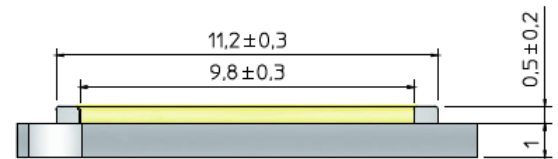


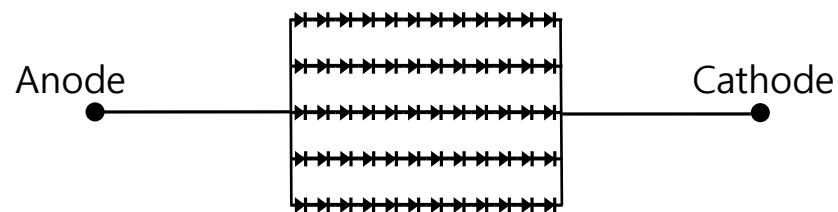
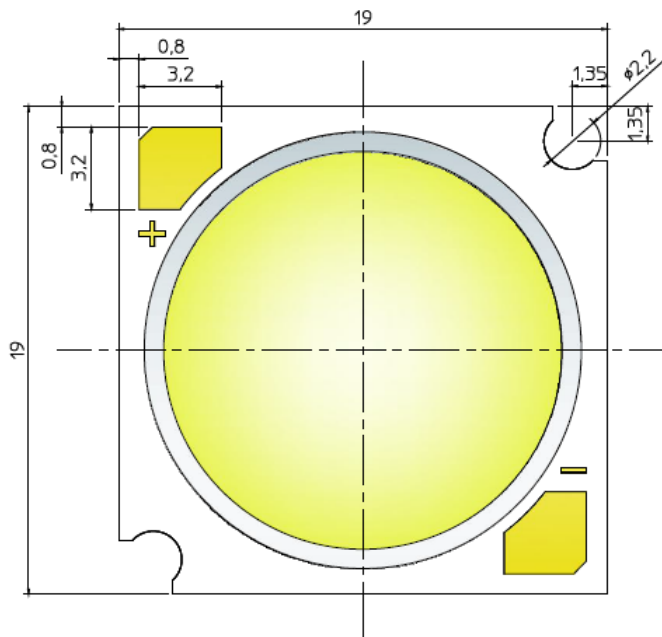
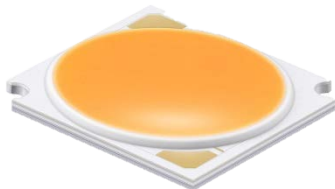
■ Circuit Array



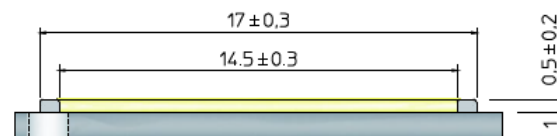
12S x 4P

<Side View>





12S x 5P



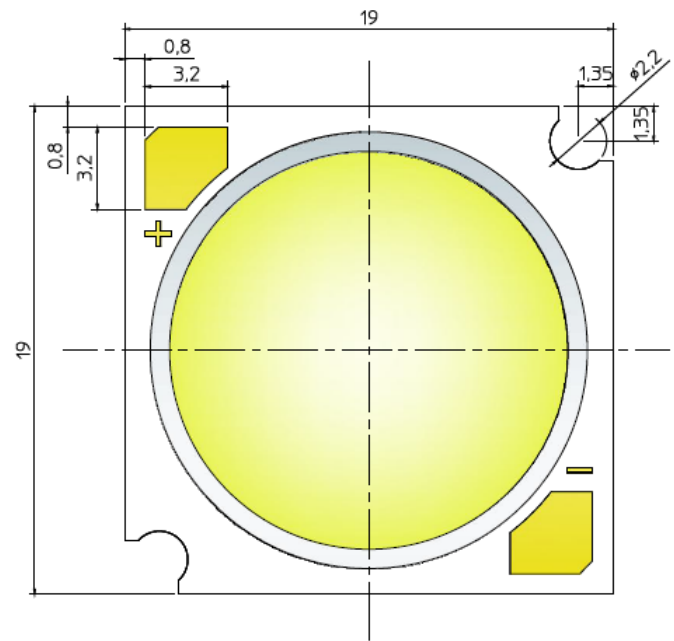
1.1.1 Package Circuit & Dimension_LC019D

