

Specification

SSC-STW9Q14C

SSC-STW9Q14C

August 2012

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STW9Q14C

Description

This surface-mount LED comes in standard package dimension. It has a substrate made up of a molded plastic reflector sitting on top of a lead frame. The die is attached within the reflector cavity and the cavity is encapsulated by silicone.

The package design coupled with careful selection of component materials allow these products to perform with high reliability.



STW9Q14C

Features

- Lead Frame type LED PKG
size: 5.6*3.0
thickness 0.75mm
- White colored SMT package
- Pb-free Reflow Soldering Application
- RoHS compliant
- High CRI Product (Ra min 90)

Applications

- Interior lighting
- General lighting
- Indoor and out door displays
- Architectural / Decorative lighting

SSC-STW9Q14C

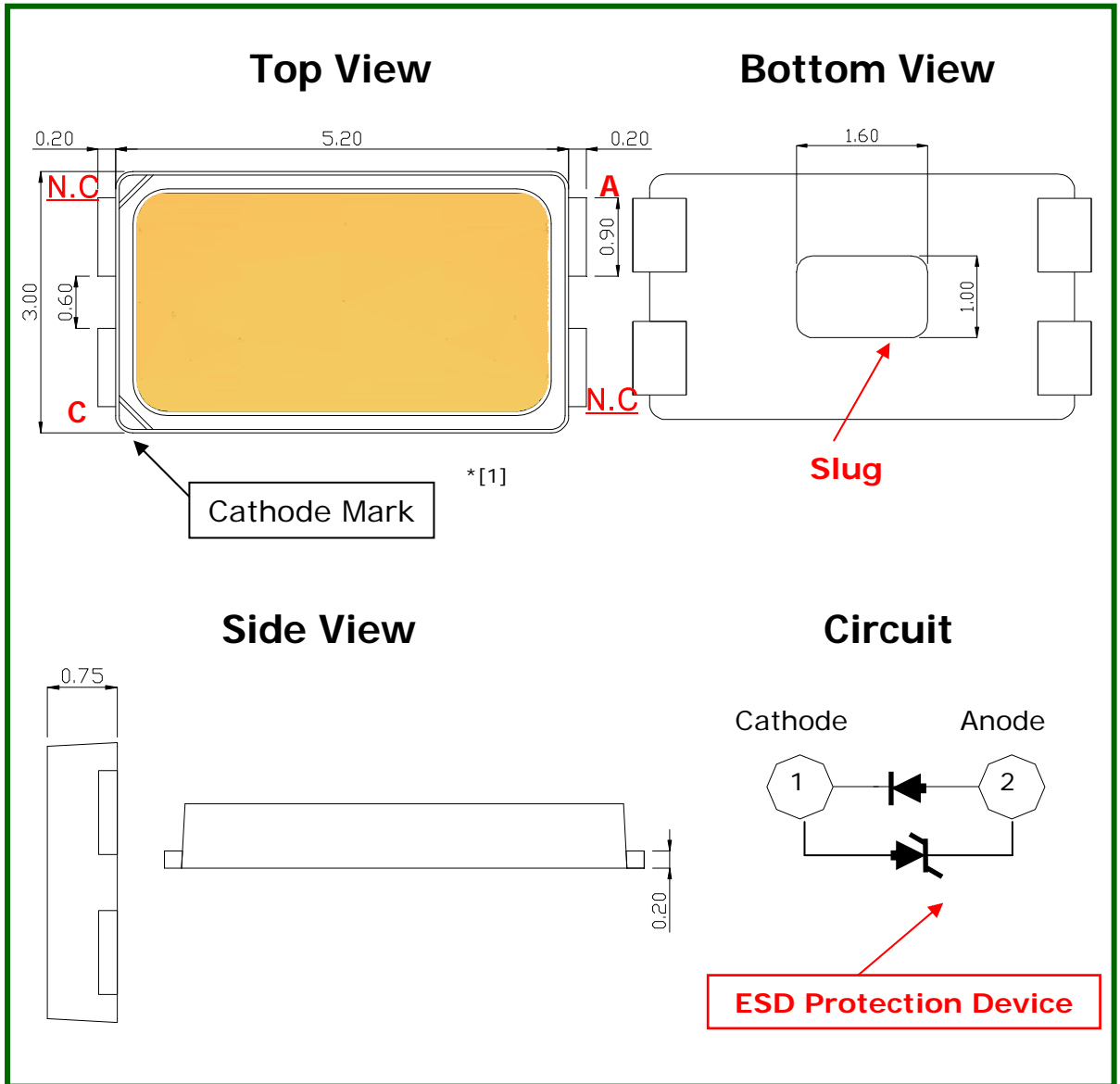
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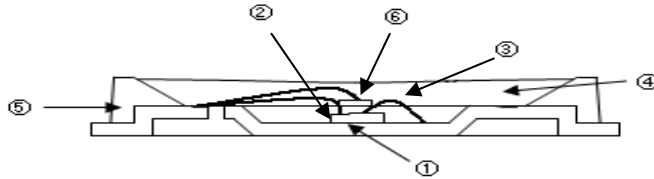
1. Outline dimensions of STW9Q14C



