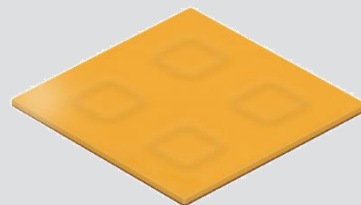


High Power LED Series Chip Scale Package Array

LH204A



Making use of CSP, Samsung's fundamental "building block", provide with greater design flexibility and better light quality



Features & Benefits

- Utilizes Samsung TF chip and Flexible substrate platform technology
- Suitable for use in indoor and outdoor directional lighting
- 80 CRI makes it well suited for most applications
- Compact footprint (3.5 x 3.5 mm)

Applications

- Indoor Lighting: Spotlight, Downlight, MR, PAR
- Industrial Lighting: High Bay Light, Low Bay Light
- Consumer Lighting: Torch Light



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1. Characteristics

a) Absolute Maximum Rating

| Item | Symbol | Rating | Unit | Condition |
|---------------------------------|-----------|------------|---------|-----------|
| Ambient / Operating Temperature | T_a | -40 ~ +105 | °C | Note 1) |
| Storage Temperature | T_{stg} | -40 ~ +120 | °C | - |
| LED Junction Temperature | T_j | 130 | °C | - |
| Forward Current | I_F | 350 | mA | - |
| Assembly Process Temperature | - | 260 <10 | °C s | - |
| ESD (HBM) | - | ±2 | kV | - |

Note:

- 1) Refer to the derating curve, '3. Typical Characteristics Graph', for proper driving current that maintained below maximum junction temperature.



b) Electro-optical Characteristics (IF = 150 mA)

| Item | Unit | Nominal CCT (K) | Condition | | Value Typ. |
|--|------|--------------------|---------------------|---------------------|---------------|
| | | | I _F (mA) | T _s (°C) | |
| Luminous Flux (Φ _v) | lm | 2700 (80 CRI) | 150 | 25 | 235 |
| | | | 150 | 85 | 215 |
| | | | 200 | 85 | 278 |
| | | | 250 | 85 | 338 |
| Forward Voltage (V _F) | V | | 150 | 25 | 12.2 |
| | | | 150 | 85 | 11.6 |
| | | | 200 | 85 | 11.9 |
| | | | 250 | 85 | 12.1 |
| Reverse Voltage (@ -10 μA) | V | | | | (min) -10.0 |
| Thermal Resistance (junction to solder point) | °C/W | | | | 2.5 |
| Beam Angle | ° | | | | 120 |

Note:

Samsung maintains measurement tolerance of: luminous flux = ±7%, forward voltage = ±0.1 V



2. Product Code Information

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| S | C | A | 8 | W | T | 7 | 8 | H | A | L | 4 | W | 0 | A | E | 1 | F |

| Digit | PKG Information | Code | Specification | | | | |
|----------|----------------------------------|--|---|---|--|--|--|
| 1 2 3 | Samsung Chip Scale Package Array | SCA | | | | | |
| 4 | CRI | 7 8 9 | Min. 70 Min. 80 Min. 90 | | | | |
| 5 | CCT | W V U T R Q P | 2700K 3000K 3500K 4000K 5000K 5700K 6500K | | | | |
| 6 | Chip Shape | T | Square type | | | | |
| 7 8 9 | Product | 78H | Chip version | | | | |
| 10 11 12 | Product Purpose | AL4 | 4 chips in 1 array | | | | |
| 13 14 | CCT (K) | W 0 V 0 U 0 T 0 R T Q T P T | 2700 3000 3500 4000 5000 5700 6500 | Bin Code: T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG | W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG R1, R2, R3, R4 Q1, Q2, Q3, Q4 P1, P2, P3, P4 | | |
| 15 16 | Luminous Flux | 6A 7B 8D AE BG DH | 165 ~ 200 175 ~ 215 185 ~ 230 200 ~ 245 215 ~ 260 230 ~ 280 | 67 78 8A AB BD DE EG GH | 165 ~ 175 175 ~ 185 185 ~ 200 200 ~ 215 215 ~ 230 230 ~ 245 245 ~ 260 260 ~ 280 | | |
| | | | Digit 15: Min. spec Digit 18: Max. spec e.g.: BD = 215~230 lm, BG = BD + DE + EG = 215~260 lm | | | | |
| 17 18 | Forward Voltage (Vf) | 1 F | 10.6 ~ 12.9 V | | | | |

a) Luminous Flux Bins and Characteristics ($I_F = 150 \text{ mA}$, $T_s = 85^\circ\text{C}$)

| CRI (R_a) Min. ¹⁾ | Nominal CCT (K) | Product Code | Sorting @ 150 mA (lm) | | Calculated Minimum Flux ²⁾ (lm) | | | |
|-------------------------------------|--------------------|---------------------------|-----------------------|--------------------------|--|----------|----------|----------|
| | | | Flux Rank | Flux Range ¹⁾ | @ 150 mA (25°C) | @ 200 mA | @ 250 mA | @ 350 mA |
| 70 | 3000 | SCA7VT78HAL4V0BG1F | EG | 245 ~ 260 | 265 | 316 | 384 | 506 |
| | | | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | | | BD | 215 ~ 230 | 232 | 277 | 337 | 444 |
| | 3500 | SCA7UT78HAL4U0BG1F | EG | 245 ~ 260 | 265 | 316 | 384 | 506 |
| | | | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | | | BD | 215 ~ 230 | 232 | 277 | 337 | 444 |
| | 4000 | SCA7TT78HAL9T0AJEP | EG | 245 ~ 260 | 265 | 316 | 384 | 506 |
| | | | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | | | BD | 215 ~ 230 | 232 | 277 | 337 | 444 |
| | 5000 | SCA7RT78HAL9RTAJEP | GH | 260 ~ 280 | 281 | 335 | 408 | 537 |
| | | | EG | 245 ~ 260 | 265 | 316 | 384 | 506 |
| | | | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | 5700 | SCA7QT78HAL4QTDH1F | GH | 260 ~ 280 | 281 | 335 | 408 | 537 |
| | | | EG | 245 ~ 260 | 265 | 316 | 384 | 506 |
| | | | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | 6500 | SCA7PT78HAL4PTBG1F | EG | 245 ~ 260 | 265 | 316 | 384 | 506 |
| | | | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | | | BD | 215 ~ 230 | 232 | 277 | 337 | 444 |

Notes:

- 1) Samsung maintains measurement tolerance of: luminous flux = $\pm 7\%$, CRI = ± 3
- 2) Calculated minimum and maximum flux values are for reference only



a) Luminous Flux Bins and Characteristics ($I_F = 150 \text{ mA}$, $T_s = 85^\circ\text{C}$)

| CRI (R_a) Min. ¹⁾ | Nominal CCT (K) | Product Code | Sorting @ 150 mA (lm) | | Calculated Minimum Flux ²⁾ (lm) | | | |
|-------------------------------------|--------------------|---------------------------|-----------------------|--------------------------|--|----------|----------|----------|
| | | | Flux Rank | Flux Range ¹⁾ | @ 150 mA (25°C) | @ 200 mA | @ 250 mA | @ 350 mA |
| 80 | 2700 | SCA8WT78HAL4W0AE1F | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | | | BD | 215 ~ 230 | 232 | 277 | 337 | 444 |
| | | | AB | 200 ~ 215 | 216 | 258 | 314 | 413 |
| | 3000 | SCA8VT78HAL4V0AE1F | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | | | BD | 215 ~ 230 | 232 | 277 | 337 | 444 |
| | | | AB | 200 ~ 215 | 216 | 258 | 314 | 413 |
| | 3500 | SCA8UT78HAL4U0AE1F | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | | | BD | 215 ~ 230 | 232 | 277 | 337 | 444 |
| | | | AB | 200 ~ 215 | 216 | 258 | 314 | 413 |
| | 4000 | SCA8TT78HAL4T0BG1F | EG | 245 ~ 260 | 265 | 316 | 384 | 506 |
| | | | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | | | BD | 215 ~ 230 | 232 | 277 | 337 | 444 |
| 5000 | | SCA8RT78HAL4RTBG1F | EG | 245 ~ 260 | 265 | 316 | 384 | 506 |
| | | | DE | 230 ~ 245 | 249 | 297 | 361 | 475 |
| | | | BD | 215 ~ 230 | 232 | 277 | 337 | 444 |

Notes:

- 1) Samsung maintains measurement tolerance of: luminous flux = $\pm 7\%$, CRI = ± 3
- 2) Calculated minimum and maximum flux values are for reference only



a) Luminous Flux Bins and Characteristics ($I_F = 150 \text{ mA}$, $T_s = 85^\circ\text{C}$)

| CRI (R_a) Min. ¹⁾ | Nominal CCT (K) | Product Code | Sorting @ 150 mA (lm) | | Calculated Minimum Flux ²⁾ (lm) | | | |
|-------------------------------------|--------------------|---------------------------|-----------------------|--------------------------|--|----------|----------|----------|
| | | | Flux Rank | Flux Range ¹⁾ | @ 150 mA (25°C) | @ 200 mA | @ 250 mA | @ 350 mA |
| 90 | 2700 | SCA9WT78HAL4W06A1F | 8A | 185 ~ 200 | 200 | 239 | 290 | 382 |
| | | | 78 | 175 ~ 185 | 189 | 226 | 275 | 362 |
| | | | 67 | 165 ~ 175 | 178 | 213 | 259 | 341 |
| | 3000 | SCA9VT78HAL4V06A1F | 8A | 185 ~ 200 | 200 | 239 | 290 | 382 |
| | | | 78 | 175 ~ 185 | 189 | 226 | 275 | 362 |
| | | | 67 | 165 ~ 175 | 178 | 213 | 259 | 341 |
| | 3500 | SCA9UT78HAL4U07B1F | AB | 200 ~ 215 | 216 | 258 | 314 | 413 |
| | | | 8A | 185 ~ 200 | 200 | 239 | 290 | 382 |
| | | | 78 | 175 ~ 185 | 189 | 226 | 275 | 362 |
| | 4000 | SCA9TT78HAL4T07B1F | AB | 200 ~ 215 | 216 | 258 | 314 | 413 |
| | | | 8A | 185 ~ 200 | 200 | 239 | 290 | 382 |
| | | | 78 | 175 ~ 185 | 189 | 226 | 275 | 362 |

Notes:

- 1) Samsung maintains measurement tolerance of: luminous flux = $\pm 7\%$, CRI = ± 3
- 2) Calculated minimum and maximum flux values are for reference only



b) Color Bins ($I_F = 150 \text{ mA}$, $T_s = 85 \text{ }^\circ\text{C}$)

| CRI (R _a) Min. | Nominal CCT (K) | Product Code | Color Rank | Chromaticity Bins |
|-------------------------------|--------------------|---------------------------|-------------------|---|
| 70 | 3000 | <i>SCA7VT78HAL4V0BG1F</i> | V0 (Whole bin) | V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG |
| | 3500 | <i>SCA7UT78HAL4U0BG1F</i> | U0 (Whole bin) | U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG |
| | 4000 | <i>SCA7TT78HAL4T0BG1F</i> | T0 (Whole bin) | T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG |
| | 5000 | <i>SCA7RT78HAL4RTDH1F</i> | RT (ANSI bin) | R1, R2, R3, R4 |
| | 5700 | <i>SCA7QT78HAL9QTAJEP</i> | QT (ANSI bin) | Q1, Q2, Q3, Q4 |
| | 6500 | <i>SCA7PT78HAL9PTAJEP</i> | PT (ANSI bin) | P1, P2, P3, P4 |
| 80 | 2700 | <i>SCA8WT78HAL4W0AE1F</i> | W0 (Whole bin) | W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG |
| | 3000 | <i>SCA8VT78HAL4V0AE1F</i> | V0 (Whole bin) | V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG |
| | 3500 | <i>SCA8UT78HAL4U0AE1F</i> | U0 (Whole bin) | U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG |
| | 4000 | <i>SCA8TT78HAL4T0BG1F</i> | T0 (Whole bin) | T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG |
| | 5000 | <i>SCA8RT78HAL4RTBG1F</i> | RT (ANSI bin) | R1, R2, R3, R4 |
| 90 | 2700 | <i>SCA9WT78HAL4W06A1F</i> | W0 (Whole bin) | W1, W2, W3, W4, W5, W6, W7, W8, W9, WA, WB, WC, WD, WE, WF, WG |
| | 3000 | <i>SCA9VT78HAL4V06A1F</i> | V0 (Whole bin) | V1, V2, V3, V4, V5, V6, V7, V8, V9, VA, VB, VC, VD, VE, VF, VG |
| | 3500 | <i>SCA9UT78HAL4U07B1F</i> | U0 (Whole bin) | U1, U2, U3, U4, U5, U6, U7, U8, U9, UA, UB, UC, UD, UE, UF, UG |
| | 4000 | <i>SCA9TT78HAL4T07B1F</i> | T0 (Whole bin) | T1, T2, T3, T4, T5, T6, T7, T8, T9, TA, TB, TC, TD, TE, TF, TG |