■ Package

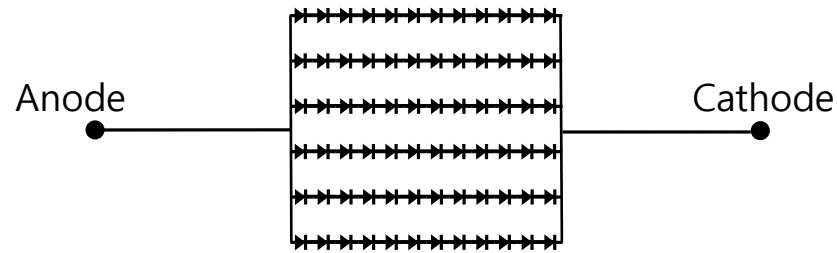


■ Dimension

<Top View>

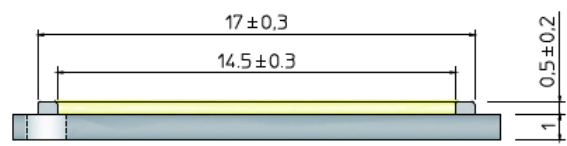


■ Circuit Array



12S x 6P

<Side View>



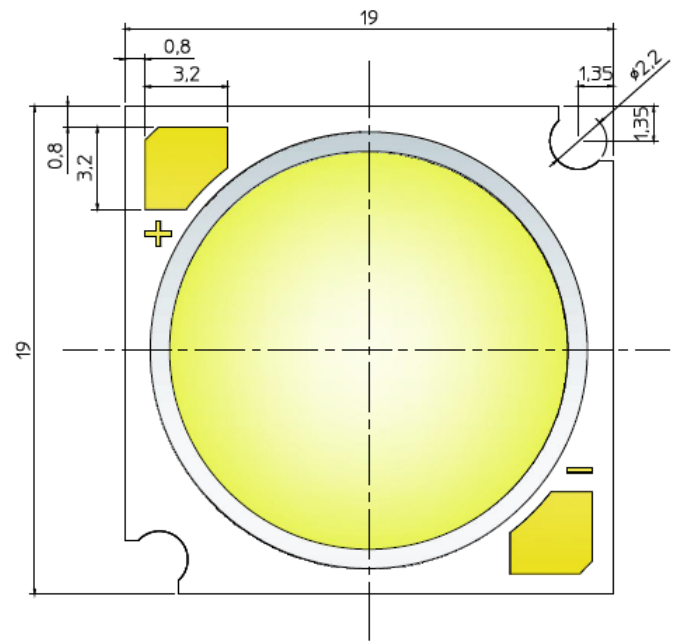
1.1.1 Package Circuit & Dimension_LC026D