Notes :

- [1] All dimensions are in millimeters.
- [2] Scale : none
- [3] Undefined tolerance is $\pm 0.1\text{mm}$
- [4] The LED package has two Cathode Marks. *[1]

Material Structure



| Parts No. | Name | Description | Materials |
|-----------|---------------|----------------|------------------------------|
| ① | LEAD FRAME | Metal | Copper Alloy (Silver Plated) |
| ② | Chip Source | Blue LED | GaN on Sapphire |
| ③ | Wire | Metal | Gold Wire |
| ④ | Encapsulation | Silicone | +Phosphor |
| ⑤ | Body | Thermo Plastic | Heat-resistant Polymer |
| ⑥ | Zener Diode | Si | - |

3. Characteristics of STW9Q14C

1) Electro-Optical characteristics at 100mA

(Ta=25℃, RH30%)

| Parameter | Symbol | Value | | | Unit |
|---|-------------------|-------|----------------|-------|------------|
| | | Min | Typ | Max | |
| Forward Voltage | V _F | 2.9 | - | 3.4 | V |
| Reverse Voltage | V _R | - | 0.9 | 1.2 | V |
| Luminous Intensity* ^[1] (2,600~4,200 K) | I _v | - | 10.2 (30.9) | - | cd (lm) |
| Correlated Color Temperature | CCT | 2,600 | - | 4,200 | K |
| Viewing Angle ^[2] | 2θ _{1/2} | - | 120 | - | - |
| Color Rendering Index* | Ra | 90 | - | 100 | - |
| Thermal resistance ^[3] | R _{thJS} | - | 18 | - | °C/W |

*Notes :

All measurements were made under the standardized environment of SSC.

[1] The luminous intensity I_v was measured at the peak of the spatial pattern which may not be aligned with the mechanical axis of the LED package.

[2] 2θ_{1/2} is the off-axis where the luminous intensity is 1/2 of the peak intensity.

[3] Thermal resistance: R_{thJS} (Junction / solder)

* Tolerance : V_F : ±0.1V, I_v : ±7%, R_a : ±2, x,y : ±0.007

2) Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|-----------------------------------|------------------|-------------|------|
| Forward Current | I _F | 160 | mA |
| Power Dissipation* ^[1] | P _d | 560 | mW |
| Junction Temperature | T _j | 125 | °C |
| Operating Temperature | T _{opr} | -40 ~ +85 | °C |
| Storage Temperature | T _{stg} | -40 ~ +100 | °C |
| ESD (HBM) | | ±5,000V HBM | V |

*Notes :

LED's properties might be different from suggested values like above and below tables if operation condition will be exceeded our parameter range.

[1] Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.

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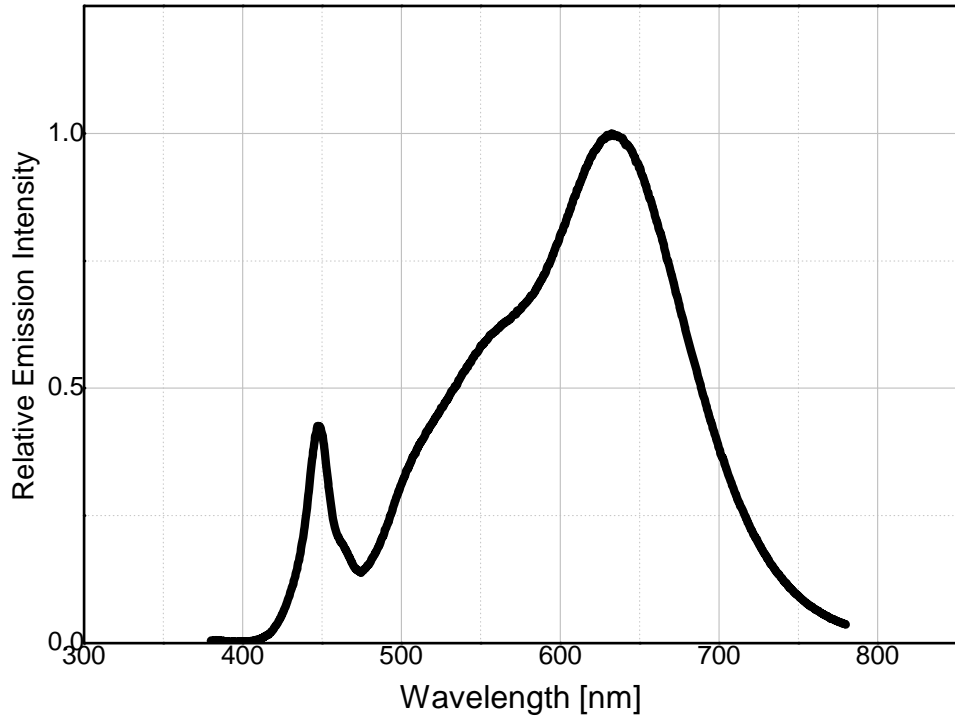
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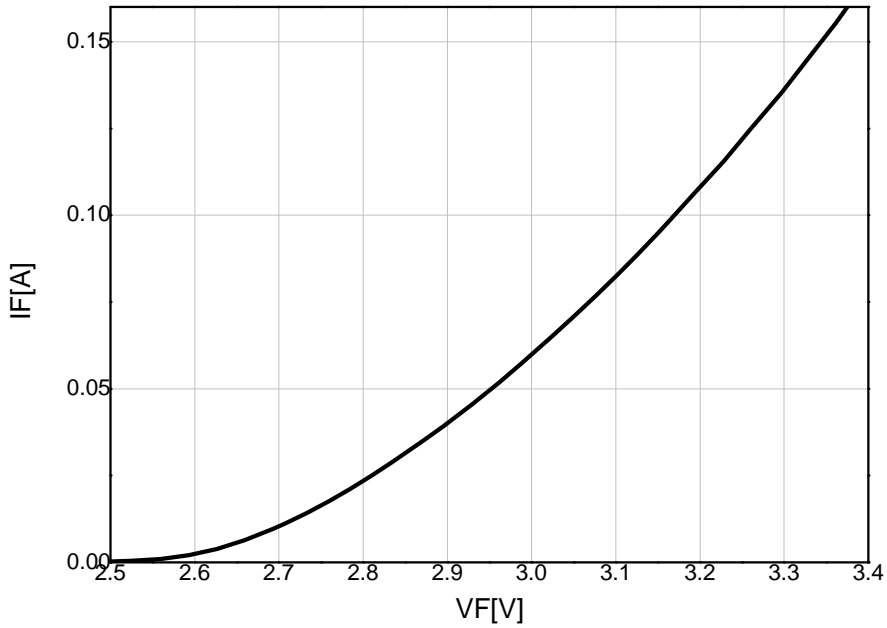
4. Characteristic diagrams

