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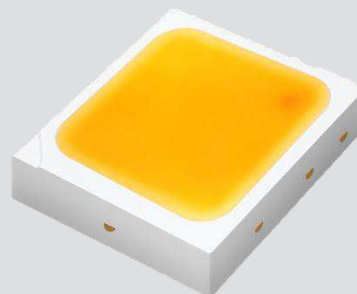
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## Middle Power LED Series 3030

# LM302A



LM302A leads lighting design trend with high performance and efficacy

### Features & Benefits

- 1 W class middle-high power LED
- EMC resin for high reliability
- Standard form factor for design flexibility
- High performance and efficacy



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## 1. Characteristics

### a) Absolute Maximum Rating

| Item                         | Symbol    | Rating     | Unit    | Condition                    |
|------------------------------|-----------|------------|---------|------------------------------|
| Operating Temperature        | $T_a$     | -40 ~ +85  | °C      | -                            |
| Storage Temperature          | $T_{stg}$ | -40 ~ +100 | °C      | -                            |
| LED Junction Temperature     | $T_j$     | 125        | °C      | -                            |
| Forward Current              | $I_F$     | 200        | mA      | -                            |
| Peak Pulsed Forward Current  | $I_{FP}$  | 400        | mA      | Duty 1/10, pulse width 10 ms |
| Assembly Process Temperature | -         | 260<br><10 | °C<br>s | -                            |
| ESD (HBM)                    | -         | 5          | kV      | -                            |

b) Electro-optical Characteristics ( $I_F = 150 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )

| Item  | Nominal CCT (K) | Rank | Bin | Min. | Typ. | Max. | Unit               |
|---|-----------------|------|-----|------|------|------|--------------------|
| Forward Voltage ( $V_f$ )                     |                 | GB   | BZ  | 5.8  | -    | 6.0  | V                  |
|   |                 |      | B1  | 6.0  | -    | 6.2  |                    |
|   |                 |      | B2  | 6.2  | -    | 6.4  |                    |
|   |                 |      | B3  | 6.4  | -    | 6.6  |                    |
|   |                 |      | B4  | 6.6  | -    | 6.8  |                    |
| Luminous Flux ( $\Phi_v$ )                    | 2700            | S0   | S2  | 102  | -    | 110  | lm                 |
|   |                 |      | S3  | 110  | -    | 118  |                    |
|   |                 |      | S4  | 118  | -    | 126  |                    |
|   | 3000            | S0   | S2  | 104  | -    | 112  |                    |
|   |                 |      | S3  | 112  | -    | 120  |                    |
|   |                 |      | S4  | 120  | -    | 128  |                    |
|   | 3500            | S0   | S2  | 107  | -    | 115  |                    |
|   |                 |      | S3  | 115  | -    | 123  |                    |
|   |                 |      | S4  | 123  | -    | 131  |                    |
|   | 4000            | S0   | S2  | 109  | -    | 117  |                    |
|   |                 |      | S3  | 117  | -    | 125  |                    |
|   |                 |      | S4  | 125  | -    | 133  |                    |
| 5000  | S0              | S2   | 113 | -    | 121  |      |                    |
|   |                 | S3   | 121 | -    | 129  |      |                    |
|   |                 | S4   | 129 | -    | 137  |      |                    |
| 5700  | S0              | S2   | 111 | -    | 119  |      |                    |
|   |                 | S3   | 119 | -    | 127  |      |                    |
|   |                 | S4   | 127 | -    | 135  |      |                    |
| 6500  | S0              | S2   | 109 | -    | 117  |      |                    |
|   |                 | S3   | 117 | -    | 125  |      |                    |
|   |                 | S4   | 125 | -    | 133  |      |                    |
| Reverse Voltage (@ 5 mA)                      |                 |      |     | 0.7  | -    | 1.2  | V                  |
| Color Rendering Index ( $R_a$ )               |                 | 5    |     | 80   | -    | -    | -                  |
| Special CRI (R9)                              |                 |      |     | 0    | -    | -    | -                  |
| Thermal Resistance (junction to solder point) |                 |      |     | -    | 12   | -    | $^\circ\text{C/W}$ |
| Beam Angle                                    |                 |      |     | -    | 120  | -    | $^\circ$           |

**Note:**

Samsung maintains measurement tolerance of: forward voltage =  $\pm 0.1 \text{ V}$ , luminous flux =  $\pm 5 \%$ , CRI =  $\pm 3$ , R9 =  $\pm 6.5$

## 2. Product Code Information

|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| S | P | M | W | H | T | 3 | 2 | 7 | F  | D  | 5  | G  | B  | W  | 0  | S  | 0  |

| Digit | PKG Information              | Code  | Specification   |
|-------|------------------------------|---|---|
| 1 2 3 | Samsung Package Middle Power | <b>SPM</b>  |   |
| 4 5   | Color                        | <b>WH</b>   | White   |
| 6     | Product Version              | <b>T</b>  |   |
| 7 8 9 | Form Factor                  | <b>327</b>  | 3.0 x 3.0 x 0.65 mm; 2 pads; LM302  |
| 10    | Sorting Current              | <b>F</b>  | 150 mA  |
| 11    | Chromaticity Coordinates     | <b>D</b>  | ANSI Standard   |
| 12    | CRI                          | <b>5</b>  | Min. 80   |
| 13 14 | Forward Voltage (V)          | <b>GB</b>   | 5.8~6.8<br>Bin Code:<br><b>BZ</b> 5.8~6.0<br><b>B1</b> 6.0~6.2<br><b>B2</b> 6.2~6.4<br><b>B3</b> 6.4~6.6<br><b>B4</b> 6.6~6.8   |
| 15 16 | CCT (K)                      | <b>W★</b><br><b>V★</b><br><b>U★</b><br><b>T★</b><br><b>R★</b><br><b>Q★</b><br><b>P★</b> | 2700<br>3000<br>3500<br>4000<br>5000<br>5700<br>6500<br>Bin Code:<br>W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG<br>V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG<br>U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG<br>T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG<br>R1, R2, R3, R4, R5, R6, R7, R8, R9, RA<br>Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, QA<br>P1, P2, P3, P4, P5, P6, P7, P8, P9, PA<br>★ : "0" (Whole bin) or "M" (Quarter bin) |
| 17 18 | Luminous Flux (lm)           | <b>S0</b>   | Bin Code:<br>S2, S3, S4   |



a) Luminous Flux Bins ( $I_f = 150 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )

| Nominal CCT (K) | CRI Min. | Product Code       | Flux Bin | Flux Range ( $\Phi_v$ , lm) |
|-----------------|----------|--------------------|----------|-----------------------------|
| 2700            | 80       | SPMWHT327FD5GBW☆S0 | S2       | 102 ~ 110                   |
|                 |          |                    | S3       | 110 ~ 118                   |
|                 |          |                    | S4       | 118 ~ 126                   |
|                 |          | SPMWHT327FD5GBW☆S2 | S2       | 102 ~ 110                   |
|                 |          |                    | S3       | 110 ~ 118                   |
|                 |          |                    | S4       | 118 ~ 126                   |
| 3000            | 80       | SPMWHT327FD5GBV☆S0 | S2       | 104 ~ 112                   |
|                 |          |                    | S3       | 112 ~ 120                   |
|                 |          |                    | S4       | 120 ~ 128                   |
|                 |          | SPMWHT327FD5GBV☆S2 | S2       | 104 ~ 112                   |
|                 |          |                    | S3       | 112 ~ 120                   |
|                 |          |                    | S4       | 120 ~ 128                   |
| 3500            | 80       | SPMWHT327FD5GBU☆S0 | S2       | 107 ~ 115                   |
|                 |          |                    | S3       | 115 ~ 123                   |
|                 |          |                    | S4       | 123 ~ 131                   |
|                 |          | SPMWHT327FD5GBU☆S2 | S2       | 107 ~ 115                   |
|                 |          |                    | S3       | 115 ~ 123                   |
|                 |          |                    | S4       | 123 ~ 131                   |
| 4000            | 80       | SPMWHT327FD5GBT☆S0 | S2       | 109 ~ 117                   |
|                 |          |                    | S3       | 117 ~ 125                   |
|                 |          |                    | S4       | 125 ~ 133                   |
|                 |          | SPMWHT327FD5GBT☆S2 | S2       | 109 ~ 117                   |
|                 |          |                    | S3       | 117 ~ 125                   |
|                 |          |                    | S4       | 125 ~ 133                   |