■ Package

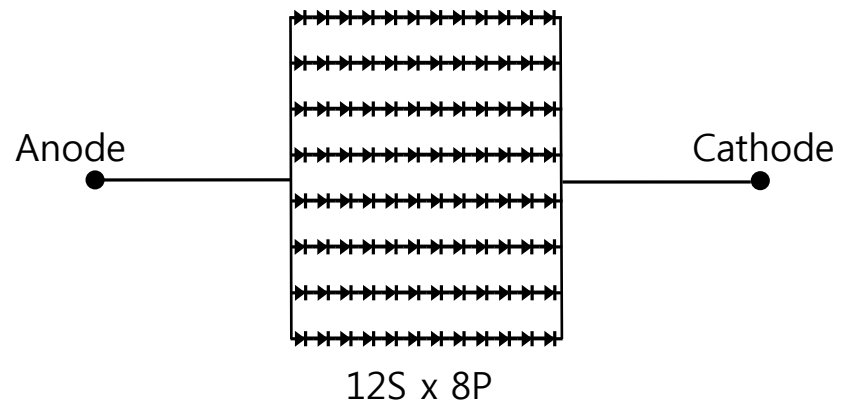


■ Dimension

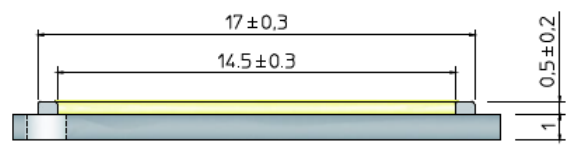
<Top View>



■ Circuit Array



<Side View>



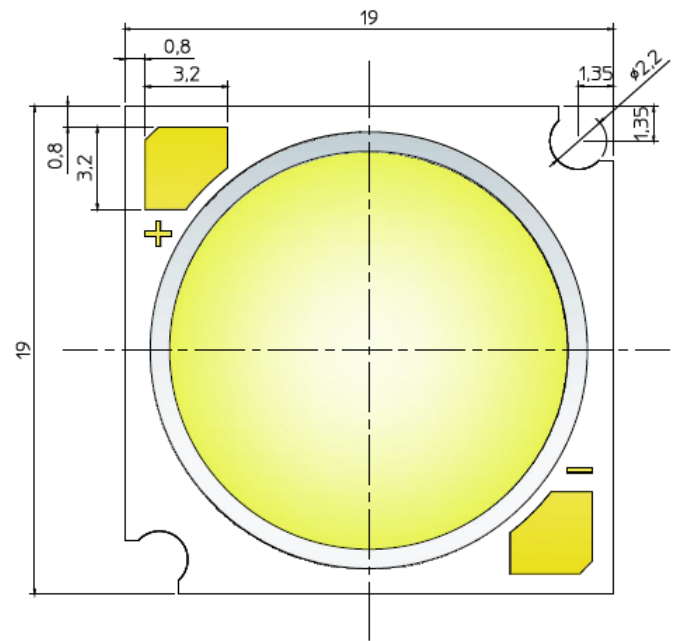
1.1.1 Package Circuit & Dimension_LC033D