1) Spectrum data

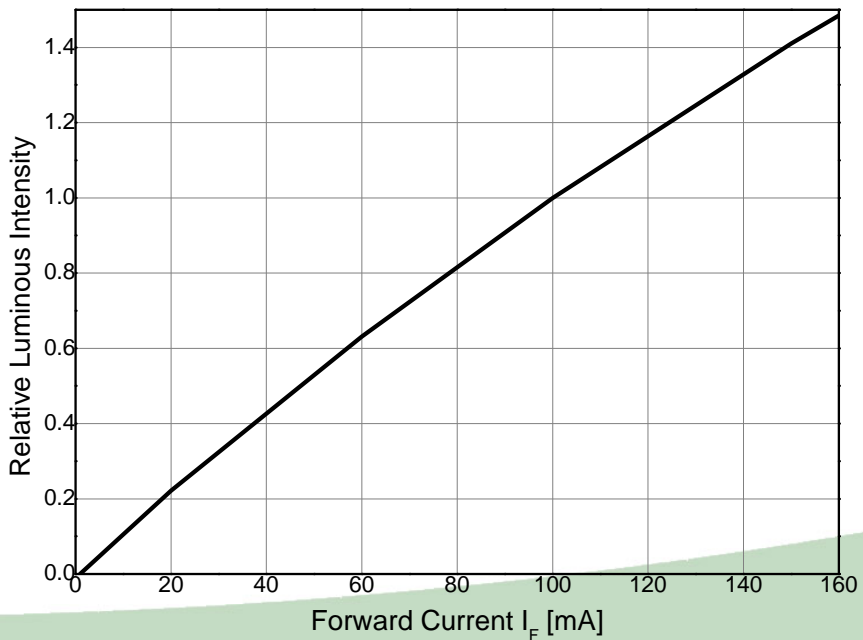
(IF=100mA, Ta=25°C, RH30%)



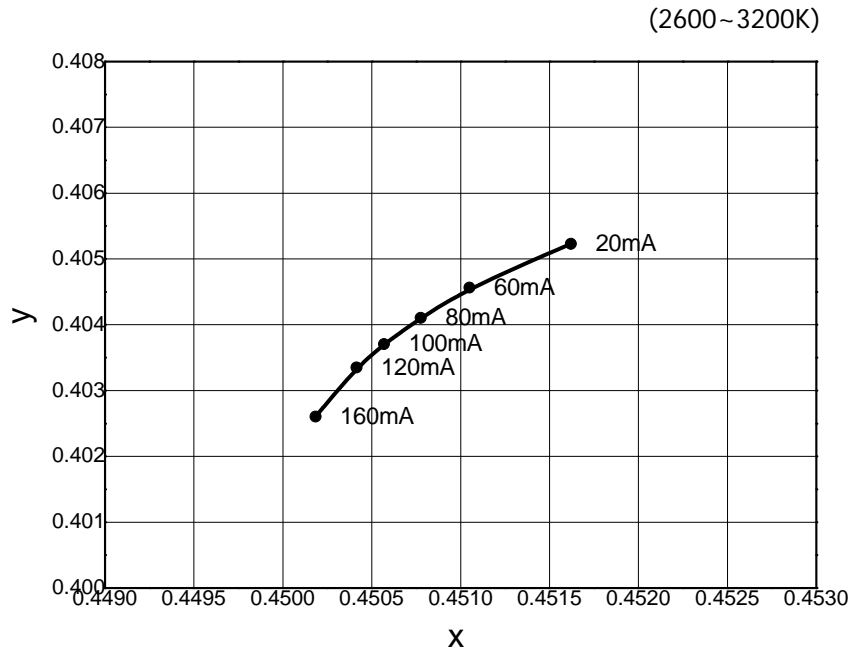
2) Forward Voltage vs. Forward Current, $T_a=25^\circ\text{C}$