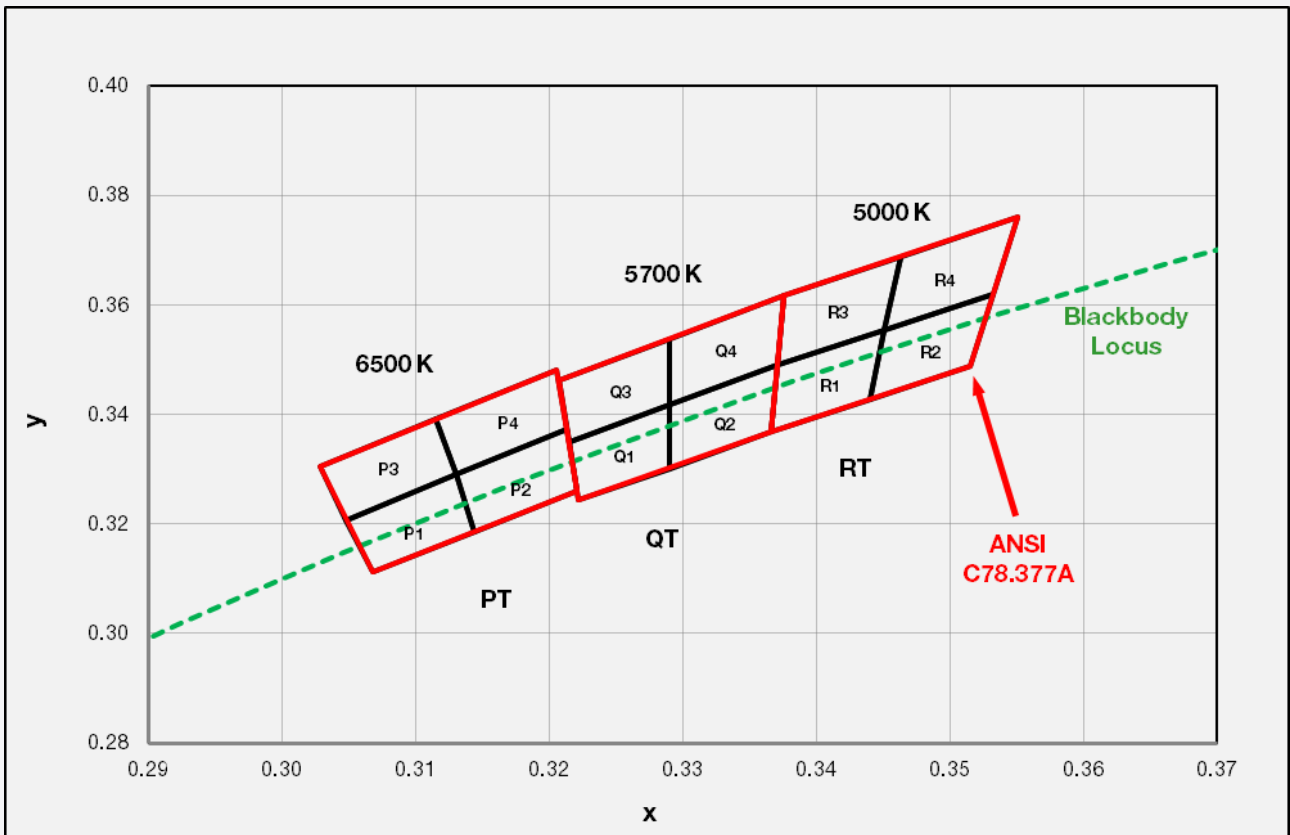
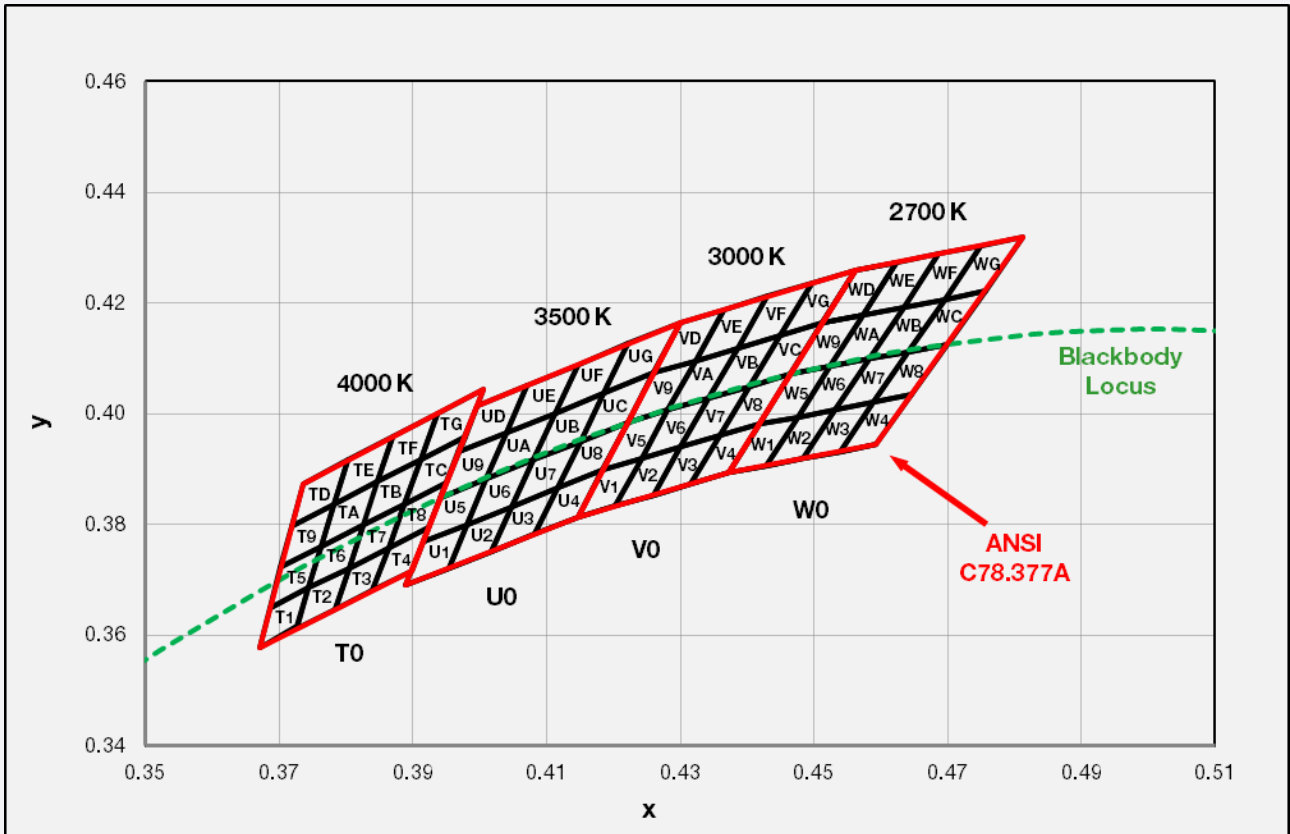