■ Package

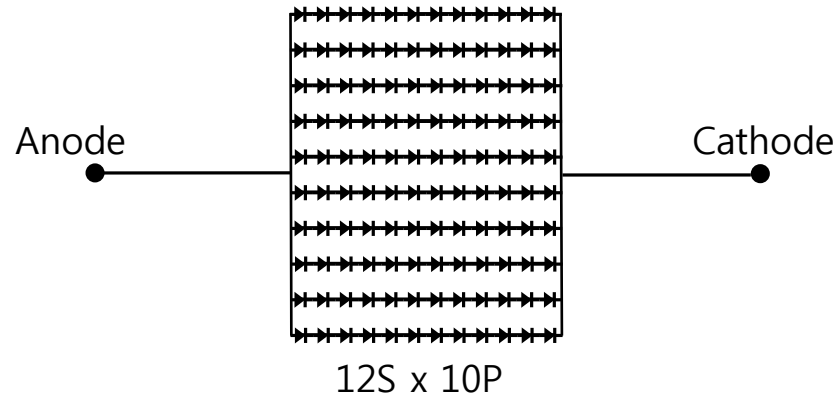


■ Dimension

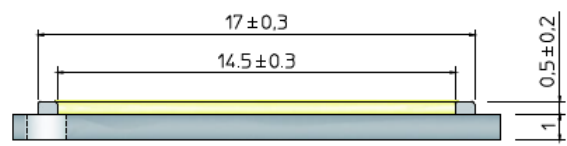
<Top View>



■ Circuit Array

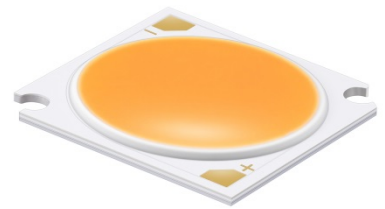


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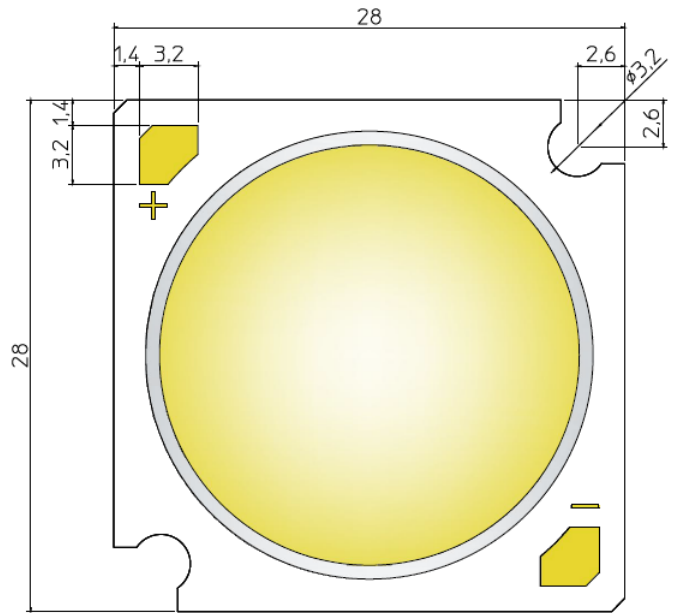
1.1.1 Package Circuit & Dimension_LC040D

■ Package

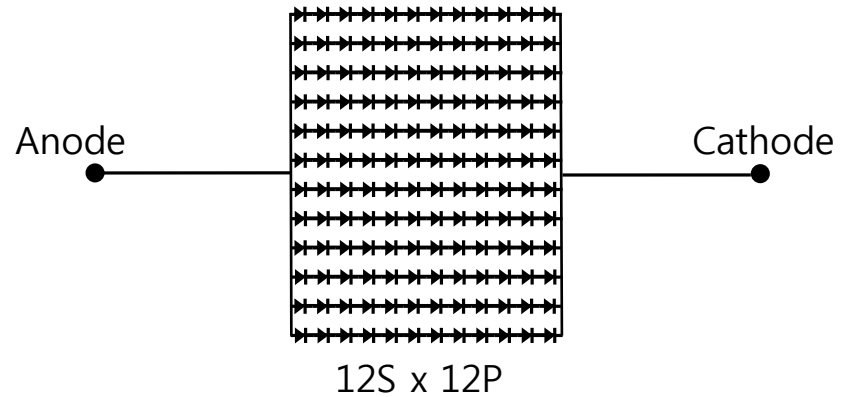


■ Dimension

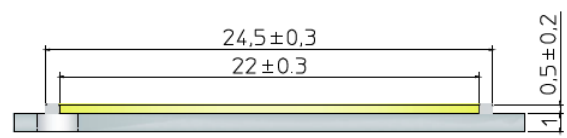
<Top View>



■ Circuit Array

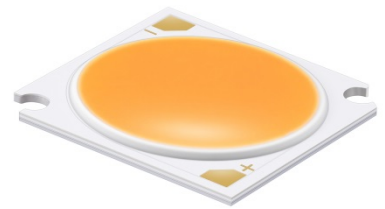


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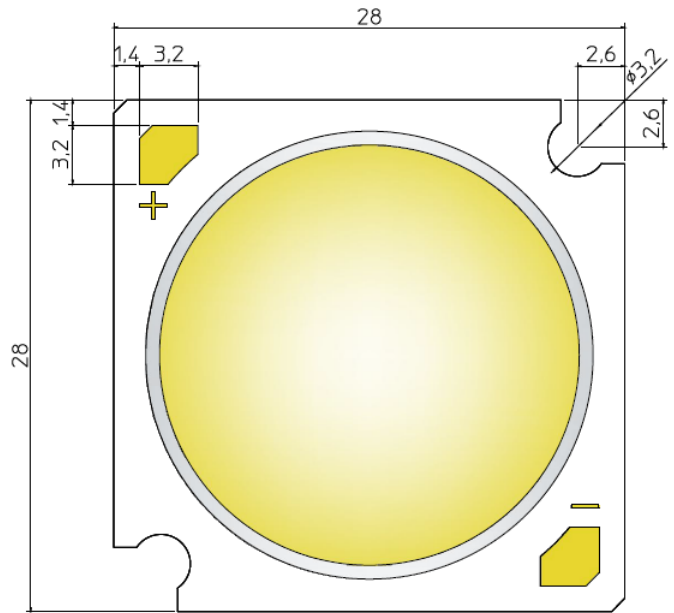
1.1.1 Package Circuit & Dimension_LC060D