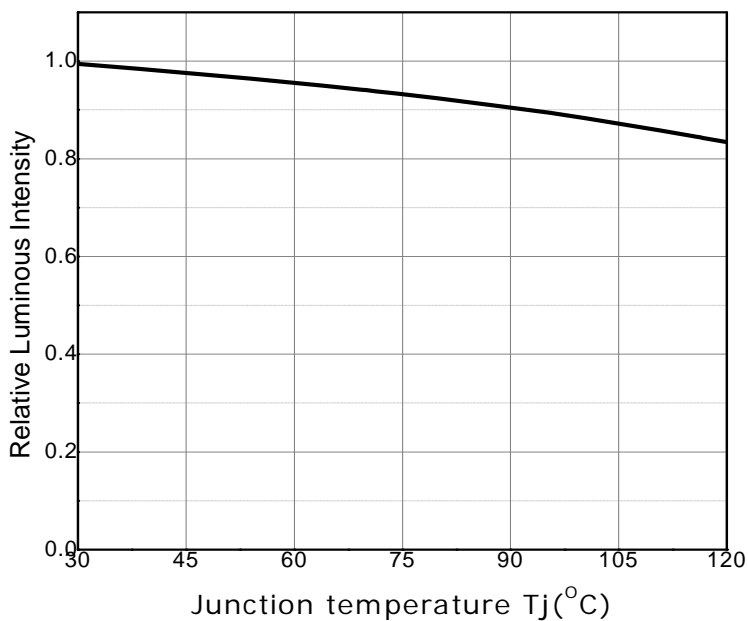
3) Forward Current vs. Relative Luminous Intensity, $T_a=25^\circ\text{C}$



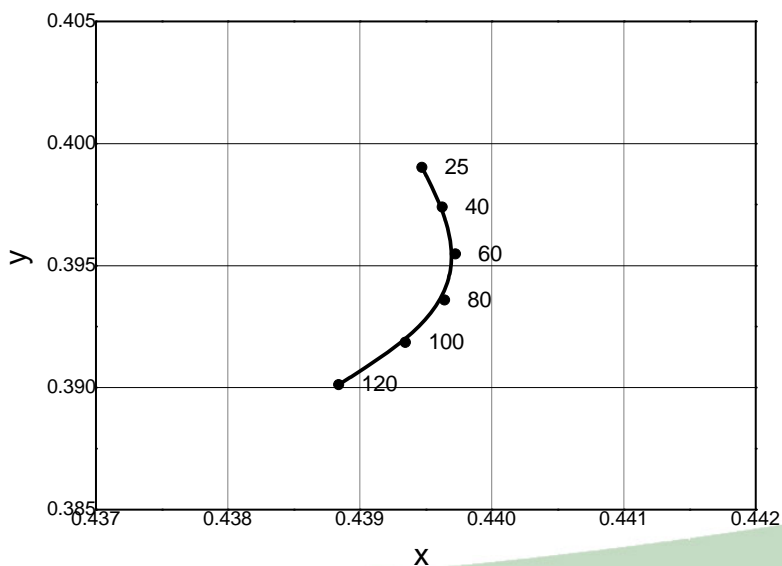
4) Chromaticity Coordinate vs. Forward Current, Ta=25 °C



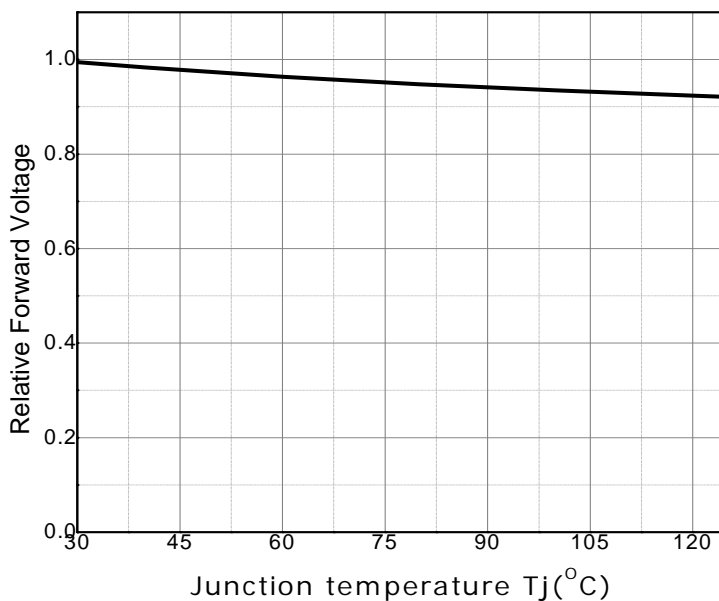
5) Relative Luminous Intensity vs. Junction Temperature, IF=100mA