c) Voltage Bins ($I_f = 150 \text{ mA}$, $T_s = 85 \text{ }^\circ\text{C}$)

| CRI (R_a) Min. | Nominal CCT (K) | Product Code | Voltage Rank | Voltage Bin | Voltage Range (V) |
|-----------------------|--------------------|--------------|--------------|-------------|----------------------|
| | | | 1F | | 10.6 ~ 12.9V |



d) Chromaticity Region & Coordinates ($I_f = 150 \text{ mA}$, $T_s = 85^\circ\text{C}$)



d) Chromaticity Region & Coordinates ($I_F = 150 \text{ mA}$, $T_s = 85 \text{ }^\circ\text{C}$)

| Region | CIE x | CIE y | Region | CIE x | CIE y |
|------------------------|--------|--------|--------|--------|--------|
| W rank (2700 K) | | | | | |
| 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 |
|------------------------|--------|--------|--------|--------|--------|
| V rank (3000 K) | | | | | |
| 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 |

d) Chromaticity Region & Coordinates

| Region | CIE x | CIE y | Region | CIE x | CIE y |
|------------------------|--------|--------|--------|--------|--------|
| U rank (3500 K) | | | | | |
| 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 |
|------------------------|--------|--------|--------|--------|--------|
| T rank (4000 K) | | | | | |
| 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 |

d) Chromaticity Region & Coordinates

| Region | CIE x | CIE y | Region | CIE x | CIE y | Region | CIE x | CIE y |
|------------------------|--------|--------|------------------------|--------|--------|------------------------|--------|--------|
| R rank (5000 K) | | | Q rank (5700 K) | | | P rank (6500 K) | | |
| R1 | 0.3371 | 0.3490 | Q1 | 0.3215 | 0.3350 | P1 | 0.3068 | 0.3113 |
| | 0.3451 | 0.3554 | | 0.3290 | 0.3417 | | 0.3144 | 0.3186 |
| | 0.3440 | 0.3427 | | 0.3290 | 0.3300 | | 0.3130 | 0.3290 |
| | 0.3366 | 0.3369 | | 0.3222 | 0.3243 | | 0.3048 | 0.3207 |
| R2 | 0.3451 | 0.3554 | Q2 | 0.3290 | 0.3417 | P2 | 0.3144 | 0.3186 |
| | 0.3533 | 0.3620 | | 0.3371 | 0.3490 | | 0.3221 | 0.3261 |
| | 0.3515 | 0.3487 | | 0.3366 | 0.3369 | | 0.3213 | 0.3373 |
| | 0.3440 | 0.3427 | | 0.3290 | 0.3300 | | 0.3130 | 0.3290 |
| R3 | 0.3376 | 0.3616 | Q3 | 0.3207 | 0.3462 | P3 | 0.3048 | 0.3207 |
| | 0.3463 | 0.3687 | | 0.3290 | 0.3538 | | 0.3130 | 0.3290 |
| | 0.3451 | 0.3554 | | 0.3290 | 0.3417 | | 0.3115 | 0.3391 |
| | 0.3371 | 0.3490 | | 0.3215 | 0.3350 | | 0.3028 | 0.3304 |
| R4 | 0.3463 | 0.3687 | Q4 | 0.3290 | 0.3538 | P4 | 0.3130 | 0.3290 |
| | 0.3551 | 0.3760 | | 0.3376 | 0.3616 | | 0.3213 | 0.3373 |
| | 0.3533 | 0.3620 | | 0.3371 | 0.3490 | | 0.3205 | 0.3481 |
| | 0.3451 | 0.3554 | | 0.3290 | 0.3417 | | 0.3115 | 0.3391 |

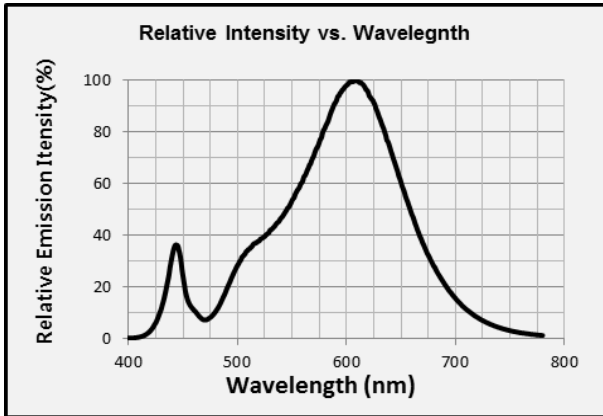
Note:

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

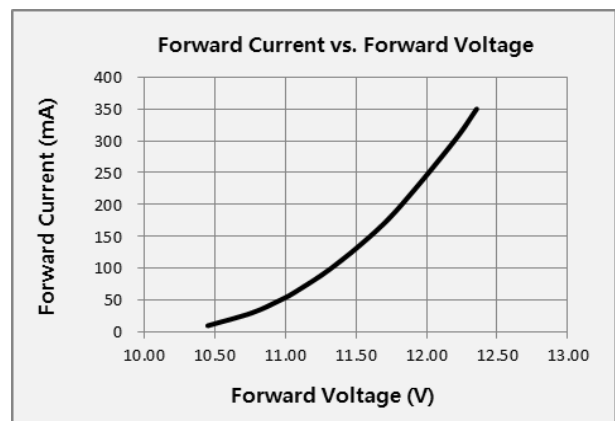
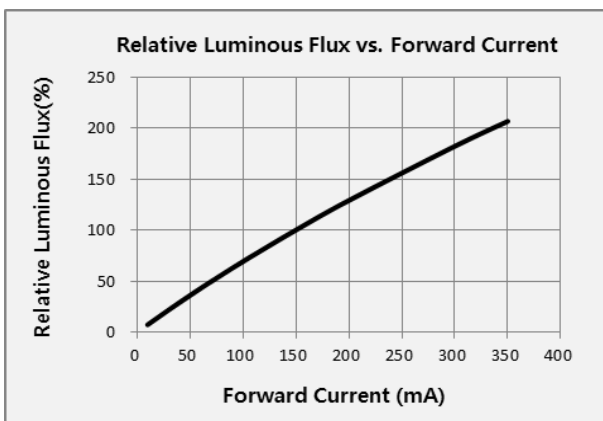
3. Typical Characteristics Graphs

a) Spectrum Distribution ($I_f = 150 \text{ mA}$, $T_s = 85 \text{ }^\circ\text{C}$)