■ Package

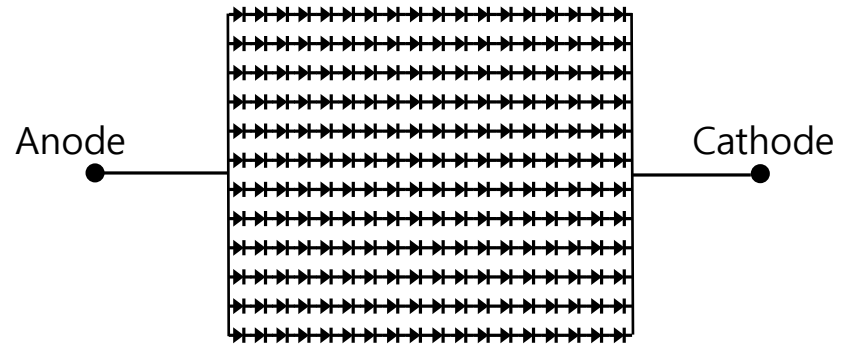


■ Dimension

<Top View>

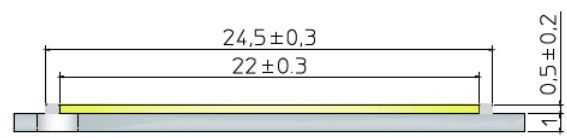


■ Circuit Array



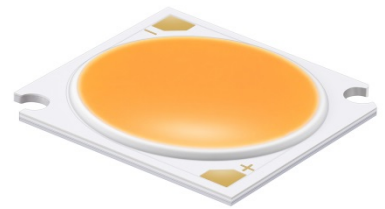
18S x 12P

<Side View>



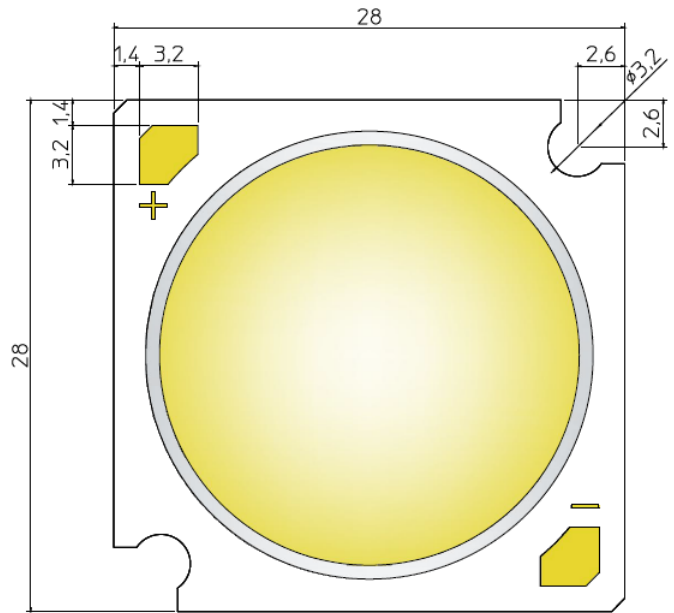
1.1.1 Package Circuit & Dimension_LC080D