**Note:**

"☆" can be "0" (Whole bin) or "M" (Quarter bin) of the color binning

a) Luminous Flux Bins ( $I_f = 150 \text{ mA}$ ,  $T_s = 25 \text{ °C}$ )

| Nominal CCT (K) | CRI Min. | Product Code       | Flux Bin | Flux Range ( $\Phi_v$ , lm) |
|-----------------|----------|--------------------|----------|-----------------------------|
| 5000            | 80       | SPMWHT327FD5GBR☆S0 | S2       | 113 ~ 121                   |
|                 |          |                    | S3       | 121 ~ 129                   |
|                 |          |                    | S4       | 129 ~ 137                   |
|                 |          | SPMWHT327FD5GBR☆S2 | S2       | 113 ~ 121                   |
|                 |          |                    | S3       | 121 ~ 129                   |
|                 |          |                    | S4       | 129 ~ 137                   |
| 5700            | 80       | SPMWHT327FD5GBQ☆S0 | S2       | 111 ~ 119                   |
|                 |          |                    | S3       | 119 ~ 127                   |
|                 |          |                    | S4       | 127 ~ 135                   |
|                 |          | SPMWHT327FD5GBQ☆S2 | S2       | 111 ~ 119                   |
|                 |          |                    | S3       | 119 ~ 127                   |
|                 |          |                    | S4       | 127 ~ 135                   |
| 6500            | 80       | SPMWHT327FD5GBP☆S0 | S2       | 109 ~ 117                   |
|                 |          |                    | S3       | 117 ~ 125                   |
|                 |          |                    | S4       | 125 ~ 133                   |
|                 |          | SPMWHT327FD5GBP☆S2 | S2       | 109 ~ 117                   |
|                 |          |                    | S3       | 117 ~ 125                   |
|                 |          |                    | S4       | 125 ~ 133                   |

**Note:**

"☆" can be "0" (Whole bin) or "M" (Quarter bin) of the color binning



b) Color Bins (I<sub>F</sub> = 150 mA, T<sub>s</sub> = 25 °C)

| Nominal CCT (K) | CRI Min. | Product Code       | Color Rank          | Chromaticity Bins   |
|-----------------|----------|--------------------|---------------------|---|
| 2700            | 80       | SPMWHT327FD5GBW0S★ | W0<br>(Whole bin)   | W1, W2, W3, W4, W5, W6, W7, W8,<br>W9, WA, WB, WC, WD, WE, WF, WG |
|                 |          | SPMWHT327FD5GBWMS★ | WM<br>(Quarter bin) | W6, W7, WA, WB  |
| 3000            | 80       | SPMWHT327FD5GBV0S★ | V0<br>(Whole bin)   | V1, V2, V3, V4, V5, V6, V7, V8,<br>V9, VA, VB, VC, VD, VE, VF, VG |
|                 |          | SPMWHT327FD5GBVMS★ | VM<br>(Quarter bin) | V6, V7, VA, VB  |
| 3500            | 80       | SPMWHT327FD5GBU0S★ | U0<br>(Whole bin)   | U1, U2, U3, U4, U5, U6, U7, U8,<br>U9, UA, UB, UC, UD, UE, UF, UG |
|                 |          | SPMWHT327FD5GBUMS★ | UM<br>(Quarter bin) | U6, U7, UA, UB  |
| 4000            | 80       | SPMWHT327FD5GBT0S★ | T0<br>(Whole bin)   | T1, T2, T3, T4, T5, T6, T7, T8,<br>T9, TA, TB, TC, TD, TE, TF, TG |
|                 |          | SPMWHT327FD5GBTMS★ | TM<br>(Quarter bin) | T6, T7, TA, TB  |
| 5000            | 80       | SPMWHT327FD5GBR0S★ | R0<br>(Whole bin)   | R1, R2, R3, R4, R5<br>R6, R7, R8, R9, RA                          |
|                 |          | SPMWHT327FD5GBRMS★ | RM<br>(Quarter bin) | R1, R2, R3, R4, R5, R6  |
| 5700            | 80       | SPMWHT327FD5GBQ0S★ | Q0<br>(Whole bin)   | Q1, Q2, Q3, Q4, Q5<br>Q6, Q7, Q8, Q9, QA                          |
|                 |          | SPMWHT327FD5GBQMS★ | QM<br>(Quarter bin) | Q1, Q2, Q3, Q4, Q5, Q6  |
| 6500            | 80       | SPMWHT327FD5GBP0S★ | P0<br>(Whole bin)   | P1, P2, P3, P4, P5<br>P6, P7, P8, P9, PA                          |
|                 |          | SPMWHT327FD5GBPMS★ | PM<br>(Quarter bin) | P1, P2, P3, P4, P5, P6  |

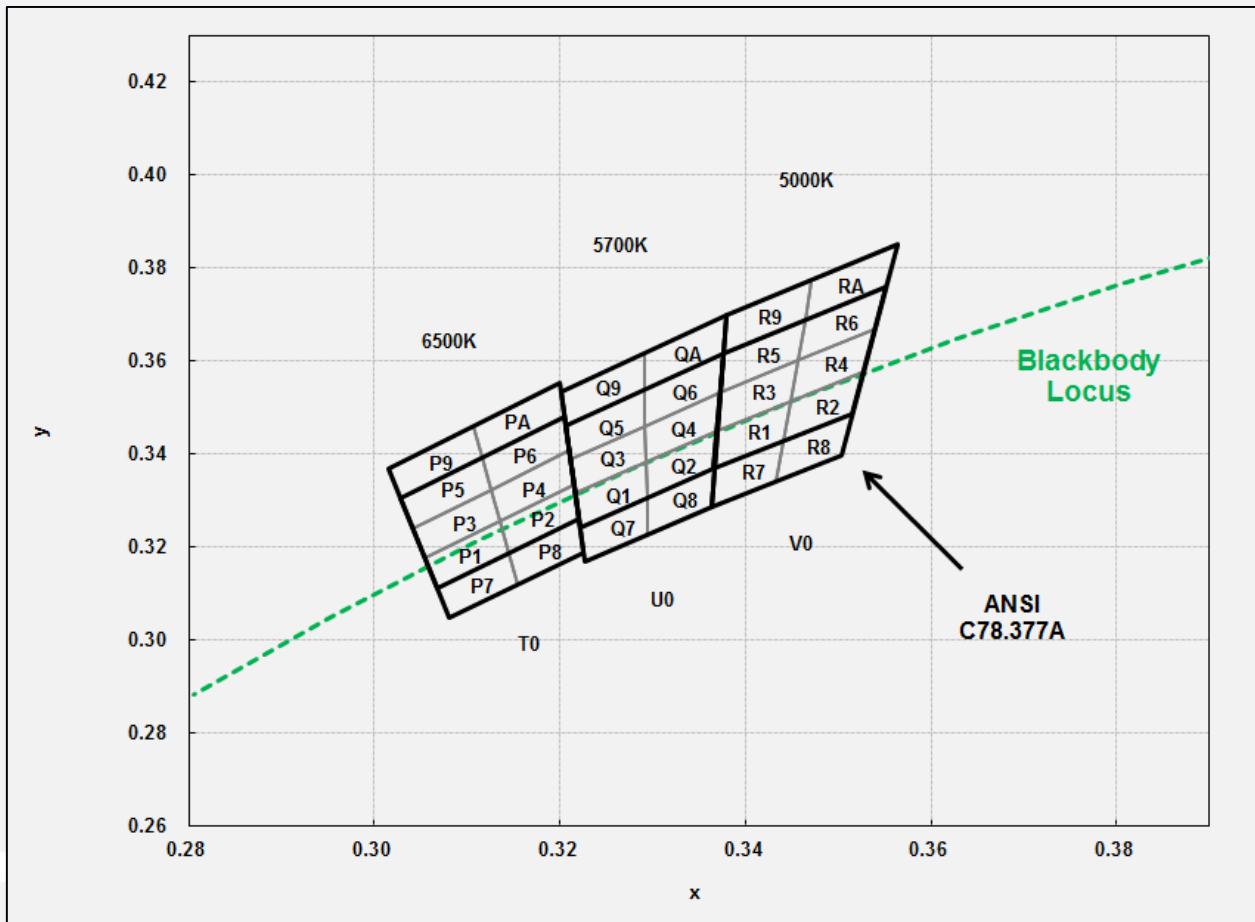
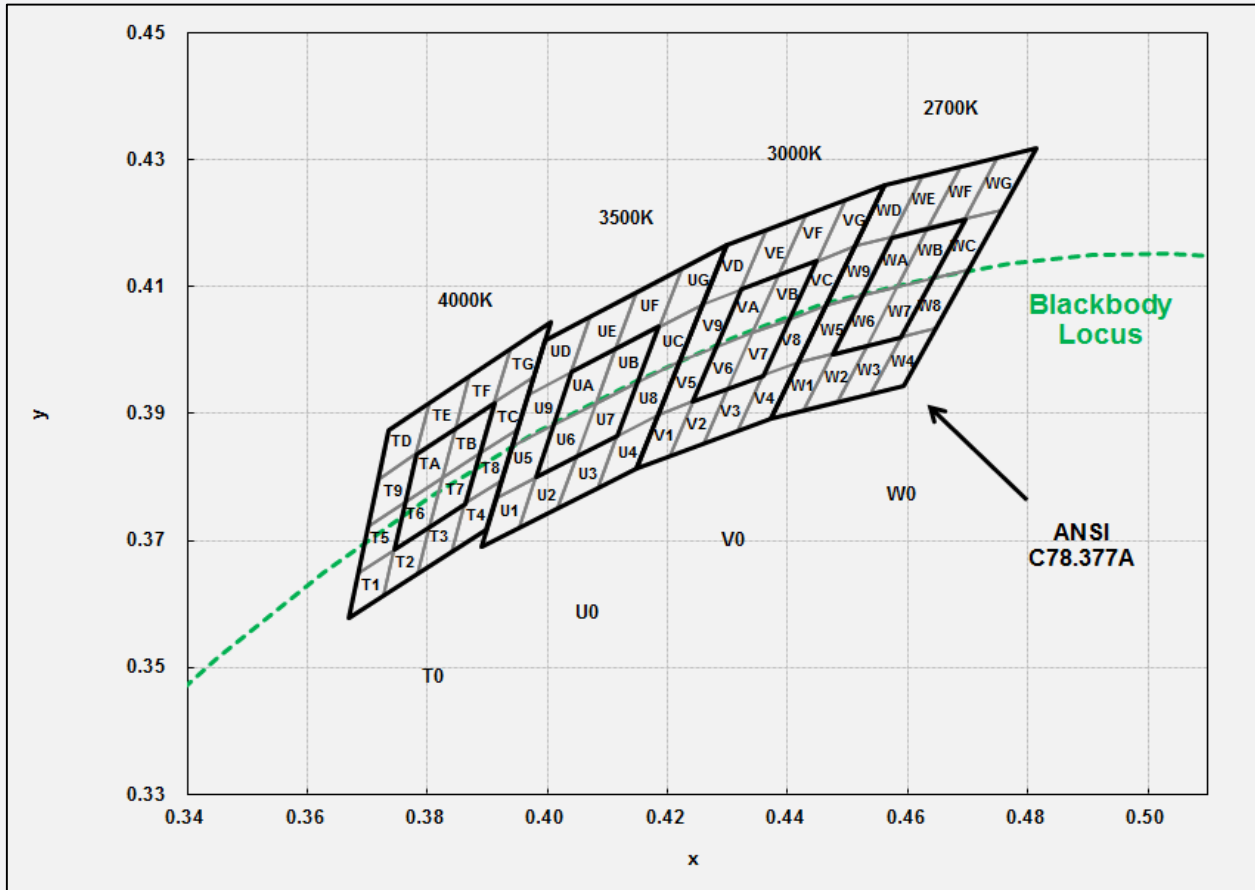
**Note:**