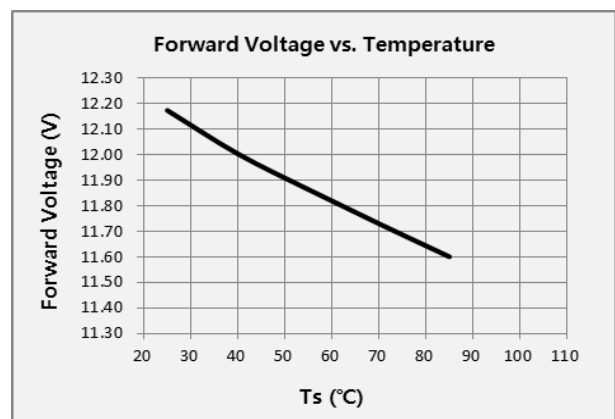
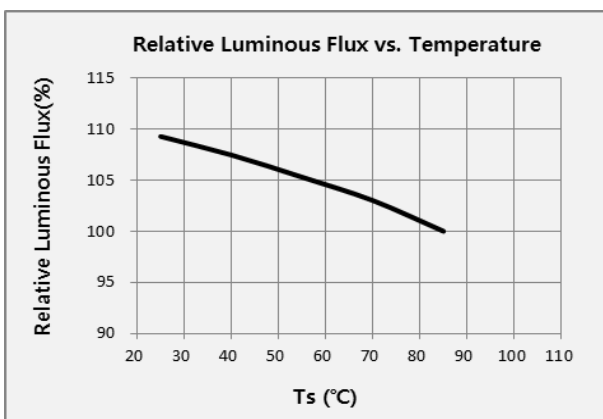
Warm White



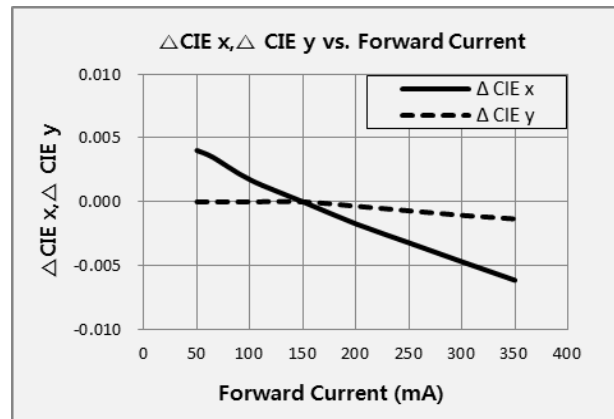
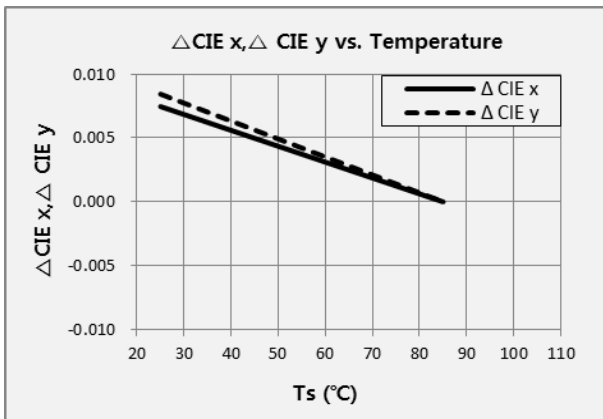
b) Forward Current Characteristics ($T_s = 85 \text{ }^\circ\text{C}$)



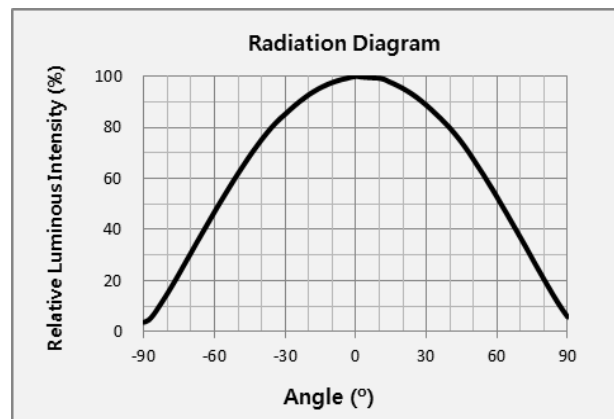
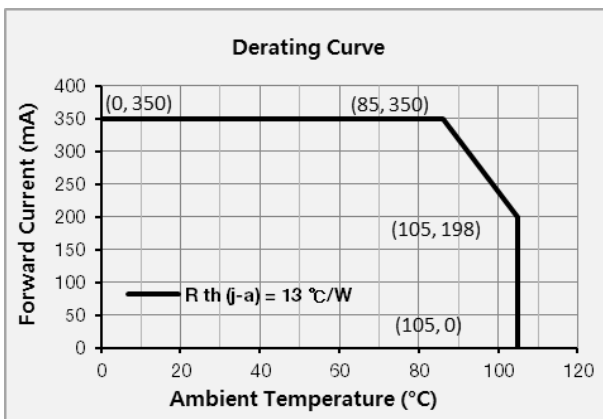
c) Temperature Characteristics ($I_f = 150 \text{ mA}$)



