

## LED Module Spot Light Series

SLE-013  
SLE-026  
SLE-033  
SLE-040



Samsung Spot Light Modules enable spot / down light design  
with better uniformity and high reliability

### Features & Benefits

- No dark area and smooth light output
- Easy installation by poke-in type holder
- Designed following Zhaga standard

### Applications

Indoor Lighting:

- Down Light
- Spot Light
- Wall Light



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## 1. Product Code Information

### SLE-013 CRI80

| Nominal CCT (K) | Product Code   |
|-----------------|----------------|
| 2700            | SI-N8W1312B0WW |
| 3000            | SI-N8V1312B0WW |
| 3500            | SI-N8U1312B0WW |
| 4000            | SI-N8T1312B0WW |
| 5000            | SI-N8R1312B0WW |

### SLE-013 CRI90

| Nominal CCT (K) | Product Code   |
|-----------------|----------------|
| 2700            | SI-N9W1312B0WW |
| 3000            | SI-N9V1312B0WW |
| 3500            | SI-N9U1312B0WW |
| 4000            | SI-N9T1312B0WW |

### SLE-026 CRI80

| Nominal CCT (K) | Product Code   |
|-----------------|----------------|
| 2700            | SI-N8W2612B0WW |
| 3000            | SI-N8V2612B0WW |
| 3500            | SI-N8U2612B0WW |
| 4000            | SI-N8T2612B0WW |
| 5000            | SI-N8R2612B0WW |

### SLE-026 CRI90

| Nominal CCT (K) | Product Code   |
|-----------------|----------------|
| 2700            | SI-N9W2612B0WW |
| 3000            | SI-N9V2612B0WW |
| 3500            | SI-N9U2612B0WW |
| 4000            | SI-N9T2612B0WW |

**SLE-033 CRI80**

| Nominal CCT (K) | Product Code   |
|-----------------|----------------|
| 2700            | SI-N8W3312B0WW |
| 3000            | SI-N8V3312B0WW |
| 3500            | SI-N8U3312B0WW |
| 4000            | SI-N8T3312B0WW |
| 5000            | SI-N8R3312B0WW |

**SLE-033 CRI90**

| Nominal CCT (K) | Product Code   |
|-----------------|----------------|
| 2700            | SI-N9W3312B0WW |
| 3000            | SI-N9V3312B0WW |
| 3000            | SI-N9U3312B0WW |
| 4000            | SI-N9T3312B0WW |

**SLE-040 CRI80**

| Nominal CCT (K) | Product Code   |
|-----------------|----------------|
| 2700            | SI-N8W4012B0WW |
| 3000            | SI-N8V4012B0WW |
| 3500            | SI-N8U4012B0WW |
| 4000            | SI-N8T4012B0WW |
| 5000            | SI-N8R4012B0WW |

**SLE-040 CRI90**

| Nominal CCT (K) | Product Code   |
|-----------------|----------------|
| 2700            | SI-N9W4012B0WW |
| 3000            | SI-N9V4012B0WW |
| 3000            | SI-N9U4012B0WW |
| 4000            | SI-N9T4012B0WW |

## 2. Characteristics

### SLE-013, SLE-026, SLE-033, SLE-040

| Item                                      | Rating                                  | Unit             | Remark                                    |
|---|---|------------------|---|
| Rated Lifetime                            | >60,000                                 | hour             | L70B50 @ $t_p, \theta = 95^\circ\text{C}$ |
| Ingress Protection (IP)                   | no rating                               | -                |   |
| Ambient / Operating Temperature ( $t_a$ ) | -20 ~ +50                               | $^\circ\text{C}$ |   |
| Storage Temperature                       | -30 ~ +75                               | $^\circ\text{C}$ |   |
| ESD                                       | $\pm 4$ kV (contact) / $\pm 8$ kV (air) | kV               | 1500 pF / 330 $\Omega$                    |
| Beam Angle                                | 115                                     | $^\circ$         | $\pm 5$                                   |