"★" can be "0", "2", "3" or "4" of the luminous flux binning

c) Voltage Bins ( $I_f = 150 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )

| Nominal CCT (K) | CRI Min. | Product Code | Voltage Rank | Voltage Bin | Voltage Range (V) |
|-----------------|----------|--------------|--------------|-------------|-------------------|
| -               | -        | -            | GB           | BZ          | 5.8 ~ 6.0         |
|                 |          |              |              | B1          | 6.0 ~ 6.2         |
|                 |          |              |              | B2          | 6.2 ~ 6.4         |
|                 |          |              |              | B3          | 6.4 ~ 6.6         |
|                 |          |              |              | B4          | 6.6 ~ 6.8         |

c) Chromaticity Region & Coordinates ( $I_f = 150 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )



**c) Chromaticity Region & Coordinates ( $I_F = 150 \text{ mA}$ ,  $T_s = 25 \text{ }^\circ\text{C}$ )**

| Region                 | CIE x  | CIE y  | Region | CIE x  | CIE y  |
|------------------------|--------|--------|--------|--------|--------|
| <b>W rank (2700 K)</b> |        |        |        |        |        |
| W1                     | 0.4373 | 0.3893 | W9     | 0.4465 | 0.4071 |
|                        | 0.4418 | 0.3981 |        | 0.4513 | 0.4164 |
|                        | 0.4475 | 0.3994 |        | 0.4573 | 0.4178 |
|                        | 0.4428 | 0.3906 |        | 0.4523 | 0.4085 |
| W2                     | 0.4428 | 0.3906 | WA     | 0.4523 | 0.4085 |
|                        | 0.4475 | 0.3994 |        | 0.4573 | 0.4178 |
|                        | 0.4532 | 0.4008 |        | 0.4634 | 0.4193 |
|                        | 0.4483 | 0.3919 |        | 0.4582 | 0.4099 |
| W3                     | 0.4483 | 0.3919 | WB     | 0.4582 | 0.4099 |
|                        | 0.4532 | 0.4008 |        | 0.4634 | 0.4193 |
|                        | 0.4589 | 0.4021 |        | 0.4695 | 0.4207 |
|                        | 0.4538 | 0.3931 |        | 0.4641 | 0.4112 |
| W4                     | 0.4538 | 0.3931 | WC     | 0.4641 | 0.4112 |
|                        | 0.4589 | 0.4021 |        | 0.4695 | 0.4207 |
|                        | 0.4646 | 0.4034 |        | 0.4756 | 0.4221 |
|                        | 0.4593 | 0.3944 |        | 0.4700 | 0.4126 |
| W5                     | 0.4418 | 0.3981 | WD     | 0.4513 | 0.4164 |
|                        | 0.4465 | 0.4071 |        | 0.4562 | 0.4260 |
|                        | 0.4523 | 0.4085 |        | 0.4624 | 0.4274 |
|                        | 0.4475 | 0.3994 |        | 0.4573 | 0.4178 |
| W6                     | 0.4475 | 0.3994 | WE     | 0.4573 | 0.4178 |
|                        | 0.4523 | 0.4085 |        | 0.4624 | 0.4274 |
|                        | 0.4582 | 0.4099 |        | 0.4687 | 0.4289 |
|                        | 0.4532 | 0.4008 |        | 0.4634 | 0.4193 |
| W7                     | 0.4532 | 0.4008 | WF     | 0.4634 | 0.4193 |
|                        | 0.4582 | 0.4099 |        | 0.4687 | 0.4289 |
|                        | 0.4641 | 0.4112 |        | 0.4750 | 0.4304 |
|                        | 0.4589 | 0.4021 |        | 0.4695 | 0.4207 |
| W8                     | 0.4589 | 0.4021 | WG     | 0.4695 | 0.4207 |
|                        | 0.4641 | 0.4112 |        | 0.4750 | 0.4304 |
|                        | 0.4700 | 0.4126 |        | 0.4813 | 0.4319 |
|                        | 0.4646 | 0.4034 |        | 0.4756 | 0.4221 |

| Region                 | CIE x  | CIE y  | Region | CIE x  | CIE y  |
|------------------------|--------|--------|--------|--------|--------|
| <b>V rank (3000 K)</b> |        |        |        |        |        |
| V1                     | 0.4147 | 0.3814 | V9     | 0.4221 | 0.3984 |
|                        | 0.4183 | 0.3898 |        | 0.4259 | 0.4073 |
|                        | 0.4242 | 0.3919 |        | 0.4322 | 0.4096 |
|                        | 0.4203 | 0.3833 |        | 0.4281 | 0.4006 |
| V2                     | 0.4203 | 0.3833 | VA     | 0.4281 | 0.4006 |
|                        | 0.4242 | 0.3919 |        | 0.4322 | 0.4096 |
|                        | 0.4300 | 0.3939 |        | 0.4385 | 0.4119 |
|                        | 0.4259 | 0.3853 |        | 0.4342 | 0.4028 |
| V3                     | 0.4259 | 0.3853 | VB     | 0.4342 | 0.4028 |
|                        | 0.4300 | 0.3939 |        | 0.4385 | 0.4119 |
|                        | 0.4359 | 0.3960 |        | 0.4449 | 0.4141 |
|                        | 0.4316 | 0.3873 |        | 0.4403 | 0.4049 |
| V4                     | 0.4316 | 0.3873 | VC     | 0.4403 | 0.4049 |
|                        | 0.4359 | 0.3960 |        | 0.4449 | 0.4141 |
|                        | 0.4418 | 0.3981 |        | 0.4513 | 0.4164 |
|                        | 0.4373 | 0.3893 |        | 0.4465 | 0.4071 |
| V5                     | 0.4183 | 0.3898 | VD     | 0.4259 | 0.4073 |
|                        | 0.4221 | 0.3984 |        | 0.4299 | 0.4165 |
|                        | 0.4281 | 0.4006 |        | 0.4364 | 0.4188 |
|                        | 0.4242 | 0.3919 |        | 0.4322 | 0.4096 |
| V6                     | 0.4242 | 0.3919 | VE     | 0.4322 | 0.4096 |
|                        | 0.4281 | 0.4006 |        | 0.4364 | 0.4188 |
|                        | 0.4342 | 0.4028 |        | 0.4430 | 0.4212 |
|                        | 0.4300 | 0.3939 |        | 0.4385 | 0.4119 |
| V7                     | 0.4300 | 0.3939 | VF     | 0.4385 | 0.4119 |
|                        | 0.4342 | 0.4028 |        | 0.4430 | 0.4212 |
|                        | 0.4403 | 0.4049 |        | 0.4496 | 0.4236 |
|                        | 0.4359 | 0.3960 |        | 0.4449 | 0.4141 |
| V8                     | 0.4359 | 0.3960 | VG     | 0.4449 | 0.4141 |
|                        | 0.4403 | 0.4049 |        | 0.4496 | 0.4236 |
|                        | 0.4465 | 0.4071 |        | 0.4562 | 0.4260 |
|                        | 0.4418 | 0.3981 |        | 0.4513 | 0.4164 |