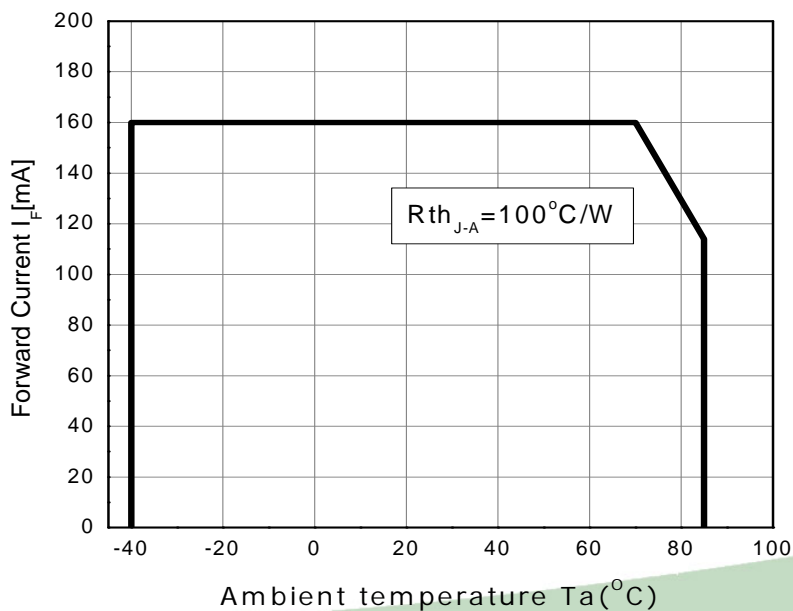
6) Chromaticity Coordinate vs. Junction Temperature, Ta=25°C



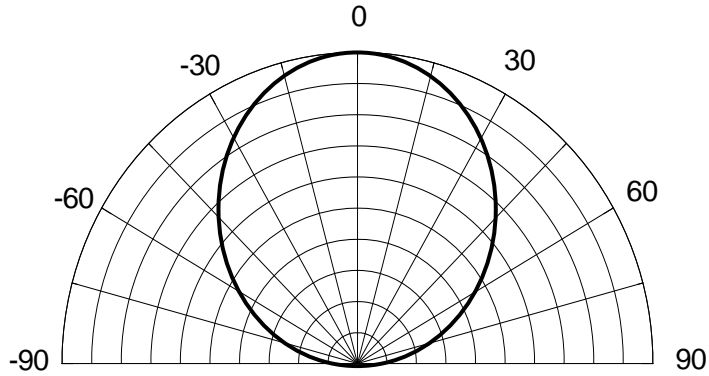
7) Ambient Temperature vs. Allowable Forward Current, $I_F=100\text{mA}$