### SLE-013 CRI80

| Item  | Nom. CCT<br>(K) | Rating |      |      | Unit         | Remark                                     |
|---|-----------------|--------|------|------|--------------|--|
|   |                 | Min.   | Typ. | Max. |              |  |
| Luminous Flux ( $\Phi_v$ )  | 2700            | 1120   | 1200 | 1290 | lm           | $I_f = 250$ mA<br>$t_p = 75^\circ\text{C}$ |
|   | 3000            | 1160   | 1240 | 1300 |              |  |
|   | 3500            | 1220   | 1310 | 1380 |              |  |
|   | 4000            | 1160   | 1240 | 1330 |              |  |
|   | 5000            | 1190   | 1300 | 1390 |              |  |
| Luminous Efficacy   | 2700            | -      | 143  | -    | lm/W         |  |
|   | 3000            | -      | 148  | -    |              |  |
|   | 3500            | -      | 156  | -    |              |  |
|   | 4000            | -      | 148  | -    |              |  |
|   | 5000            | -      | 155  | -    |              |  |
| CCT   | 2700            | -      | 2700 | -    | K            |  |
|   | 3000            | -      | 3020 | -    |              |  |
|   | 3500            | -      | 3440 | -    |              |  |
|   | 4000            | -      | 3990 | -    |              |  |
|   | 5000            | -      | 5080 | -    |              |  |
| Color Consistency (initial)<br>2700 K, 3000 K, 3500 K, 4000 K, 5000 K |                 | -      | 3    | -    | MacAdam step |  |
| Color Rendering Index (Ra)  |                 | 80     | -    | -    | -            |  |
| Operating Current ( $I_f$ )   |                 | -      | 250  | 350  | mA           |  |
| Operating Voltage ( $V_f$ )   |                 | 30.0   | 33.5 | 37.0 | Vdc          |  |
| Power Consumption   |                 | -      | 8.4  | 12.8 | W            |  |

## SLE-013 CRI90

| Item  | Nom. CCT<br>(K) | Rating |      |      | Unit         | Remark  |
|---|-----------------|--------|------|------|--------------|---|
|   |                 | Min.   | Typ. | Max. |              |   |
| Luminous Flux ( $\Phi_v$ )                                    | 2700            | 860    | 950  | 1050 | lm           | $I_f = 250 \text{ mA}$<br>$t_p = 75 \text{ }^\circ\text{C}$ |
|   | 3000            | 870    | 980  | 1070 |              |   |
|   | 3500            | 890    | 1000 | 1090 |              |   |
|   | 4000            | 950    | 1050 | 1140 |              |   |
| Luminous Efficacy   | 2700            | -      | 113  | -    | lm/W         |   |
|   | 3000            | -      | 117  | -    |              |   |
|   | 3500            | -      | 119  | -    |              |   |
|   | 4000            | -      | 125  | -    |              |   |
| CCT   | 2700            | -      | 2680 | -    | K            |   |
|   | 3000            | -      | 3000 | -    |              |   |
|   | 3500            | -      | 3420 | -    |              |   |
|   | 4000            | -      | 3960 | -    |              |   |
| Color Consistency (initial)<br>2700 K, 3000 K, 3500 K, 4000 K |                 | -      | 3    | -    | MacAdam step |   |
| Color Rendering Index (Ra)                                    |                 | 90     | -    | -    | -            |   |
| Operating Current ( $I_f$ )                                   |                 | -      | 250  | 350  | mA           |   |
| Operating Voltage ( $V_f$ )                                   |                 | 30.0   | 33.5 | 37.0 | Vdc          |   |
| Power Consumption   |                 | -      | 8.4  | 12.8 | W            |   |

## SLE-026 CRI80

| Item  | Nom. CCT<br>(K) | Rating |      |      | Unit         | Remark |
|---|-----------------|--------|------|------|--------------|--------|
|   |                 | Min.   | Typ. | Max. |              |        |
| Luminous Flux ( $\Phi_v$ )  | 2700            | 2340   | 2530 | 2720 | lm           |        |
|   | 3000            | 2340   | 2540 | 2730 |              |        |
|   | 3500            | 2420   | 2600 | 2760 |              |        |
|   | 4000            | 2480   | 2700 | 2880 |              |        |
|   | 5000            | 2510   | 2720 | 2920 |              |        |
| Luminous Efficacy   | 2700            | -      | 151  | -    | lm/W         |        |
|   | 3000            | -      | 152  | -    |              |        |
|   | 3500            | -      | 155  | -    |              |        |
|   | 4000            | -      | 161  | -    |              |        |
|   | 5000            | -      | 162  | -    |              |        |
| CCT   | 2700            | -      | 2700 | -    | K            |        |
|   | 3000            | -      | 3020 | -    |              |        |
|   | 3500            | -      | 3460 | -    |              |        |
|   | 4000            | -      | 4000 | -    |              |        |
|   | 5000            | -      | 5070 | -    |              |        |
| Color Consistency (initial)<br>2700 K, 3000 K, 3500 K, 4000 K, 5000 K |                 | -      | 3    | -    | MacAdam step |        |
| Color Rendering Index (Ra)  |                 | 80     | -    | -    | -            |        |
| Operating Current ( $I_f$ )   |                 | -      | 500  | 700  | mA           |        |
| Operating Voltage ( $V_f$ )   |                 | 30.0   | 33.5 | 37.0 | Vdc          |        |
| Power Consumption   |                 | -      | 16.8 | 25.6 | W            |        |