## c) Chromaticity Region &amp; Coordinates

| Region                 | CIE x  | CIE y  | Region | CIE x  | CIE y  |
|------------------------|--------|--------|--------|--------|--------|
| <b>U rank (3500 K)</b> |        |        |        |        |        |
| U1                     | 0.3889 | 0.3690 | U9     | 0.3941 | 0.3848 |
|                        | 0.3915 | 0.3768 |        | 0.3968 | 0.3930 |
|                        | 0.3981 | 0.3800 |        | 0.4040 | 0.3966 |
|                        | 0.3953 | 0.3720 |        | 0.4010 | 0.3882 |
| U2                     | 0.3953 | 0.3720 | UA     | 0.4010 | 0.3882 |
|                        | 0.3981 | 0.3800 |        | 0.4040 | 0.3966 |
|                        | 0.4048 | 0.3832 |        | 0.4113 | 0.4001 |
|                        | 0.4017 | 0.3751 |        | 0.4080 | 0.3916 |
| U3                     | 0.4017 | 0.3751 | UB     | 0.4080 | 0.3916 |
|                        | 0.4048 | 0.3832 |        | 0.4113 | 0.4001 |
|                        | 0.4116 | 0.3865 |        | 0.4186 | 0.4037 |
|                        | 0.4082 | 0.3782 |        | 0.4150 | 0.3950 |
| U4                     | 0.4082 | 0.3782 | UC     | 0.4150 | 0.3950 |
|                        | 0.4116 | 0.3865 |        | 0.4186 | 0.4037 |
|                        | 0.4183 | 0.3898 |        | 0.4259 | 0.4073 |
|                        | 0.4147 | 0.3814 |        | 0.4221 | 0.3984 |
| U5                     | 0.3915 | 0.3768 | UD     | 0.3968 | 0.3930 |
|                        | 0.3941 | 0.3848 |        | 0.3996 | 0.4015 |
|                        | 0.4010 | 0.3882 |        | 0.4071 | 0.4052 |
|                        | 0.3981 | 0.3800 |        | 0.4040 | 0.3966 |
| U6                     | 0.3981 | 0.3800 | UE     | 0.4040 | 0.3966 |
|                        | 0.4010 | 0.3882 |        | 0.4071 | 0.4052 |
|                        | 0.4080 | 0.3916 |        | 0.4146 | 0.4089 |
|                        | 0.4048 | 0.3832 |        | 0.4113 | 0.4001 |
| U7                     | 0.4048 | 0.3832 | UF     | 0.4113 | 0.4001 |
|                        | 0.4080 | 0.3916 |        | 0.4146 | 0.4089 |
|                        | 0.4150 | 0.3950 |        | 0.4222 | 0.4127 |
|                        | 0.4116 | 0.3865 |        | 0.4186 | 0.4037 |
| U8                     | 0.4116 | 0.3865 | UG     | 0.4186 | 0.4037 |
|                        | 0.4150 | 0.3950 |        | 0.4222 | 0.4127 |
|                        | 0.4221 | 0.3984 |        | 0.4299 | 0.4165 |
|                        | 0.4183 | 0.3898 |        | 0.4259 | 0.4073 |

| Region                 | CIE x  | CIE y  | Region | CIE x  | CIE y  |
|------------------------|--------|--------|--------|--------|--------|
| <b>T rank (4000 K)</b> |        |        |        |        |        |
| T1                     | 0.3670 | 0.3578 | T9     | 0.3702 | 0.3722 |
|                        | 0.3726 | 0.3612 |        | 0.3763 | 0.3760 |
|                        | 0.3744 | 0.3685 |        | 0.3782 | 0.3837 |
|                        | 0.3686 | 0.3649 |        | 0.3719 | 0.3797 |
| T2                     | 0.3726 | 0.3612 | TA     | 0.3763 | 0.3760 |
|                        | 0.3783 | 0.3646 |        | 0.3825 | 0.3798 |
|                        | 0.3804 | 0.3721 |        | 0.3847 | 0.3877 |
|                        | 0.3744 | 0.3685 |        | 0.3782 | 0.3837 |
| T3                     | 0.3783 | 0.3646 | TB     | 0.3825 | 0.3798 |
|                        | 0.3840 | 0.3681 |        | 0.3887 | 0.3836 |
|                        | 0.3863 | 0.3758 |        | 0.3912 | 0.3917 |
|                        | 0.3804 | 0.3721 |        | 0.3847 | 0.3877 |
| T4                     | 0.3840 | 0.3681 | TC     | 0.3887 | 0.3837 |
|                        | 0.3898 | 0.3716 |        | 0.3950 | 0.3875 |
|                        | 0.3924 | 0.3794 |        | 0.3978 | 0.3958 |
|                        | 0.3863 | 0.3758 |        | 0.3912 | 0.3917 |
| T5                     | 0.3686 | 0.3649 | TD     | 0.3719 | 0.3797 |
|                        | 0.3744 | 0.3685 |        | 0.3782 | 0.3837 |
|                        | 0.3763 | 0.3760 |        | 0.3802 | 0.3916 |
|                        | 0.3702 | 0.3722 |        | 0.3736 | 0.3874 |
| T6                     | 0.3744 | 0.3685 | TE     | 0.3782 | 0.3837 |
|                        | 0.3804 | 0.3721 |        | 0.3847 | 0.3877 |
|                        | 0.3825 | 0.3798 |        | 0.3869 | 0.3958 |
|                        | 0.3763 | 0.376  |        | 0.3802 | 0.3916 |
| T7                     | 0.3804 | 0.3721 | TF     | 0.3847 | 0.3877 |
|                        | 0.3863 | 0.3758 |        | 0.3912 | 0.3917 |
|                        | 0.3887 | 0.3836 |        | 0.3937 | 0.4001 |
|                        | 0.3825 | 0.3798 |        | 0.3869 | 0.3958 |
| T8                     | 0.3863 | 0.3758 | TG     | 0.3912 | 0.3917 |
|                        | 0.3924 | 0.3794 |        | 0.3978 | 0.3958 |
|                        | 0.3950 | 0.3875 |        | 0.4006 | 0.4044 |
|                        | 0.3887 | 0.3836 |        | 0.3937 | 0.4001 |

## c) Chromaticity Region &amp; Coordinates

| Region                 | CIE x  | CIE y  | Region | CIE x  | CIE y  |
|------------------------|--------|--------|--------|--------|--------|
| <b>R rank (5000 K)</b> |        |        |        |        |        |
| R1                     | 0.3366 | 0.3369 | R6     | 0.3456 | 0.3601 |
|                        | 0.3441 | 0.3428 |        | 0.3539 | 0.3669 |
|                        | 0.3449 | 0.3515 |        | 0.3551 | 0.3760 |
|                        | 0.3369 | 0.3451 |        | 0.3464 | 0.3688 |
| R2                     | 0.3441 | 0.3428 | R7     | 0.3363 | 0.3287 |
|                        | 0.3515 | 0.3487 |        | 0.3433 | 0.3341 |
|                        | 0.3527 | 0.3578 |        | 0.3441 | 0.3428 |
|                        | 0.3449 | 0.3515 |        | 0.3366 | 0.3369 |
| R3                     | 0.3369 | 0.3451 | R8     | 0.3433 | 0.3341 |
|                        | 0.3449 | 0.3515 |        | 0.3503 | 0.3396 |
|                        | 0.3456 | 0.3601 |        | 0.3515 | 0.3487 |
|                        | 0.3373 | 0.3534 |        | 0.3441 | 0.3428 |
| R4                     | 0.3449 | 0.3515 | R9     | 0.3376 | 0.3616 |
|                        | 0.3527 | 0.3578 |        | 0.3464 | 0.3688 |
|                        | 0.3539 | 0.3669 |        | 0.3471 | 0.3775 |
|                        | 0.3456 | 0.3601 |        | 0.3379 | 0.3698 |
| R5                     | 0.3373 | 0.3534 | RA     | 0.3464 | 0.3688 |
|                        | 0.3456 | 0.3601 |        | 0.3551 | 0.3760 |
|                        | 0.3464 | 0.3688 |        | 0.3564 | 0.3851 |
|                        | 0.3376 | 0.3616 |        | 0.3471 | 0.3775 |

| Region                 | CIE x  | CIE y  | Region | CIE x  | CIE y  |
|------------------------|--------|--------|--------|--------|--------|
| <b>Q rank (5700 K)</b> |        |        |        |        |        |
| Q1                     | 0.3222 | 0.3243 | Q6     | 0.3292 | 0.3461 |
|                        | 0.3294 | 0.3306 |        | 0.3373 | 0.3534 |
|                        | 0.3293 | 0.3384 |        | 0.3376 | 0.3616 |
|                        | 0.3217 | 0.3316 |        | 0.3292 | 0.3539 |
| Q2                     | 0.3294 | 0.3306 | Q7     | 0.3227 | 0.3170 |
|                        | 0.3366 | 0.3369 |        | 0.3295 | 0.3228 |
|                        | 0.3369 | 0.3451 |        | 0.3294 | 0.3306 |
|                        | 0.3293 | 0.3384 |        | 0.3222 | 0.3243 |
| Q3                     | 0.3217 | 0.3316 | Q8     | 0.3295 | 0.3228 |
|                        | 0.3293 | 0.3384 |        | 0.3363 | 0.3287 |
|                        | 0.3292 | 0.3461 |        | 0.3366 | 0.3369 |
|                        | 0.3212 | 0.3389 |        | 0.3294 | 0.3306 |
| Q4                     | 0.3293 | 0.3384 | Q9     | 0.3207 | 0.3462 |
|                        | 0.3369 | 0.3451 |        | 0.3292 | 0.3539 |
|                        | 0.3373 | 0.3534 |        | 0.3291 | 0.3617 |
|                        | 0.3292 | 0.3461 |        | 0.3202 | 0.3535 |
| Q5                     | 0.3212 | 0.3389 | QA     | 0.3292 | 0.3539 |
|                        | 0.3292 | 0.3461 |        | 0.3376 | 0.3616 |
|                        | 0.3292 | 0.3539 |        | 0.3379 | 0.3698 |
|                        | 0.3207 | 0.3462 |        | 0.3291 | 0.3617 |