■ Package

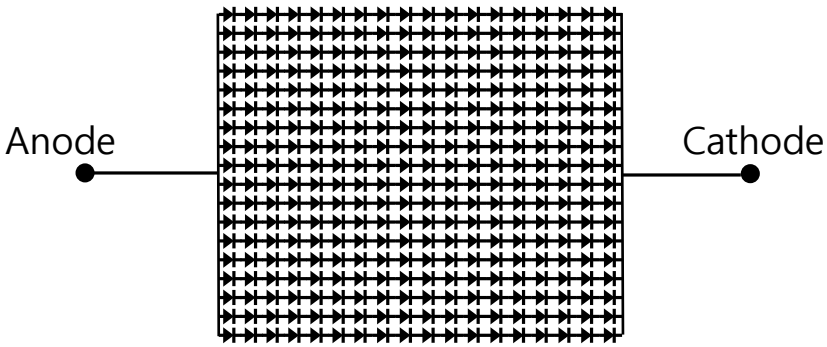


■ Dimension

<Top View>

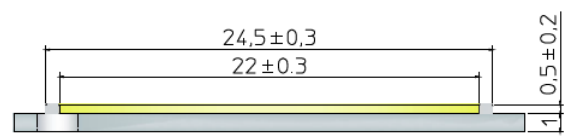


■ Circuit Array



18S x 18P

<Side View>

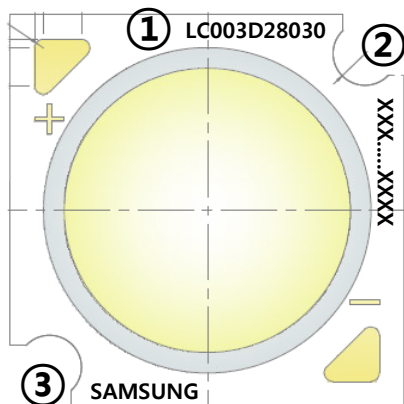


1.1.2 Laser-marking guide_D-series Gen.1

Format _ D-series Gen.1

| 1313 Size | 1919 Size | 2828 Size |
|--------------------------|---------------------------|---------------------------|
| <p>ex) 3W Ra80 3000K</p> | <p>ex) 26W Ra80 3000K</p> | <p>ex) 40W Ra80 3000K</p> |

Information _ D-series Gen.1



① LC003D 1 80 30
3W COB Gen1 Ra80 3000K

② LOT No. of Inner-code

③ “SAMSUNG” should be printed by Samsung One Font

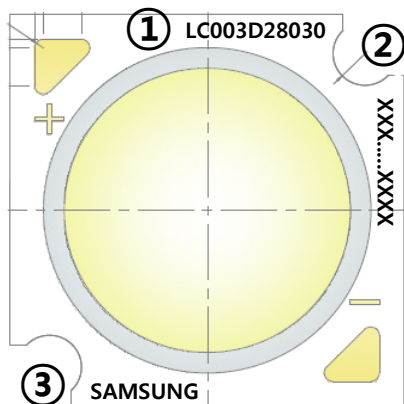
※ The detail dimension of font position and size are not exactly defined.

1.1.2 Laser-marking guide_D-series Gen.2

Format _ D-series Gen.2

| 1313 Size | 1919 Size | 2828 Size |
|--------------------------|---------------------------|---------------------------|
| <p>ex) 3W Ra80 3000K</p> | <p>ex) 26W Ra80 3000K</p> | <p>ex) 40W Ra80 3000K</p> |

Information _ D-series Gen.2



① LC003D 2 80 30
3W COB Gen2 Ra80 3000K

② LOT No. of Inner-code

③ “SAMSUNG” should be printed by Samsung One Font

※ The detail dimension of font position and size are not exactly defined.

1.2 Package characteristics

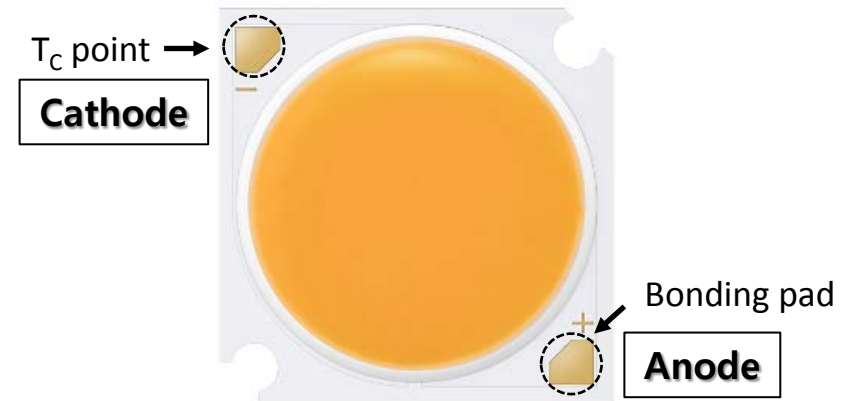
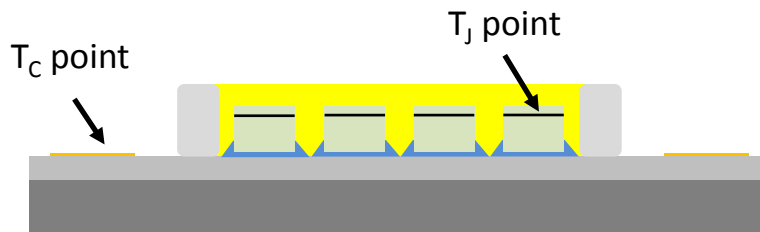
■ Thermal characteristics