$I_f = 500 \text{ mA}$   
 $t_p = 75 \text{ }^\circ\text{C}$

## SLE-026 CRI90

| Item  | Nom. CCT<br>(K) | Rating |      |      | Unit         | Remark  |
|---|-----------------|--------|------|------|--------------|---|
|   |                 | Min.   | Typ. | Max. |              |   |
| Luminous Flux ( $\Phi_v$ )                                    | 2700            | 1880   | 2050 | 2250 | lm           | $I_f = 500 \text{ mA}$<br>$t_p = 75 \text{ }^\circ\text{C}$ |
|   | 3000            | 1910   | 2080 | 2300 |              |   |
|   | 3500            | 1950   | 2140 | 2360 |              |   |
|   | 4000            | 2040   | 2250 | 2440 |              |   |
| Luminous Efficacy   | 2700            | -      | 122  | -    | lm/W         |   |
|   | 3000            | -      | 124  | -    |              |   |
|   | 3500            | -      | 128  | -    |              |   |
|   | 4000            | -      | 134  | -    |              |   |
| CCT   | 2700            | -      | 2680 | -    | K            |   |
|   | 3000            | -      | 3000 | -    |              |   |
|   | 3500            | -      | 3410 | -    |              |   |
|   | 4000            | -      | 3950 | -    |              |   |
| Color Consistency (initial)<br>2700 K, 3000 K, 3500 K, 4000 K |                 | -      | 3    | -    | MacAdam step |   |
| Color Rendering Index (Ra)                                    |                 | 90     | -    | -    | -            |   |
| Operating Current ( $I_f$ )                                   |                 | -      | 500  | 700  | mA           |   |
| Operating Voltage ( $V_f$ )                                   |                 | 30.0   | 33.5 | 37.0 | Vdc          |   |
| Power Consumption   |                 | -      | 16.8 | 25.6 | W            |   |



## SLE-033 CRI80

| Item  | Nom. CCT<br>(K) | Rating |      |      | Unit         | Remark |
|---|-----------------|--------|------|------|--------------|--------|
|   |                 | Min.   | Typ. | Max. |              |        |
| Luminous Flux ( $\Phi_v$ )  | 2700            | 3120   | 3350 | 3580 | lm           |        |
|   | 3000            | 3300   | 3540 | 3770 |              |        |
|   | 3500            | 3370   | 3610 | 3870 |              |        |
|   | 4000            | 3250   | 3510 | 3750 |              |        |
|   | 5000            | 3280   | 3550 | 3790 |              |        |
| Luminous Efficacy   | 2700            | -      | 142  | -    | lm/W         |        |
|   | 3000            | -      | 150  | -    |              |        |
|   | 3500            | -      | 153  | -    |              |        |
|   | 4000            | -      | 148  | -    |              |        |
|   | 5000            | -      | 150  | -    |              |        |
| CCT   | 2700            | -      | 2700 | -    | K            |        |
|   | 3000            | -      | 3040 | -    |              |        |
|   | 3500            | -      | 3460 | -    |              |        |
|   | 4000            | -      | 4000 | -    |              |        |
|   | 5000            | -      | 5070 | -    |              |        |
| Color Consistency (initial)<br>2700 K, 3000 K, 3500 K, 4000 K, 5000 K |                 | -      | 3    | -    | MacAdam step |        |
| Color Rendering Index (Ra)  |                 | 80     | -    | -    | -            |        |
| Operating Current ( $I_f$ )   |                 | -      | 700  | 900  | mA           |        |
| Operating Voltage ( $V_f$ )   |                 | 30.6   | 33.8 | 37.4 | Vdc          |        |
| Power Consumption   |                 | -      | 23.7 | 33.7 | W            |        |