### c) Chromaticity Region & Coordinates

| Region                 | CIE x  | CIE y  | Region | CIE x  | CIE y  |
|------------------------|--------|--------|--------|--------|--------|
| <b>P rank (6500 K)</b> |        |        |        |        |        |
| P1                     | 0.3068 | 0.3113 | P6     | 0.3126 | 0.3324 |
|                        | 0.3145 | 0.3187 |        | 0.3210 | 0.3408 |
|                        | 0.3135 | 0.3256 |        | 0.3205 | 0.3481 |
|                        | 0.3055 | 0.3177 |        | 0.3117 | 0.3393 |
| P2                     | 0.3145 | 0.3187 | P7     | 0.3081 | 0.3049 |
|                        | 0.3221 | 0.3261 |        | 0.3154 | 0.3119 |
|                        | 0.3216 | 0.3334 |        | 0.3145 | 0.3187 |
|                        | 0.3135 | 0.3256 |        | 0.3068 | 0.3113 |
| P3                     | 0.3055 | 0.3177 | P8     | 0.3154 | 0.3119 |
|                        | 0.3135 | 0.3256 |        | 0.3226 | 0.3188 |
|                        | 0.3126 | 0.3324 |        | 0.3221 | 0.3261 |
|                        | 0.3041 | 0.3240 |        | 0.3145 | 0.3187 |
| P4                     | 0.3135 | 0.3256 | P9     | 0.3028 | 0.3304 |
|                        | 0.3216 | 0.3334 |        | 0.3117 | 0.3393 |
|                        | 0.3210 | 0.3408 |        | 0.3107 | 0.3461 |
|                        | 0.3126 | 0.3324 |        | 0.3015 | 0.3368 |
| P5                     | 0.3041 | 0.3240 | PA     | 0.3117 | 0.3393 |
|                        | 0.3126 | 0.3324 |        | 0.3205 | 0.3481 |
|                        | 0.3117 | 0.3393 |        | 0.3200 | 0.3554 |
|                        | 0.3028 | 0.3304 |        | 0.3107 | 0.3461 |

**Note:**

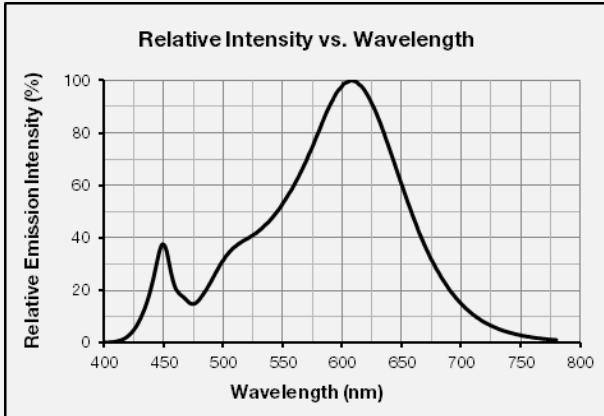
Samsung maintains measurement tolerance of:  $C_x, C_y = \pm 0.005$