■ T_j & T_c point

- T_j point : Junction temperature of chip(Chip)
 - : Generally, this temperature couldn't measure.
- T_c point : Case temperature of PCB(COB package).
 - : Generally, this temperature could measure by thermocouple.

■ Recommended T_c point

- T_c point : One of both pad in the COB package(below image).
 - ※ T_s point is soldering point under SMT PKG. However, COB isn't SMT structure.
So, T_s and T_c is same meaning in COB.



2. Handling Guide

■ Handling Guide

- User have not to touch the lighting Emitting Surface(LES) in any cases.

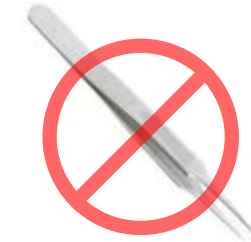
► Tools



White Ceramic tweezer

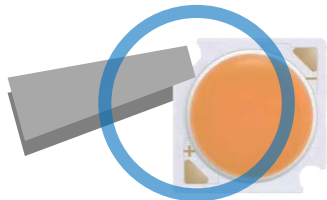


Vacuum tweezer



Sharped-tip Tweezer

► Pick-up



Softly handling when use
white Ceramic tweezer



Use vacuum tweezer case
(have to keep clean vacuum pad side)



DO NOT allow @ LES side



※ This recommended is provided for informational purpose only and is not a warranty or a specification.

2. Handling Guide

■ Particle on COB



Samsung's management for "Particle"

→ Samsung COB is managed below target for quality.

- Point particle : Diameter $\geq 1\text{mm}$
- Line particle : Length $\geq 1\text{mm}$, Width $\geq 0.15\text{mm}$

▪ Recommended method for particle removal



If user want to remove "Particle",

→ User should use blower.

※ This recommended is provided for informational purpose only and is not a warranty or a specification.

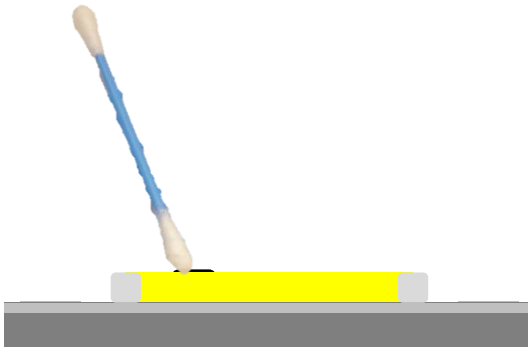
2. Handling Guide

■ Contamination and cleaning



In the production process of luminaire,
COB can be contaminated by an unexpected contaminant.

▪ Recommended method for cleaning



The organic material like as solder flux have to be cleaned out by using the tip of cotton swap soaked isopropyl alcohol(IPA).

※ This device should not be used in any type of fluid such as water, oil, organic solvent, etc.

※ This recommended is provided for informational purpose only and is not a warranty or a specification.

2. Handling Guide

■ Handling Guide (Document)

■ Environment of Working place

The working area for assembly luminaire is recommended to be maintained clean for preventing any contamination and keeping workers' safety. If all working area cannot be maintained clean, at least the space for assembly have to be kept clean and lower humidity in air.

■ Handling PKGs

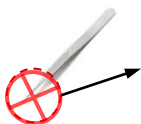
- ① Users have not to touch the lighting emitting surface(LES) in any cases.