$I_f = 700 \text{ mA}$   
 $t_p = 75 \text{ }^\circ\text{C}$

## SLE-033 CRI90

| Item  | Nom. CCT<br>(K) | Rating |      |      | Unit         | Remark  |
|---|-----------------|--------|------|------|--------------|---|
|   |                 | Min.   | Typ. | Max. |              |   |
| Luminous Flux ( $\Phi_v$ )                                    | 2700            | 2380   | 2610 | 2830 | lm           | $I_f = 700 \text{ mA}$<br>$t_p = 75 \text{ }^\circ\text{C}$ |
|   | 3000            | 2430   | 2660 | 2890 |              |   |
|   | 3500            | 2510   | 2740 | 2970 |              |   |
|   | 4000            | 2580   | 2820 | 3050 |              |   |
| Luminous Efficacy   | 2700            | -      | 110  | -    | lm/W         |   |
|   | 3000            | -      | 112  | -    |              |   |
|   | 3500            | -      | 116  | -    |              |   |
|   | 4000            | -      | 119  | -    |              |   |
| CCT   | 2700            | -      | 2680 | -    | K            |   |
|   | 3000            | -      | 3000 | -    |              |   |
|   | 3500            | -      | 3410 | -    |              |   |
|   | 4000            | -      | 3930 | -    |              |   |
| Color Consistency (initial)<br>2700 K, 3000 K, 3500 K, 4000 K |                 | -      | 3    | -    | MacAdam step |   |
| Color Rendering Index (Ra)                                    |                 | 90     | -    | -    | -            |   |
| Operating Current ( $I_f$ )                                   |                 | -      | 700  | 900  | mA           |   |
| Operating Voltage ( $V_f$ )                                   |                 | 30.6   | 33.8 | 37.4 | Vdc          |   |
| Power Consumption   |                 | -      | 23.7 | 33.7 | W            |   |

## SLE-040 CRI80

| Item  | Nom. CCT<br>(K) | Rating |      |      | Unit         | Remark |
|---|-----------------|--------|------|------|--------------|--------|
|   |                 | Min.   | Typ. | Max. |              |        |
| Luminous Flux ( $\Phi_v$ )  | 2700            | 3970   | 4280 | 4590 | lm           |        |
|   | 3000            | 4090   | 4540 | 4870 |              |        |
|   | 3500            | 3980   | 4330 | 4740 |              |        |
|   | 4000            | 4110   | 4510 | 4960 |              |        |
|   | 5000            | 4150   | 4560 | 5010 |              |        |
| Luminous Efficacy   | 2700            | -      | 139  | -    | lm/W         |        |
|   | 3000            | -      | 148  | -    |              |        |
|   | 3500            | -      | 141  | -    |              |        |
|   | 4000            | -      | 147  | -    |              |        |
|   | 5000            | -      | 149  | -    |              |        |
| CCT   | 2700            | -      | 2700 | -    | K            |        |
|   | 3000            | -      | 3040 | -    |              |        |
|   | 3500            | -      | 3450 | -    |              |        |
|   | 4000            | -      | 3990 | -    |              |        |
|   | 5000            | -      | 5070 | -    |              |        |
| Color Consistency (initial)<br>2700 K, 3000 K, 3500 K, 4000 K, 5000 K |                 | -      | 3    | -    | MacAdam step |        |
| Color Rendering Index (Ra)  |                 | 80     | -    | -    | -            |        |
| Operating Current ( $I_f$ )   |                 | -      | 900  | 1000 | mA           |        |
| Operating Voltage ( $V_f$ )   |                 | 30.8   | 34.1 | 37.4 | Vdc          |        |
| Power Consumption   |                 | -      | 30.7 | 36.5 | W            |        |