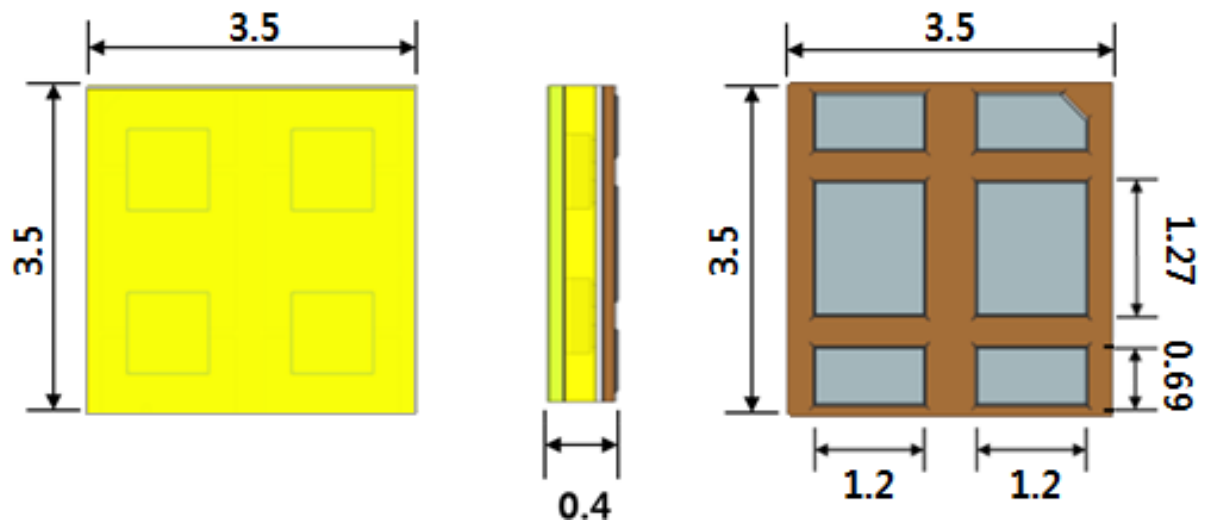
d) Color Shift Characteristics ($I_F = 150 \text{ mA}$, $T_s = 85 \text{ }^\circ\text{C}$)



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



4. Outline Drawing & Dimension



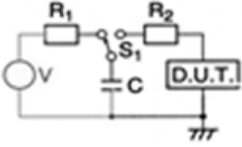
- Measurement unit: mm
- Maximum compressing force is 15 N on the body ①
- Do not place pressure on the encapsulation resin ②

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 & Conditions

a) Test Items

| Test Item | Test Condition | Test Hour / Cycle | Sample No. | |
|-------------------------------------|--|--|------------|----|
| Room Temperature Life Test | 25 °C, Derating max current | 1000 h | 22 | |
| High Temperature Life Test | 85 °C, Derating max current | 1000 h | 22 | |
| High Temperature Humidity Life Test | 85 °C, 85 % RH, Derating max current | 1000 h | 22 | |
| Low Temperature Life Test | -40 °C, Derating max current | 1000 h | 22 | |
| Powered Temperature Cycle Test | -45 °C / 20 min ↔ 85 °C / 20 min, sweep 100 min cycle on/off: each 5 min, Derating max current | 100 cycles | 22 | |
| Thermal Shock | -45 °C / 15 min ↔ 125 °C / 15 min → 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 ₁ : 10 MΩ R ₂ : 1.5 kΩ C: 100 pF V: ±2 kV | 5 times | 30 |
| ESD (MM) | | | | |
| Vibration Test | 20~2000~20 Hz, 200 m/s ² , sweep 4 min X, Y, Z 3 direction, each 1 cycle | 4 cycles | 11 | |
| Mechanical Shock Test | 1500 g, 0.5 ms 3 shocks each X-Y-Z axis | 5 cycles | 11 | |

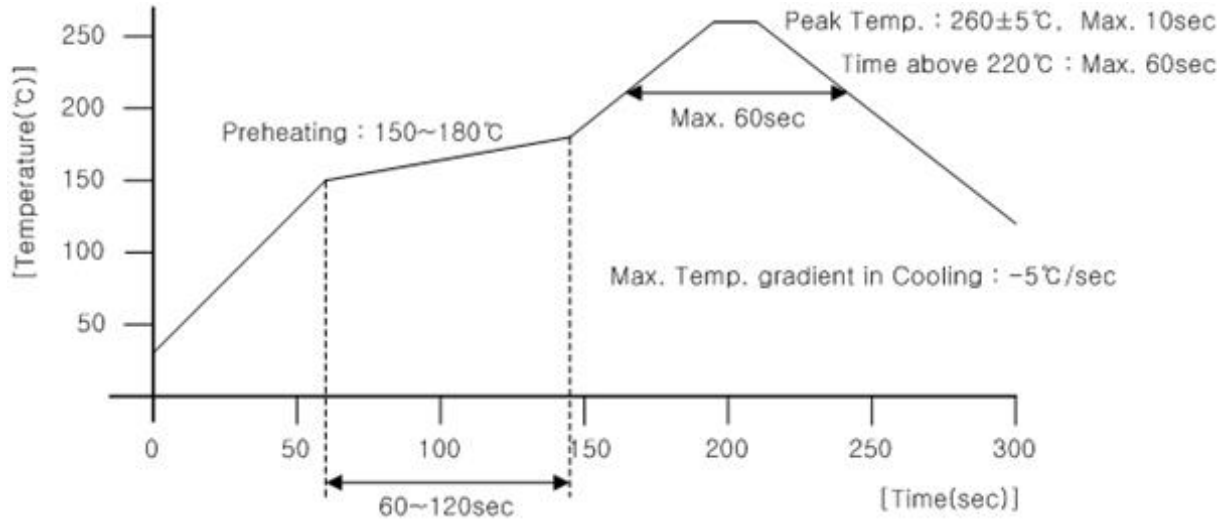
b) Criteria for Judging the Damage

| Item | Symbol | Test Condition (T _s = 25 °C) | Limit | |
|-----------------|----------------|--|-------------------|-------------------|
| | | | Min | Max |
| Forward Voltage | V _F | I _F = 150 mA | Init. Value * 0.9 | Init. Value * 1.1 |
| Luminous Flux | Φ _v | I _F = 150 mA | Init. Value * 0.7 | Init. Value * 1.1 |

6. Soldering Conditions

a) Reflow Conditions (Pb free)

Reflow frequency: 2 times max.