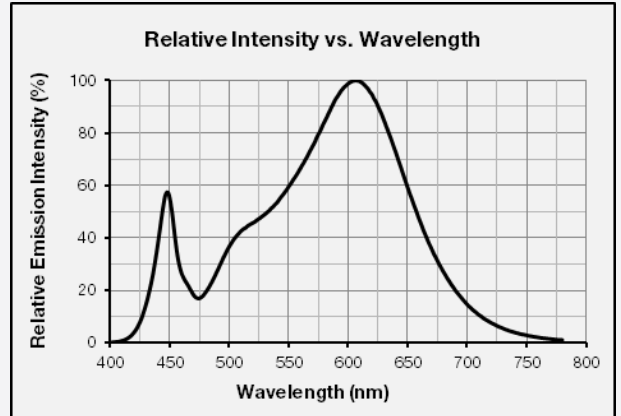
### 3. Typical Characteristics Graphs

#### a) Spectrum Distribution ( $I_f = 150 \text{ mA}$ , $T_s = 25 \text{ }^\circ\text{C}$ )

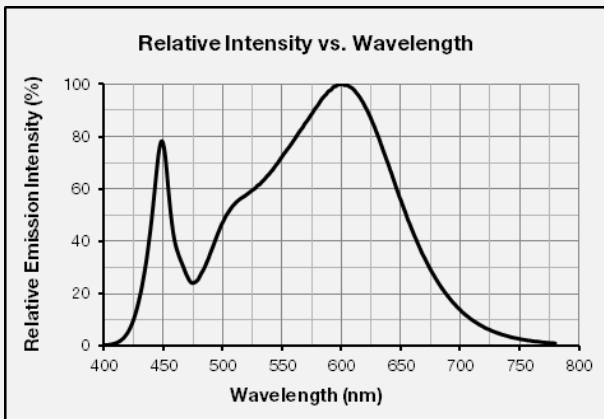
CCT: 2700 K



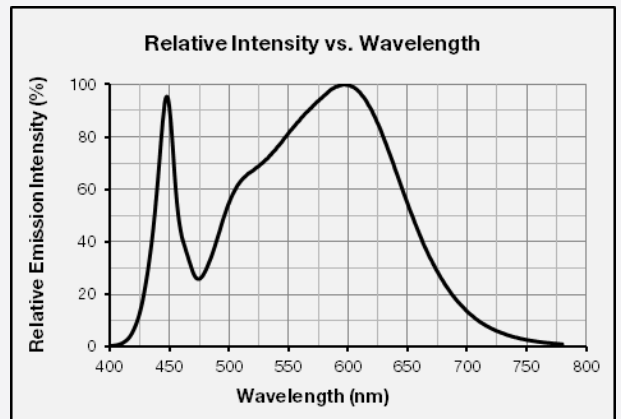
CCT: 3000 K



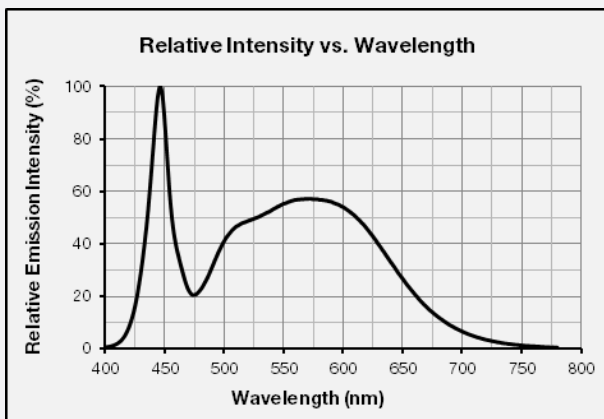
CCT: 3500 K



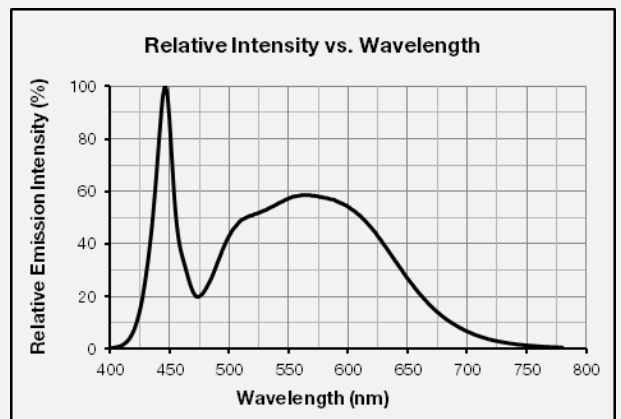
CCT: 4000 K



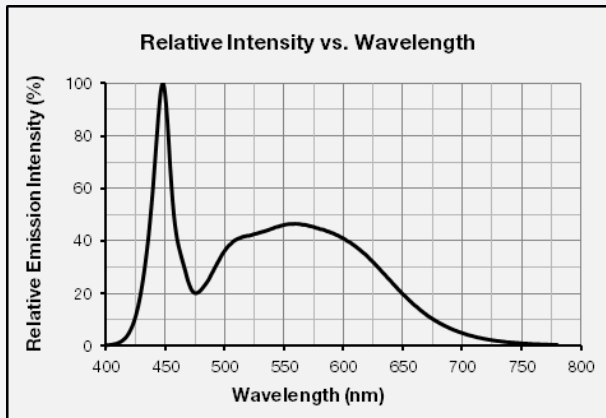
CCT: 5000 K



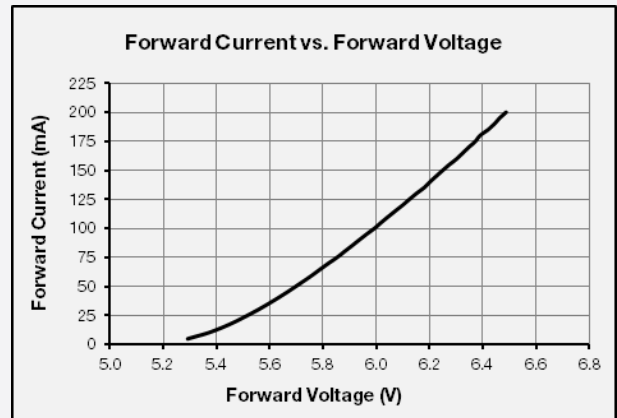
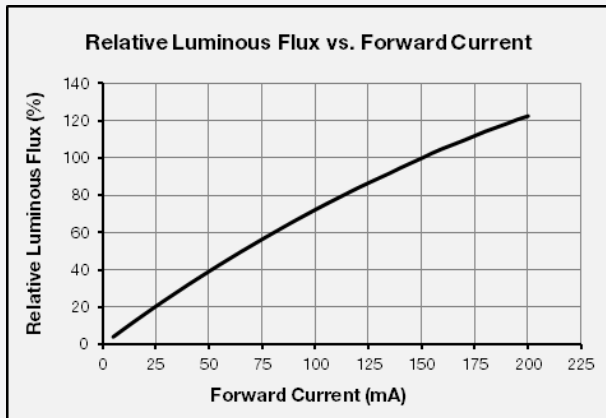
CCT: 5700 K



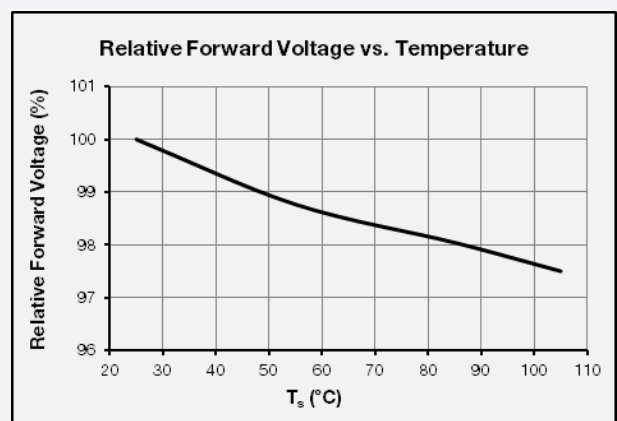
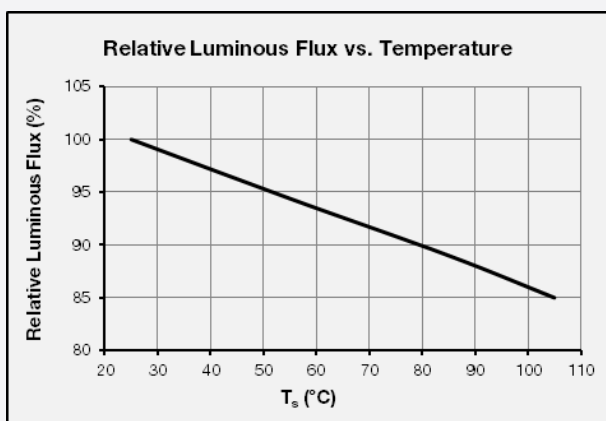
CCT: 6500 K



**b) Forward Current Characteristics ( $T_s = 25^\circ\text{C}$ )**



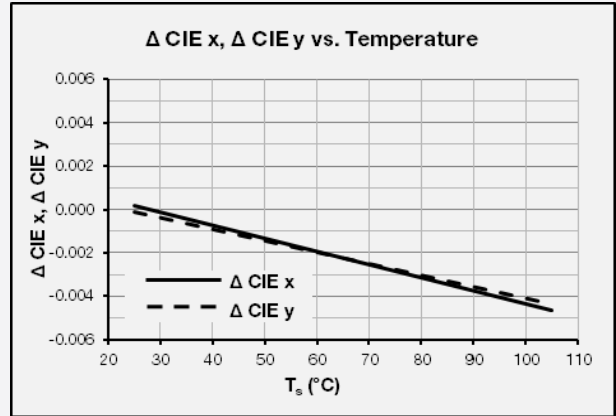
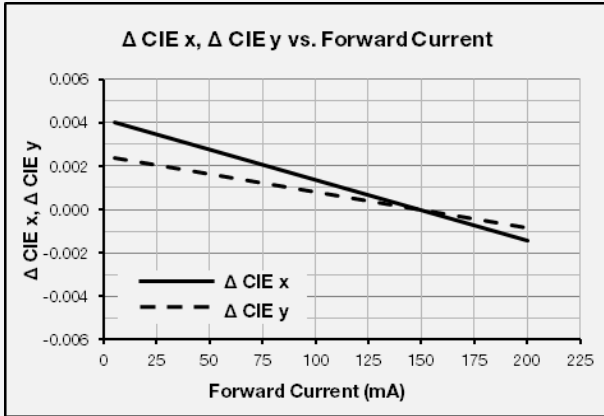
**c) Temperature Characteristics ( $I_f = 150\text{ mA}$ )**