$I_f = 900 \text{ mA}$   
 $t_p = 75 \text{ }^\circ\text{C}$

## SLE-040 CRI90

| Item  | Nom. CCT<br>(K) | Rating |      |      | Unit         | Remark  |
|---|-----------------|--------|------|------|--------------|---|
|   |                 | Min.   | Typ. | Max. |              |   |
| Luminous Flux ( $\Phi_v$ )                                    | 2700            | 2990   | 3280 | 3540 | lm           |   |
|   | 3000            | 3040   | 3330 | 3600 |              |   |
|   | 3500            | 3130   | 3410 | 3710 |              |   |
|   | 4000            | 3220   | 3530 | 3810 |              |   |
| Luminous Efficacy   | 2700            | -      | 107  | -    | lm/W         |   |
|   | 3000            | -      | 109  | -    |              |   |
|   | 3500            | -      | 111  | -    |              |   |
|   | 4000            | -      | 115  | -    |              |   |
| CCT   | 2700            | -      | 2680 | -    | K            | $I_f = 900 \text{ mA}$<br>$t_p = 75 \text{ }^\circ\text{C}$ |
|   | 3000            | -      | 3000 | -    |              |   |
|   | 3500            | -      | 3420 | -    |              |   |
|   | 4000            | -      | 3940 | -    |              |   |
| Color Consistency (initial)<br>2700 K, 3000 K, 3500 K, 4000 K |                 | -      | 3    | -    | MacAdam step |   |
| Color Rendering Index (Ra)                                    |                 | 90     | -    | -    | -            |   |
| Operating Current ( $I_f$ )                                   |                 | -      | 900  | 1000 | mA           |   |
| Operating Voltage ( $V_f$ )                                   |                 | 30.8   | 34.1 | 37.4 | Vdc          |   |
| Power Consumption   |                 | -      | 30.7 | 36.5 | W            |   |

**Notes:**

- 1)  $t_p$ : temperature at which performance is specified ; measured at “Tc point”.
- 2) Samsung maintains a measurement tolerance of: Luminous flux:  $\pm 7 \%$ , CRI:  $\pm 1.0$ , Voltage:  $\pm 5 \%$ .

## SLE-013, SLE-026, SLE-033, SLE-040

| Item        | Nominal*     | Life**                               | Max.***       | Unit             |
|-------------|--------------|--------------------------------------|---------------|------------------|
| Temperature | 75 ( $t_p$ ) | 95 ( $t_{p,60}$ )<br>L70B50, 60,000h | 100 ( $t_c$ ) | $^\circ\text{C}$ |

**Notes:**

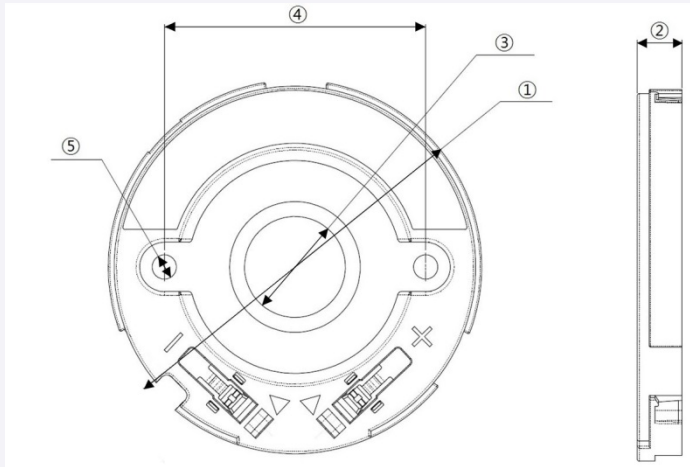
- \* Temperature used to specify performance of the module ( $t_p$ ).
- \*\* Rated maximum performance temperature at which lifetime is specified ( $t_{p,60}$ ).
- \*\*\* Rated maximum temperature, highest permissible temperature to avoid safety risk ( $t_c$ ).

All temperatures are measured at the designated “Tc point” as indicated on the module.

Please use heat-sink(or heat dissipation solution) with proper thermal capacity(operating wattage).