At LES (Lighting Emitting Surface), the resin and phosphor cannot protect the bonding wire from deformation or disconnection by an external force

- ② When handling with tweezers user have to grip the thermo plastic(white mold).
③ Users have to wear the anti-static gloves or anti-static wrist band.
④ When handling COB, user have to use the anti-static tweezers.

(Especially, a sharpened-tip of the tweezers would have high possibility of giving a physical defect to CSP)



The sharp tip may physically damage the resin of Phosphor Resin or wall.

- ⑤ When switching on COB with an electrical power supplier, an unexpected or abrupt current should bring about EOS failure in COB. This may also bring about the failure in use or the decrease of life time of products. Please discharge the stored voltage of the power supplier.

2. Handling Guide

■ Handling Guide (Document)

■ Chemical compatibility

During manufacturing luminaire, the many chemicals could attack and contaminate packages. It is necessary to avoid the contaminants and chemicals in manufacturing process and operation. And we are providing the guideline for chemicals and relevant failure mode. (Refer to chemical guideline).

■ Storage

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. (Shelf life of sealed bags: 12 months, temp. $\sim 40^{\circ}\text{C}$, $\sim 90\% \text{RH}$)

- After sealed bag is to be opened and , COB have to be followed the below guide.

- a. COB should be mounted within 672 hours(28 days) at an assembly line with a condition of no more than $30^{\circ}\text{C}/60\% \text{RH}$
- b. COB should be stored at $<10\% \text{RH}$

- Repack unused products with anti-moisture packing, fold to close any opening and then store in a dry place.

- If moisture sensitivity indicator is $>60\%$ at $23 \pm 5^{\circ}\text{C}$ the recovery work should be carried out at the proper condition. In that case, COB should be baked at $60 \pm 5^{\circ}\text{C}$

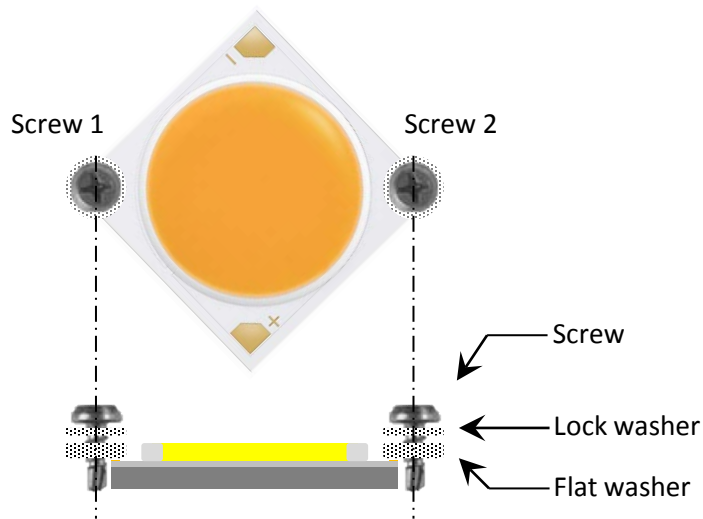
3. Assembly Guide

■ Fixation of COB

Fixing of COB is usually used in two basic method
One is using the fixation screw, the other is using the holder, which are provided by holder makers.

■ Using fixation screw

This COB could be fixed by fastening 2 pairs of screw and washer.
The concaved corner is adequate shape for fixing COB with screws of M3.
The torque of fixing screw is recommended to be 0.7~1.0N·m.



The corner nearby electrode pad should not be allowed to fix screw. It is highly possible to bring about the electrical shortage.

| Screw size | Washer size | Screw hole size |
|------------|-------------|-----------------|
| M3 | M3 | M3 |

※ This recommended is provided for informational purpose only and is not a warranty or a specification.

3. Assembly Guide

▪ Using specific holder for COB

Considering holders, the luminaire is consisted of the key parts like as shown in below figures.

As described earlier, three main parts have to be well- functioned as thermal, optical and electrical.

The holder plays the role which can connect all key parts so as to properly perform the their functions.

This means that the holder is very simple and safe to fix the COB in the manufacturing luminaires.

The below figure describe the assembly process by using the holder.