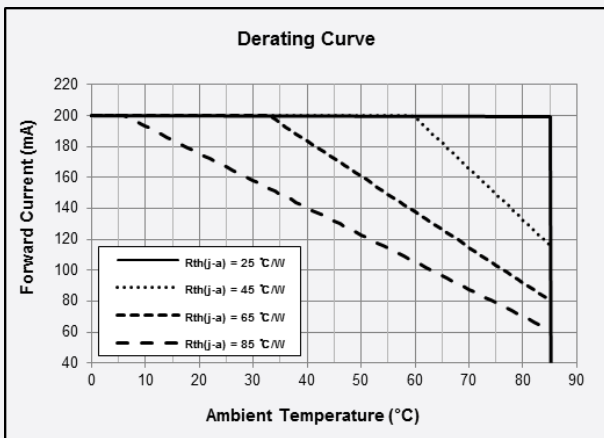
d) Color Shift Characteristics

$T_s = 25^\circ\text{C}$

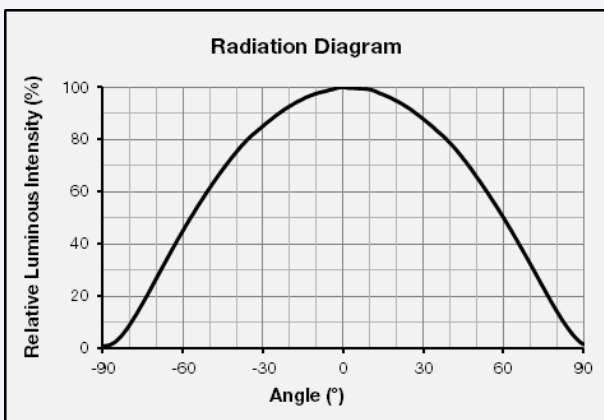
$I_F = 150\text{ mA}$



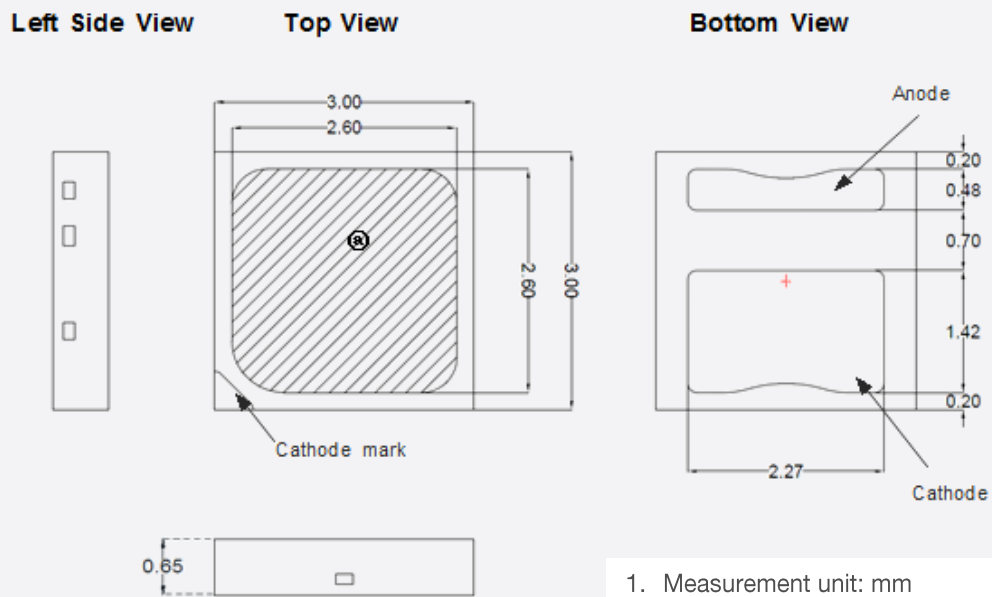
e) Derating Curve



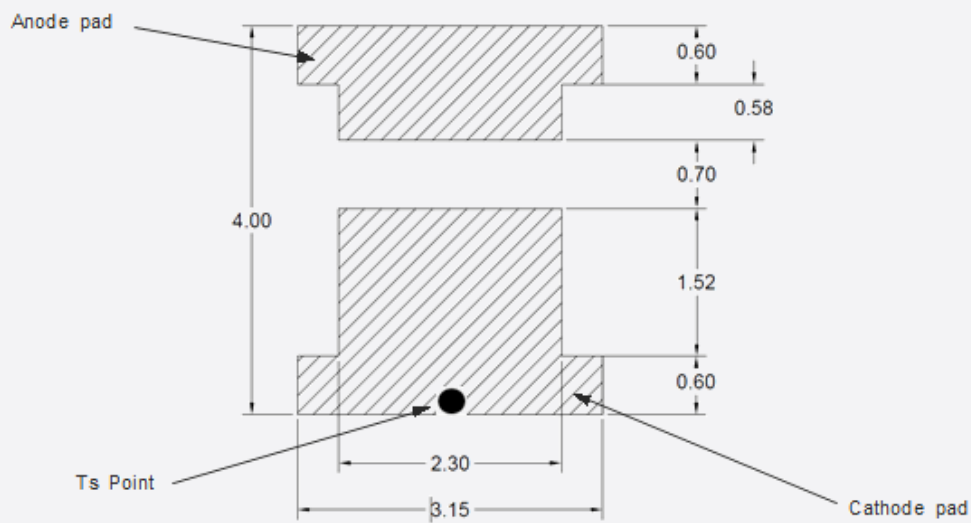
f) Beam Angle Characteristics ( $I_F = 150\text{ mA}$ ,  $T_s = 25^\circ\text{C}$ )



## 4. Outline Drawing & Dimension



1. Measurement unit: mm
2. Tolerance:  $\pm 0.10$  mm
3. Do not place pressure on the encapsulation resin ①



**Recommended Land Pattern**

### Notes:

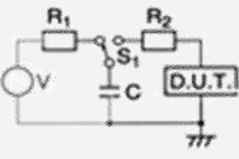
- 1) This LED has built-in ESD protection device(s) connected in parallel to LED chip(s).
- 2)  $T_s$  point and measurement method:
  - ① Measure one point at the cathode pad. If necessary, remove PSR of PCB to reach  $T_s$  point.
  - ② All pads must be soldered to the PCB to dissipate heat properly, otherwise the LED can be damaged.

**Precautions:**

- 1) Pressure on the LEDs will influence to the reliability of the LEDs. Precautions should be taken to avoid strong pressure on the LEDs. Do not put stress on the LEDs during heating.
- 2) Re-soldering should not be done after the LEDs have been soldered. If re-soldering is unavoidable, LED's characteristics should be carefully checked before and after such repair.
- 3) Do not stack assembled PCBs together. Since materials of LEDs is soft, abrasion between two PCB assembled with LED might cause catastrophic failure of the LEDs.

## 5. Reliability Test Items and Conditions

### a) Test Items

| Test Item                           | Test Condition   | Test Hour / Cycle  | Sample Size |    |
|-------------------------------------|--|--|-------------|----|
| Room Temperature Life Test          | 25 °C, DC 200 mA   | 1000 h   | 22          |    |
| High Temperature Life Test          | 85 °C, DC 200 mA   | 1000 h   | 22          |    |
| High Temperature Humidity Life Test | 85 °C, 85 % RH, DC 200 mA  | 1000 h   | 22          |    |
| Low Temperature Life Test           | -40 °C, DC 200 mA  | 1000 h   | 22          |    |
| Powered Temperature Cycle Test      | -45 °C / 20 min ↔ 85 °C / 20 min, sweep<br>100 min cycle on/off: each 5 min, DC 200 mA | 100 cycles   | 22          |    |
| Thermal Cycle                       | -45 °C / 15 min ↔ 125 °C / 15 min<br>→ Hot plate 180 °C                                | 500 cycles   | 100         |    |
| High Temperature Storage            | 120 °C   | 1000 h   | 11          |    |
| Low Temperature Storage             | -40 °C   | 1000 h   | 11          |    |
| ESD (HBM)                           |     | R <sub>1</sub> : 10 MΩ<br>R <sub>2</sub> : 1.5 kΩ<br>C: 100 pF<br>V: ±5 kV | 5 times     | 30 |
| ESD (MM)                            |  |  |             |    |
| Vibration Test                      | 20~2000~20 Hz, 200 m/s <sup>2</sup> , sweep 4 min<br>X, Y, Z 3 direction, each 1 cycle | 4 cycles   | 11          |    |
| Mechanical Shock Test               | 1500 g, 0.5 ms<br>3 shocks each X-Y-Z axis   | 5 cycles   | 11          |    |

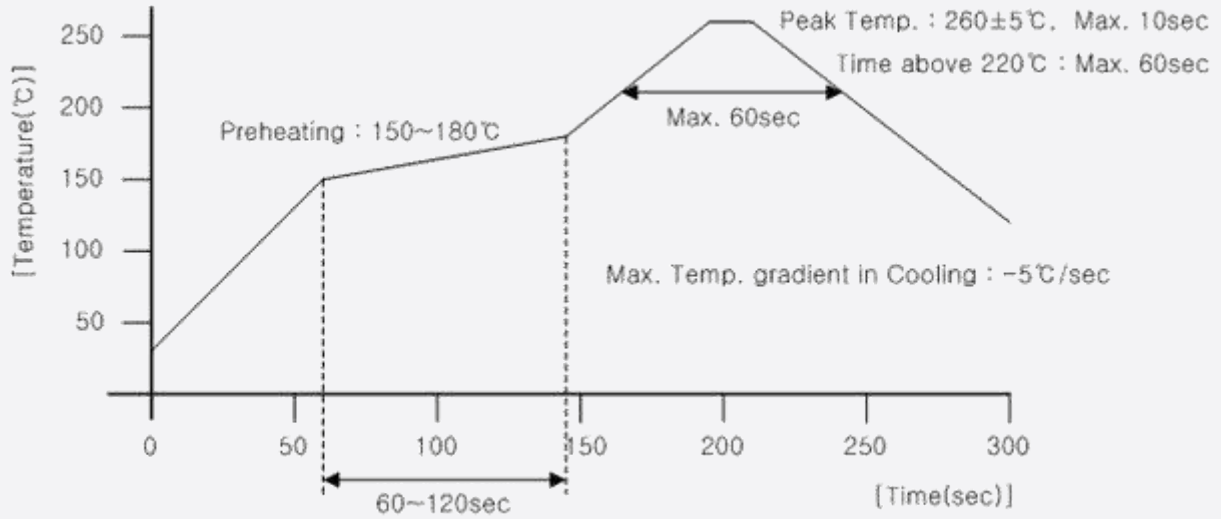
### b) Criteria for Judging the Damage

| Item            | Symbol         | Test Condition<br>(T <sub>s</sub> = 25 °C) | Limit             |                   |
|-----------------|----------------|--|-------------------|-------------------|
|                 |                |  | Min.              | Max.              |
| Forward Voltage | V <sub>F</sub> | I <sub>F</sub> = 150 mA                    | Init. Value * 0.9 | Init. Value * 1.1 |
| Luminous Flux   | Φ <sub>v</sub> | I <sub>F</sub> = 150 mA                    | Init. Value * 0.7 | Init. Value * 1.1 |