### 3. Structure and Assembly

#### a) Appearance

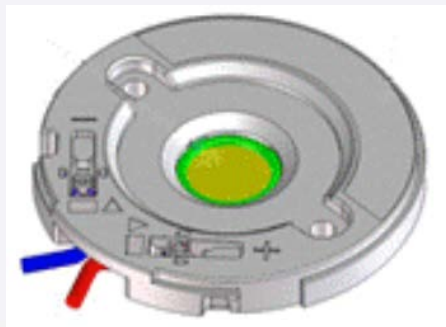
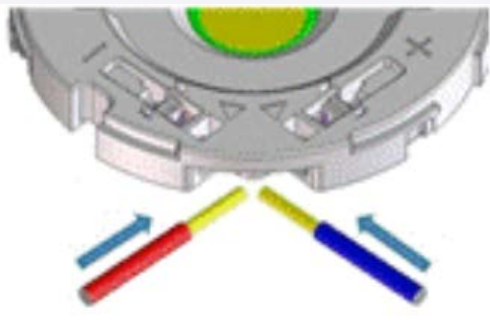


#### b) Dimension

| Number | Item                                  | Dimension | Tolerance       | Unit            |    |
|--------|---------------------------------------|-----------|-----------------|-----------------|----|
| ①      | Module Diameter                       | 50        | $\pm 0.25$      | mm              |    |
| ②      | Module Height                         | 6.1       | $\pm 0.25$      | mm              |    |
| ③      | Light Emitting Surface (LES) Diameter | SLE-013   | 13.5            | $+0.15 / -0.20$ | mm |
|        |                                       | SLE-026   | 19              | $+0.15 / -0.20$ | mm |
|        |                                       | SLE-033   | 19              | $+0.15 / -0.20$ | mm |
|        |                                       | SLE-040   | 19              | $+0.15 / -0.20$ | mm |
| ④      | Distance Between Screw Holes          | 35        | $\pm 0.15$      | mm              |    |
| ⑤      | Screw Hole Size (M3 screw)            | 3.3       | $+0.10 / -0.20$ | mm              |    |
|        | Module Weight                         | 10        | $\pm 1.5$       | g               |    |

#### c) Assembly

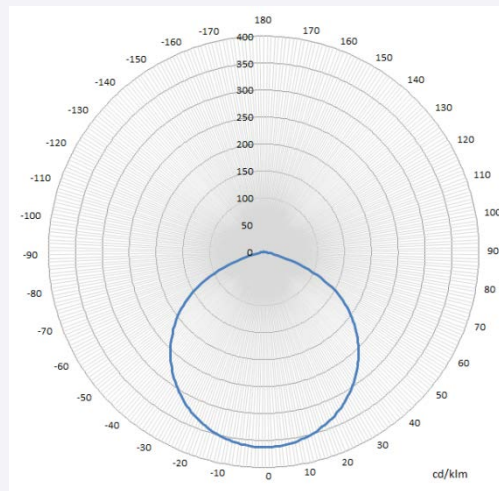
Connectors on the board are provided for easy wiring with the LED driver and between modules.



#### d) Structure

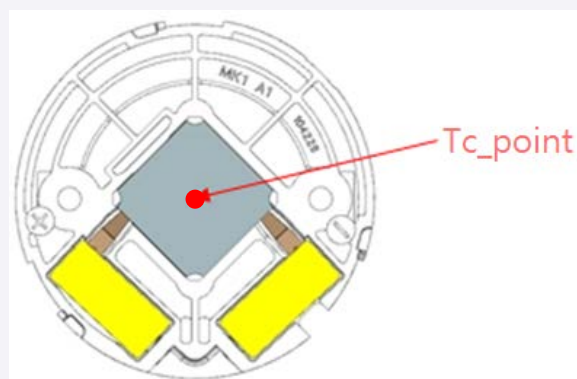
| Item      | Specification   |
|-----------|---|
| LED       | COB PKG 1 pc (LC013B / LC026B / LC033B / LC040B)      |
| Socket    | Material: PBT   |
| Connector | Reworkable poke-in connector type                     |
| Wire      | 22~18 AWG ; terminal strip length of $8.0 \pm 0.5$ mm |

#### e) Light Distribution



#### f) Thermal Management

Performance temperatures are measured on “Tc point” as indicated on the module.