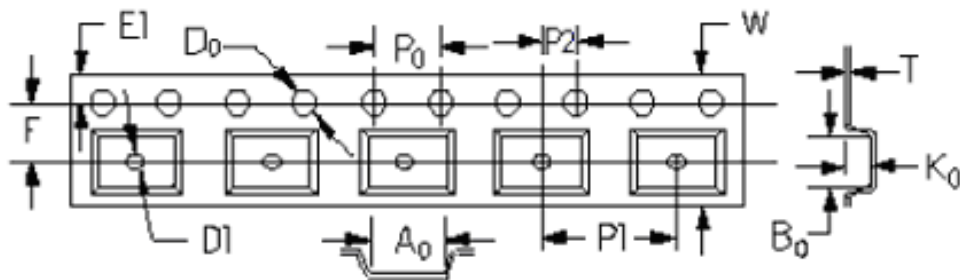


b) Manual Soldering Conditions

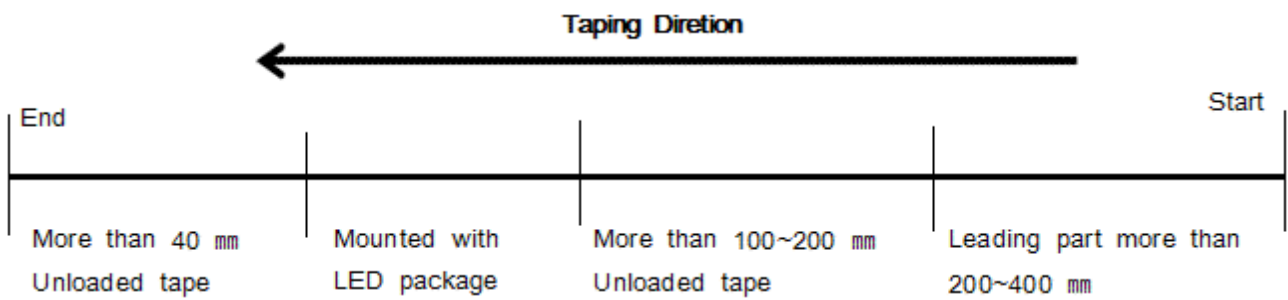
Not more than 5 seconds @ max. 300 °C, under soldering iron.

7. Tape & Reel

a) Taping Dimension

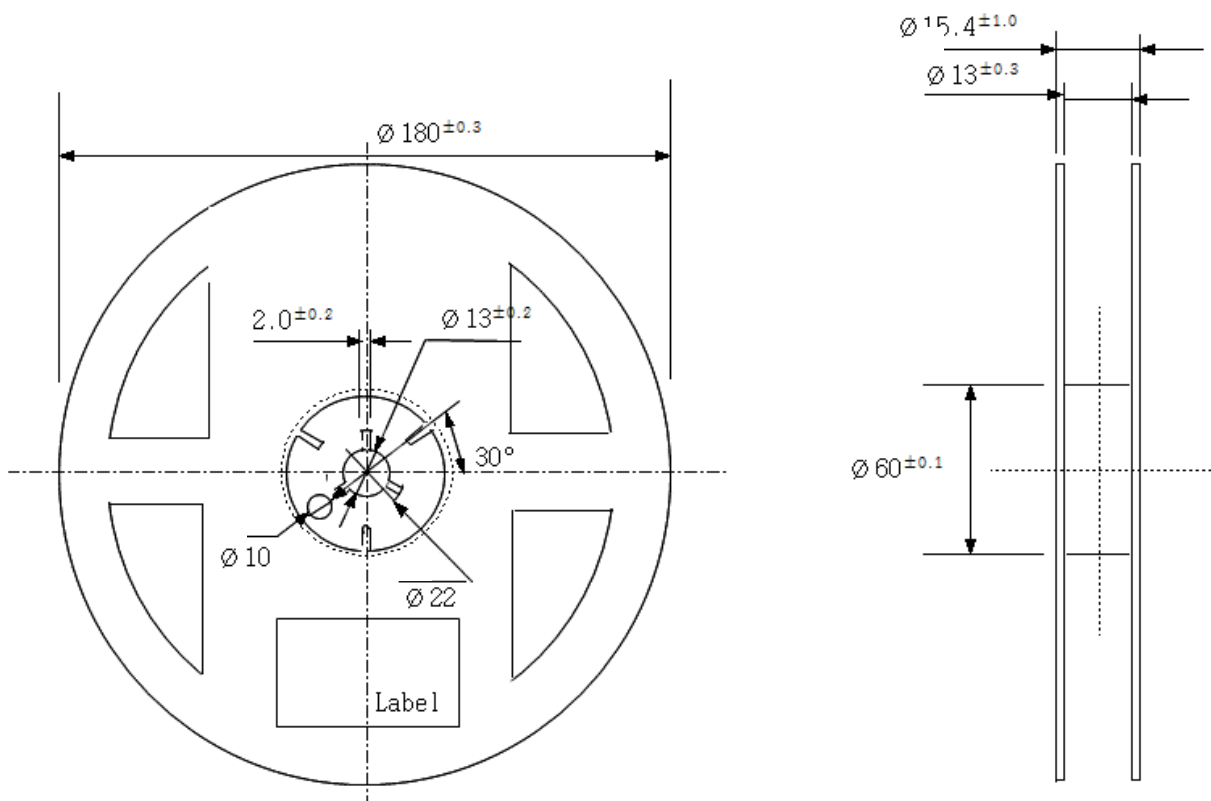


| Ao | Bo | Ko | T | W | P1 | E1 | F | D0 | D1 | P2 | Po | Po10 |
|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|--------|
| 3.800 | 3.800 | 1.000 | 0.250 | 12.000 | 8.000 | 1.750 | 5.500 | 1.500 | 1.500 | 2.000 | 4.000 | 40.000 |



b) Reel Dimension

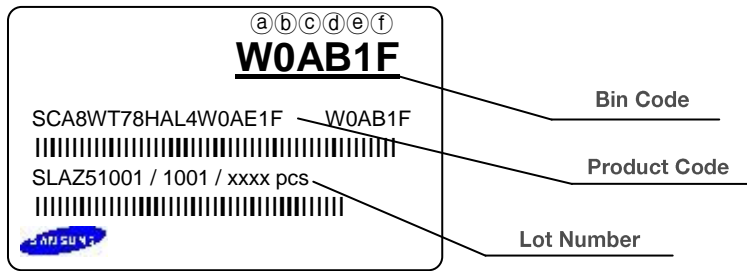
(unit: mm)

**Notes:**

- 1) Quantity: The quantity/reel is 1,000 pcs
- 2) Cumulative tolerance: Cumulative tolerance / 10 pitches is ± 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° 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



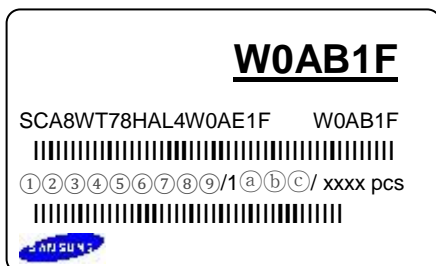
Note: Denoted bin code and product code above is only an example (see description on page 7)

Bin Code:

- ⒶⒷ: Forward Voltage bin (refer to page 10)
- ⒸⒹ: Chromaticity bin (refer to page 9)
- ⒺⒻ: Luminous Flux bin (refer to page 6-8)

b) Lot Number

The lot number is composed of the following characters:



①②③④⑤⑥⑦⑧⑨ / 1ⒶⒷⒸ / xxxx pcs

- ① : Production site (S: Giheung, Korea)
- ② : L (LED)
- ③ : Product state (A: Normal, B: Bulk, C: First Production, R: Reproduction, S: Sample)
- ④ : Year (A: 2016, B:2017, C:2018...)
- 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


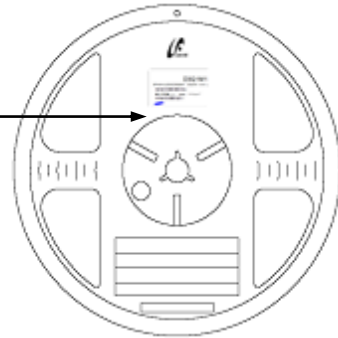
W0AB1F

SCA8WT78HAL4W0AE1F W0AB1F

|||||

SLAZ51001 / 1001 / xxxx pcs

|||||

Aluminum Vinyl Packing Bag


W0AB1F

SCA8WT78HAL4W0AE1F W0AB1F

|||||

SLAZ51001 / 1001 / xxxx pcs

|||||




Outer Box

Material: Paper SW(B)

| Type | Size (mm) | | | Note |
|--------|-----------|---------|---------|---------------|
| | (a) | (b) | (c) | |
| 7 inch | 245 ± 5 | 220 ± 5 | 182 ± 5 | Up to 7 reels |


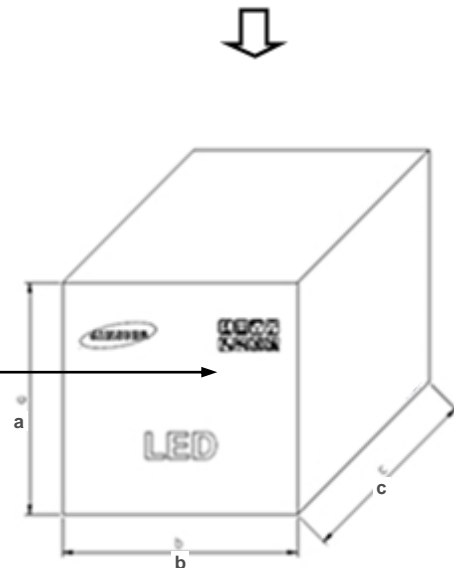
W0AB1F

SCA8WT78HAL4W0AE1F W0AB1F

|||||

SLAZ51001 / 1001 / xxxx pcs

|||||

b) Aluminum Vinyl Packing Bag



CAUTION

This bag contains
MOISTURE SENSITIVE DEVICES

LEVEL
2a

1. Shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)
2. Peak package body temperature: 240 °C
3. After this bag is opened, devices that will be subjected to reflow solder or other high temperature processes must be:
 - a. Mounted within 672 hours at factory conditions of equal to or less than 30°C /60% RH, or
 - b. Stored at <10% RH
4. Devices require bake, before mounting, if:
 - a. Humidity Indicator Card is >65% when read at 23±5°C, or
 - b. 2a is not met.
5. If baking is required, devices must be baked for 1 hours at 60±5°C

Note: If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure.

Bag seal due date: _____
(If blank, see code label)

Note: Level and body temperature by IPC/JEDEC J-STD-020

W0AB1F

SCA8WT78HAL4W0AE1F W0AB1F
 |||
 SLAZ5001 / 1001 / xxxx pcs
 |||








주의 사항

이 알루미늄 지퍼 팩은 습기 및 정전기로부터 제품을 보호하기 위하여 제작되었습니다. 개봉 후에는 즉시 솔더 작업을 실시하는 것을 권장합니다.

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Important

This Al Zipper bag is designed to protect the enclosed products from moisture and ESD. Once opened, the products should be soldered onto the printed circuit board immediately. When not in use, please do not leave the products unprotected by the Al Zipper Bag. To repack unused products., please ensure the zip-lock is completely sealed with the dry pack left inside.

c) Silica Gel & Humidity Indicator Card inside Aluminum Vinyl Bag



HUMISAFE™

10% 20% 30% 40% 50% 60%



READ AT TOP OF GREEN COLOR
CHANGE BETWEEN YELLOW AND GREEN

Warning if Green Change Desiccant

GP&E Co., Ltd.
6CF-60NS

10. Precautions in Handling & Use

- 1) For over-current protection, users are recommended to apply resistors connected in series with the LEDs to mitigate sudden change of the forward current caused by shift of forward voltage.
- 2) This device should not be used in any type of fluid such as water, oil, organic solvent, etc. When cleaning is required, IPA is recommended as the cleaning agent. Some solvent-based cleaning agent may damage the silicone resins used in the device.
- 3) When the device is in operation, the forward current should be carefully determined considering the maximum ambient temperature and corresponding junction temperature.
- 4) LEDs must be stored in a clean environment. If the LEDs are to be stored for three months or more after being shipped from Samsung, they should be packed with a nitrogen-filled container (shelf life of sealed bags is 12 months at temperature 0~40 °C, 0~90 % RH).
- 5) After storage bag is opened, device subjected to soldering, solder reflow, or other high temperature processes must be:
 - a. Mounted within 672 hours (28 days) at an assembly line with a condition of no more than 30 °C / 60 % RH, or
 - b. Stored at <10 % RH
- 6) Repack unused devices with anti-moisture packing, fold to close any opening and then store in a dry place.
- 7) Devices require baking before mounting, if humidity card reading is >60 % at 23 ± 5 °C.
- 8) Devices must be baked for 1 hour at 60 ± 5 °C, if baking is required.
- 9) The LEDs are sensitive to the static electricity and surge current. It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs. If voltage exceeding the absolute maximum rating is applied to LEDs, it may cause damage or even destruction to LED devices. Damaged LEDs may show some unusual characteristics such as increase in leakage current, lowered turn-on voltage, or abnormal lighting of LEDs at low current.
- 10) VOCs (Volatile Organic Compounds) can be generated from adhesives, flux, hardener or organic additives used in luminaires (fixtures). Transparent LED silicone encapsulant is permeable to those chemicals and they may lead to a discoloration of encapsulant when they exposed to heat or light. This phenomenon can cause a significant loss of light emitted (output) from the luminaires. In order to prevent these problems, we recommend users to know the physical properties of materials used in luminaires and they must be carefully selected.
- 11) Risk of sulfurization (or tarnishing)
 The LED from Samsung 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, LED should not be used and stored together with oxidizing substances made of materials such as rubber, plain paper, lead solder cream, etc.

Legal and additional information.

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