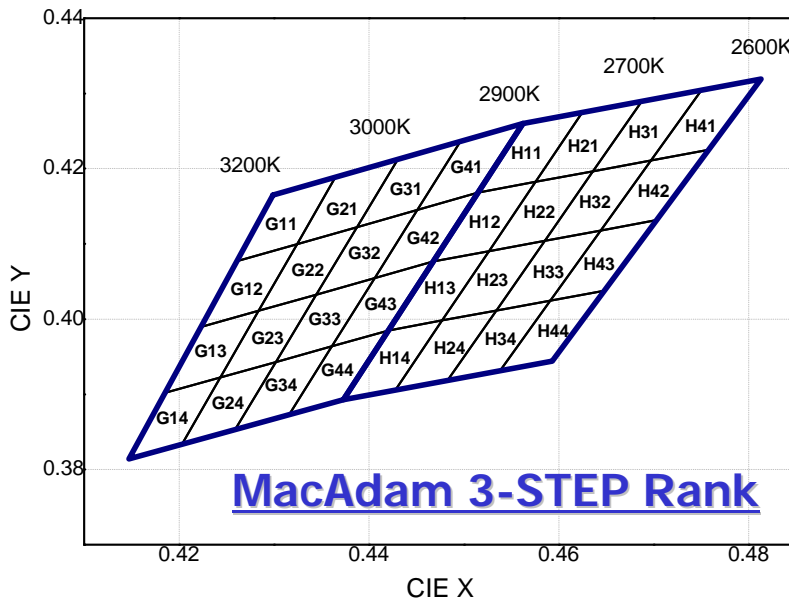
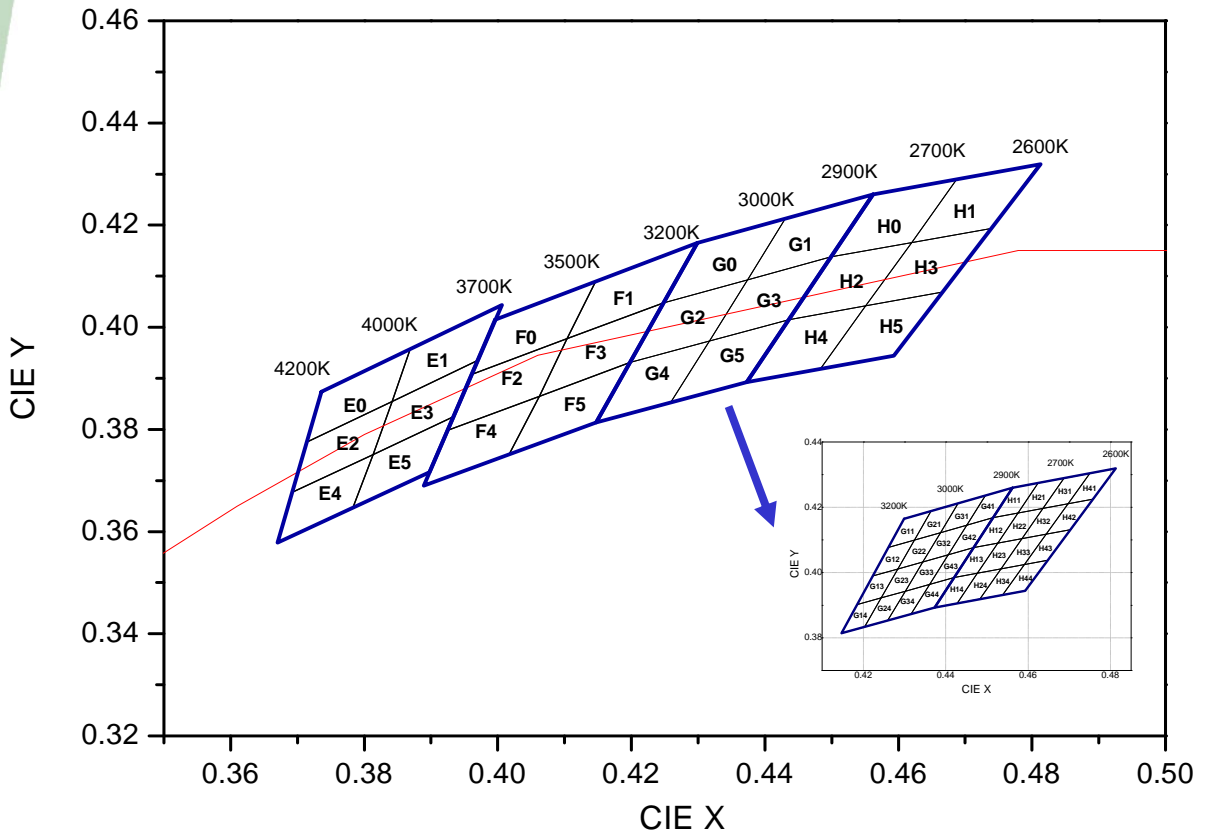
8) Ambient Temperature vs. Maximum Forward Current



9) Viewing angle, $T_a=25^\circ\text{C}$



5. Color & Binning



* Measurement Uncertainty of the Color Coordinates : ± 0.007

5. Color & Binning

● COLOR RANK

<IF=100mA, Ta=25℃>

| 4000~4200K | | | | | |
|------------|--------|--------|--------|--------|--------|
| E0 | | E2 | | E4 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.3736 | 0.3874 | 0.3714 | 0.3775 | 0.3692 | 0.3677 |
| 0.3714 | 0.3775 | 0.3692 | 0.3677 | 0.367 | 0.3578 |
| 0.3842 | 0.3855 | 0.3813 | 0.3751 | 0.3783 | 0.3646 |
| 0.3869 | 0.3958 | 0.3842 | 0.3855 | 0.3813 | 0.3751 |
| 3700~4000K | | | | | |
| E1 | | E3 | | E5 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.3869 | 0.3958 | 0.3842 | 0.3855 | 0.3813 | 0.3751 |
| 0.3842 | 0.3855 | 0.3813 | 0.3751 | 0.3783 | 0.3646 |
| 0.397 | 0.3935 | 0.3934 | 0.3825 | 0.3898 | 0.3716 |
| 0.4006 | 0.4044 | 0.397 | 0.3935 | 0.3934 | 0.3825 |
| 3500~3700K | | | | | |
| F0 | | F2 | | F4 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.3996 | 0.4015 | 0.396 | 0.3907 | 0.3925 | 0.3798 |
| 0.396 | 0.3907 | 0.3925 | 0.3798 | 0.3889 | 0.369 |
| 0.4104 | 0.3978 | 0.4062 | 0.3865 | 0.4017 | 0.3751 |
| 0.4146 | 0.4089 | 0.4104 | 0.3978 | 0.4062 | 0.3865 |
| 3200~3500K | | | | | |
| F1 | | F3 | | F5 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.4146 | 0.4089 | 0.4104 | 0.3978 | 0.4062 | 0.3865 |
| 0.4104 | 0.3978 | 0.4062 | 0.3865 | 0.4017 | 0.3751 |
| 0.4248 | 0.4048 | 0.4198 | 0.3931 | 0.4147 | 0.3814 |
| 0.4299 | 0.4165 | 0.4248 | 0.4048 | 0.4198 | 0.3931 |

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* Measurement Uncertainty of the Color Coordinates : ± 0.007