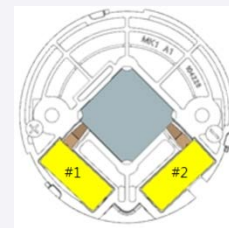


#### 4. Certification and Declaration

| Item                 | Compliant to                  | Remark                             |
|----------------------|-------------------------------|------------------------------------|
| Test & Certification | CE                            | -                                  |
|                      | ENEC                          | -                                  |
|                      | VDE                           | -                                  |
|                      | UL / cUL Recognized Component | COB and Holder received separately |
|                      | Photobiological Safety        | Risk Group 1 (IEC / EN 62471)      |
| Declaration          | RoHS                          | Hazardous Substance & Material     |
|                      | REACH                         | Hazardous Substance & Material     |

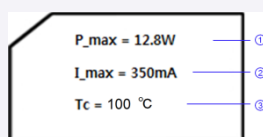
## 5. Label Structure

### a) Module Label #1



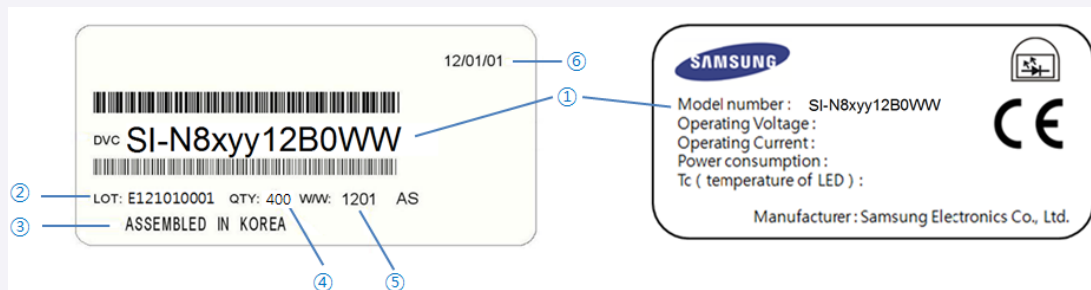
| Number | Item                        | SLE-013, SLE-026, SLE-33, SLE-040 |
|--------|-----------------------------|-----------------------------------|
| ①      | Model Number (Product Code) | Refer to page 3                   |
| ②      | Lot No.                     | -                                 |
| ③      | CCT, LED Maker, Group No.   | -                                 |

### b) Module Label #2



| Number | Item  | SLE-013 | SLE-026 | SLE-033 | SLE-040 |
|--------|-------|---------|---------|---------|---------|
| ①      | P max | 12.8 W  | 25.6 W  | 33.7 W  | 36.5 W  |
| ②      | I max | 350 mA  | 700m A  | 900m A  | 1000 mA |
| ③      | $t_c$ | 100 °C  | 100 °C  | 100 °C  | 100 °C  |

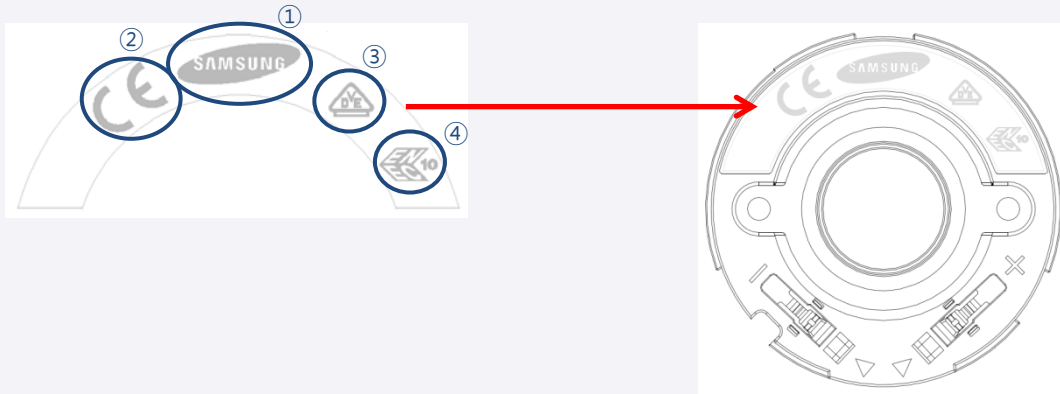
### c) Box Labels



| Number | Item                           | SLE-013, SLE-026, SLE-033, SLE-040 |
|--------|--------------------------------|------------------------------------|
| ①      | Model Number (Product Code)    | Refer to page 3                    |
| ②      | Lot No.                        | -                                  |
| ③      | Country of Origin              | ASSEMBLED IN KOREA                 |
| ④      | Packing Quantity               | 400                                |
| ⑤      | Product Date (year & week)     | yyww                               |
| ⑥      | Product Date (year/month/date) | yy/mm/dd                           |