## 6. Soldering Conditions

### a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.



### b) Manual Soldering Conditions

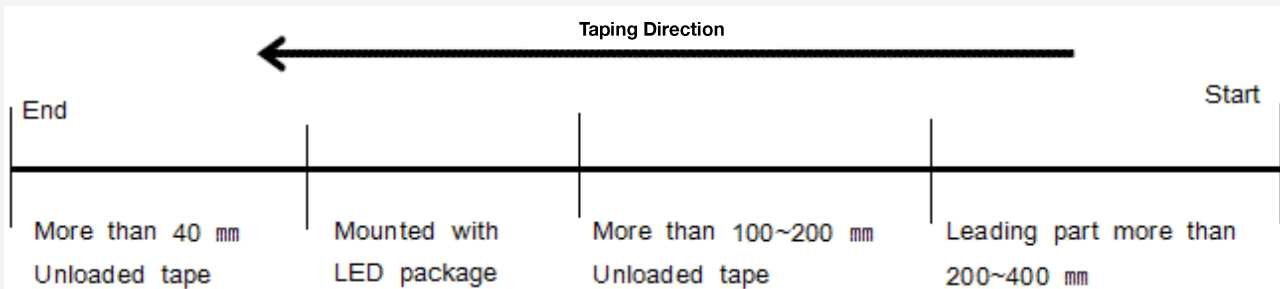
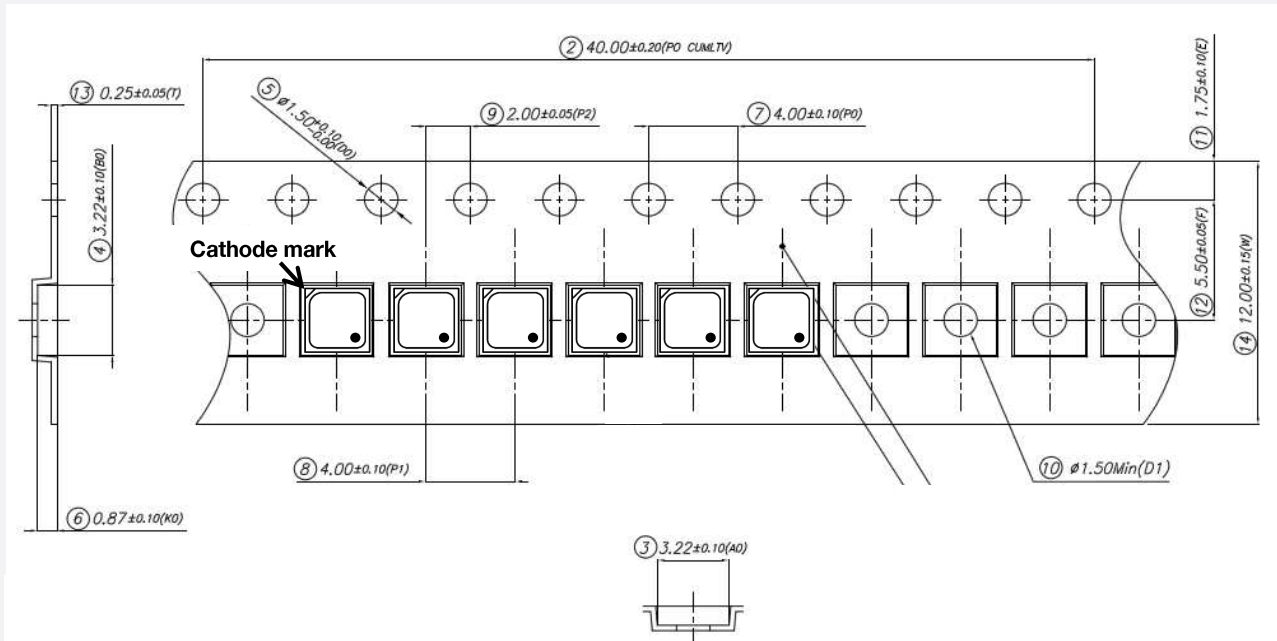
Not more than 5 seconds @ max. 300 °C, under soldering iron.



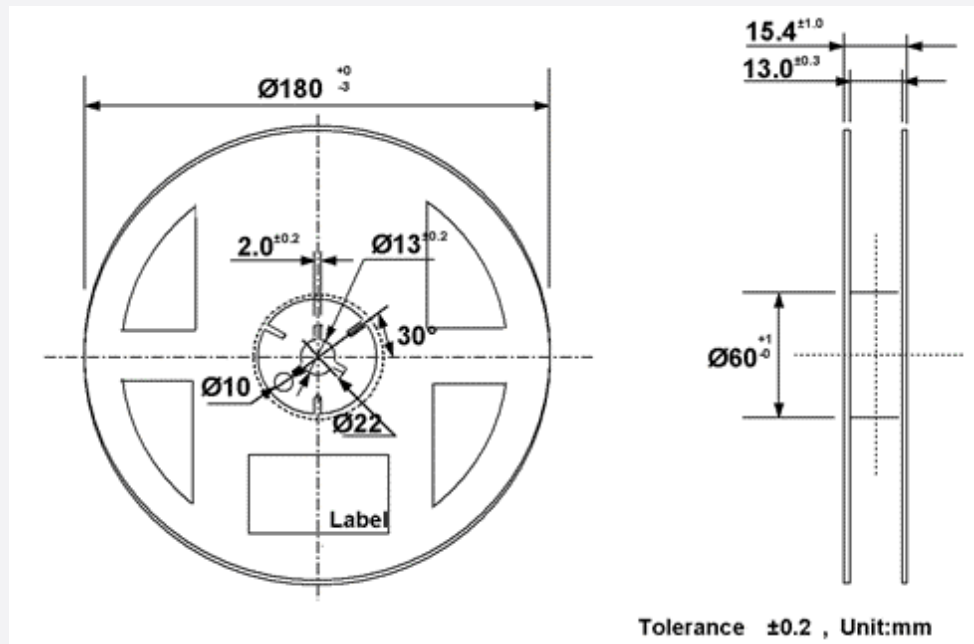
## 7. Tape & Reel

### a) Taping Dimension

(unit: mm)



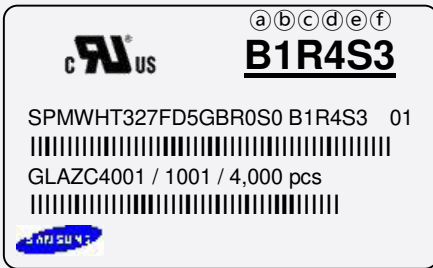
## b) Reel Dimension

**Notes:**

- 1) Quantity: The quantity/reel is 4,000 pcs
- 2) Cumulative tolerance: Cumulative tolerance / 10 pitches is  $\pm 0.2$  mm
- 3) Adhesion strength of cover tape: Adhesion strength is 0.1-0.7 N when the cover tape is turned off from the carrier tape at  $10^\circ$  angle to the carrier tape
- 4) Packaging: P/N, Manufacturing data code no. and quantity are indicated on the aluminum packing bag

## 8. Label Structure

### a) Label Structure



Note: Denoted bin code and product code above is only an example  
'★' means all kind of Chromaticity Coordinate Ranks

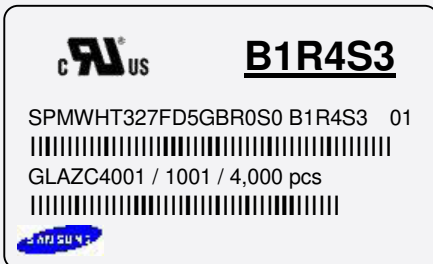
Bin Code:

ⒶⒷ: Forward Voltage bin (refer to page 7)

ⒸⒹ: Chromaticity bin (refer to page 9~12)

ⒺⒻ: Luminous Flux bin (refer to page 4-5)

### b) Lot Number



The lot number is composed of the following characters:

①②③④⑤⑥⑦⑧⑨ / 1ⒶⒷⒸ / 4,000 pcs

① : Production site (S: Giheung, Korea, G: Tianjin, China)

② : L (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)

⑥ : Day (1~9, A, B~V)

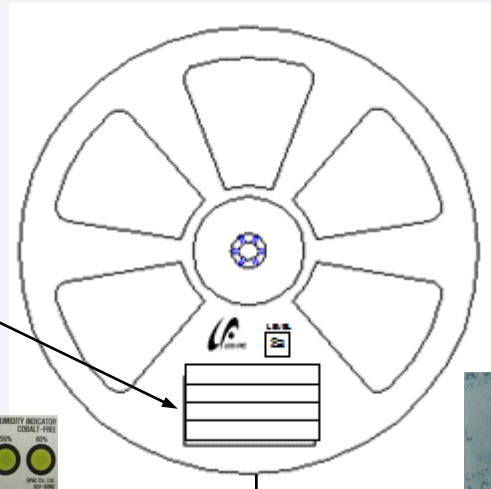
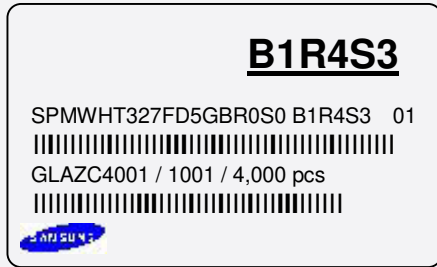
⑦⑧⑨ : Product serial number (001 ~ 999)

ⒶⒷⒸ : Reel number (001 ~ 999)

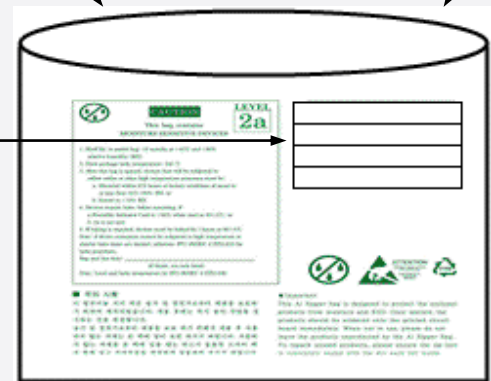
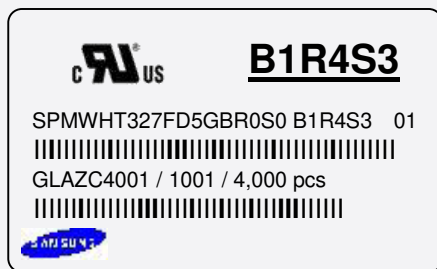
## 9. Packing Structure

### a) Packing Process

Reel



Aluminum Vinyl Packing Bag



Outer Box

Material: Paper (SW3B(B))

| Type     | Size (mm) |         |         | Note           |
|----------|-----------|---------|---------|----------------|
|          | L         | W       | H       |                |
| 7 inch L | 245 ± 5   | 220 ± 5 | 182 ± 5 | Up to 10 reels |
| 7 inch S | 245 ± 5   | 220 ± 5 | 86 ± 5  | Up to 5 reels  |

① Side Label