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서식번호 : SSC-QP-7-07-12 (Rev.01)

5. Color & Binning

● COLOR RANK

<IF=100mA, Ta=25℃>

| 3000~3200K | | | | 2900~3000K | | | |
|------------|--------|--------|--------|------------|--------|--------|--------|
| G11 | | G21 | | G31 | | G41 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.4365 | 0.4189 | 0.4430 | 0.4212 | 0.4496 | 0.4236 | 0.4562 | 0.4260 |
| 0.4324 | 0.4100 | 0.4387 | 0.4122 | 0.4451 | 0.4145 | 0.4515 | 0.4168 |
| 0.4261 | 0.4077 | 0.4324 | 0.4100 | 0.4387 | 0.4122 | 0.4451 | 0.4145 |
| 0.4299 | 0.4165 | 0.4365 | 0.4189 | 0.4430 | 0.4212 | 0.4496 | 0.4236 |
| G12 | | G22 | | G32 | | G42 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.4324 | 0.4100 | 0.4387 | 0.4122 | 0.4451 | 0.4145 | 0.4515 | 0.4168 |
| 0.4284 | 0.4011 | 0.4345 | 0.4033 | 0.4406 | 0.4055 | 0.4468 | 0.4077 |
| 0.4223 | 0.3990 | 0.4284 | 0.4011 | 0.4345 | 0.4033 | 0.4406 | 0.4055 |
| 0.4261 | 0.4077 | 0.4324 | 0.4100 | 0.4387 | 0.4122 | 0.4451 | 0.4145 |
| G13 | | G23 | | G33 | | G43 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.4284 | 0.4011 | 0.4345 | 0.4033 | 0.4406 | 0.4055 | 0.4468 | 0.4077 |
| 0.4243 | 0.3922 | 0.4302 | 0.3943 | 0.4361 | 0.3964 | 0.4420 | 0.3985 |
| 0.4185 | 0.3902 | 0.4243 | 0.3922 | 0.4302 | 0.3943 | 0.4361 | 0.3964 |
| 0.4223 | 0.3990 | 0.4284 | 0.4011 | 0.4345 | 0.4033 | 0.4406 | 0.4055 |
| G14 | | G24 | | G34 | | G44 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.4243 | 0.3922 | 0.4302 | 0.3943 | 0.4361 | 0.3964 | 0.4316 | 0.3873 |
| 0.4203 | 0.3834 | 0.4259 | 0.3853 | 0.4259 | 0.3853 | 0.4302 | 0.3943 |
| 0.4147 | 0.3814 | 0.4203 | 0.3834 | 0.4420 | 0.3985 | 0.4373 | 0.3893 |
| 0.4185 | 0.3902 | 0.4243 | 0.3922 | 0.4316 | 0.3873 | 0.4361 | 0.3964 |

5. Color & Binning

● COLOR RANK

<IF=100mA, Ta=25°C>

| 2700~2900K | | | | 2600~2700K | | | |
|------------|--------|--------|--------|------------|--------|--------|--------|
| H11 | | H21 | | H31 | | H41 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.4325 | 0.4275 | 0.4687 | 0.4289 | 0.4750 | 0.4304 | 0.4810 | 0.4319 |
| 0.4575 | 0.4182 | 0.4636 | 0.4197 | 0.4697 | 0.4211 | 0.4758 | 0.4225 |
| 0.4515 | 0.4168 | 0.4575 | 0.4182 | 0.4636 | 0.4197 | 0.4697 | 0.4211 |
| 0.4562 | 0.4260 | 0.4625 | 0.4275 | 0.4687 | 0.4289 | 0.4750 | 0.4304 |
| H12 | | H22 | | H32 | | H42 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.4575 | 0.4182 | 0.4636 | 0.4197 | 0.4697 | 0.4211 | 0.4758 | 0.4225 |
| 0.4526 | 0.4090 | 0.4585 | 0.4104 | 0.4644 | 0.4118 | 0.4703 | 0.4132 |
| 0.4468 | 0.4077 | 0.4526 | 0.4090 | 0.4585 | 0.4104 | 0.4644 | 0.4118 |
| 0.4515 | 0.4168 | 0.4575 | 0.4182 | 0.4636 | 0.4197 | 0.4697 | 0.4211 |
| H13 | | H23 | | H33 | | H43 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.4526 | 0.4090 | 0.4585 | 0.4104 | 0.4644 | 0.4118 | 0.4703 | 0.4132 |
| 0.4477 | 0.3998 | 0.4534 | 0.4012 | 0.4591 | 0.4025 | 0.4648 | 0.4038 |
| 0.4420 | 0.3985 | 0.4477 | 0.3998 | 0.4534 | 0.4012 | 0.4591 | 0.4025 |
| 0.4468 | 0.4077 | 0.4526 | 0.4090 | 0.4585 | 0.4104 | 0.4644 | 0.4118 |
| H14 | | H24 | | H34 | | H44 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.4477 | 0.3998 | 0.4534 | 0.4012 | 0.4591 | 0.4025 | 0.4648 | 0.4038 |
| 0.4428 | 0.3906 | 0.4483 | 0.3919 | 0.4538 | 0.3932 | 0.4593 | 0.3944 |
| 0.4373 | 0.3893 | 0.4428 | 0.3906 | 0.4483 | 0.3919 | 0.4538 | 0.3932 |
| 0.4420 | 0.3985 | 0.4477 | 0.3998 | 0.4534 | 0.4012 | 0.4591 | 0.4025 |