#### d) Certification Labels & Logo

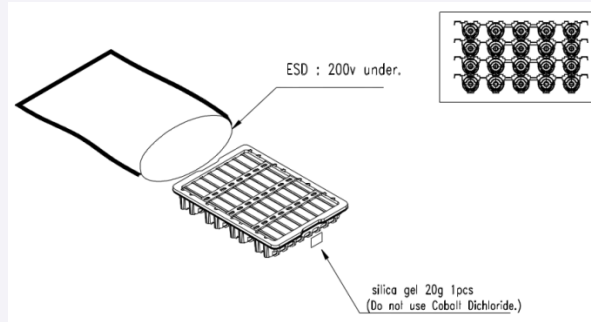


| Number | Item                   | Remark |
|--------|------------------------|--------|
| ①      | Samsung logo           | -      |
| ②      | CE Certificate mark    | -      |
| ③      | VDE Certificate mark   | -      |
| ④      | ENEC Certificate marks | -      |

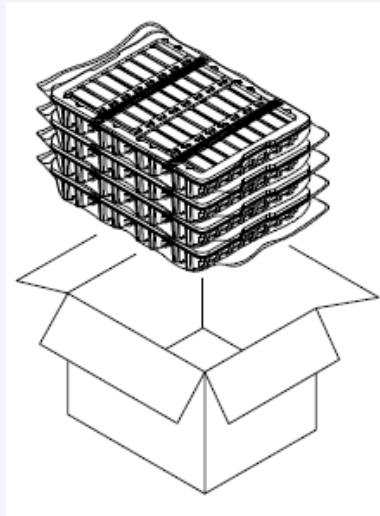
## 6. Packing Structure

### Packing Process

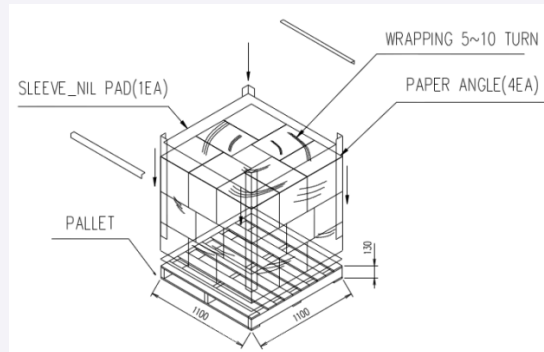
Step 1



Step 2



Step 3



| Packing   | Quantity (modules) | Dimension (mm) |       |        |           |
|-----------|--------------------|----------------|-------|--------|-----------|
|           |                    | Length         | Width | Height | Tolerance |
| Tray      | 100                | 420            | 300   | 59     | ±2        |
| Outer Box | 400 (4 trays)      | 430            | 310   | 240    | ±5        |
| Pallet    | 9600 (24 boxes)    | 1100           | 1100  | 130    | -         |

## 7. Precautions in Handling & Use

- 1) This LED Module should not be used in any type of fluid such as water, oil, organic solvent, etc. When washing is required, IPA is recommended to use. When using other solvents it should be confirmed beforehand whether the solvents may react with the Module material. The banned freon solvents should not be used. Do not clean using ultrasonic cleaner.
- 2) The LEDs are sensitive to the static electricity and surge. It is recommended to use a wrist band or anti-electrostatic glove when handling the LED Modules. 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 leak current, lowered turn-on voltage, or abnormal lighting of LEDs at low current.
- 3) 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 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 (fixtures). In order to prevent these problems, we recommend users to know the physical properties of the materials used in luminaires, and they must be selected carefully.
- 4) Risk of sulfurization (or tarnishing)  
The LED uses a silver-plated lead frame 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 lead frame may cause intensity degradation, change of chromaticity coordinates and, in extreme cases, open circuit. It requires caution. Due to possible sulfurization of lead frame, the LED Modules should not be used and stored together with oxidizing substances made of materials such as rubber, plain paper, lead solder cream, etc.
- 5) The resin area is very sensitive, please do not handle, press, touch or rub it.
- 6) Do not drop the Module or give shocks.
- 7) Do not store the Module in a dusty place or humid location.
- 8) Do not disassemble the Module.
- 9) Do not directly look into the lighted LED with naked eyes for a long period of time.
- 10) Please consider the creepage and clearance distance at the end product.

# Legal and additional information.

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