6. Bin Code Description

| Bin Code | | |
|--------------------------|------------|---------------------|
| Luminous Intensity [mcd] | Color Rank | Forward Voltage [V] |
| S0 | E1 | Z1 |



2,600K ~ 4,200K

| Luminous Intensity [mcd] * [1] @ $I_F = 100\text{mA}$ | | | Flux * [2] [lm] |
|---|-------|-------|-----------------------|
| RANK | Min. | Max. | Typ. |
| S0 | 9000 | 10000 | 29.5 |
| T0 | 10000 | 11000 | 31.8 |
| U0 | 11000 | 11700 | 33.5 |

| Color Rank @ $I_F = 100\text{mA}$ |
|--------------------------------------|
| E~H |

| Forward Voltage [V] @ $I_F = 100\text{mA}$ | | |
|---|------|------|
| RANK | Min. | Max. |
| Y3 | 2.9 | 3.0 |
| Z1 | 3.0 | 3.1 |
| Z2 | 3.1 | 3.2 |
| Z3 | 3.2 | 3.3 |
| A1 | 3.3 | 3.4 |

- Available ranks
- Not yet available ranks

| CCT | CIE | IV Rank | | |
|------------|-----|---------|----|----|
| 3700~4200K | E | SO | T0 | U0 |
| 3200~3700K | F | SO | T0 | U0 |
| 2900~3200K | G | SO | T0 | U0 |
| 2600~2900K | H | SO | T0 | U0 |

***Notes :**

All measurements were made under the standardized environment of SSC.

[1] SSC sort the LED package according to the luminous intensity IV.

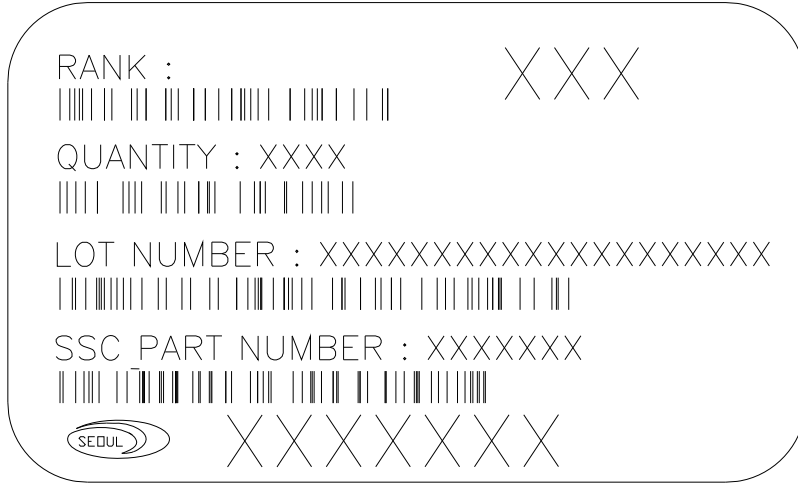
[2] The lumen table is only for reference.

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7. Labeling



Full code form :

X₁X₂-X₃X₄-X₅-X₆X₇-X₈

- X₁ : Company
- X₂ : Kind of LED
- X₃X₄ : CRI Group
- X₅ : Package series
- X₆X₇ : Characteristic code
- X₈ : Version

Rank

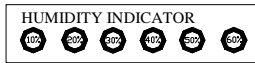
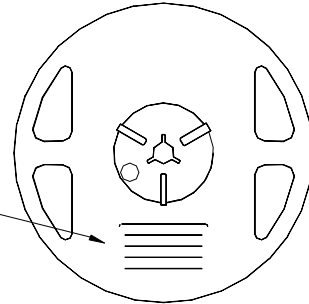
#1#2#3

- #1 : Luminous Intensity : IV [mcd]
- #2 : Color coordinates : x, y
- #3 : Forward Voltage : V_F [V]

8. Packing

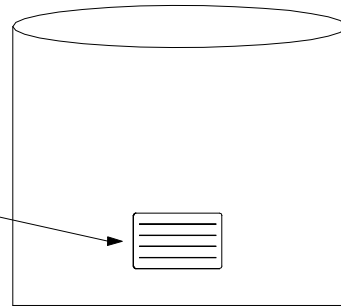
Reel

RANK: XXXX
 QUANTITY : XXXX
 LOT NUMBER : XXXXXXXXXXXX
 PART NUMBER : XXXXXXXX
 SEOUL SEMICONDUCTOR CO., LTD.



Aluminum Vinyl Bag

RANK: XXXX
 QUANTITY : XXXX
 LOT NUMBER : XXXXXXXXXXXX
 PART NUMBER : XXXXXXXX
 SEOUL SEMICONDUCTOR CO., LTD.



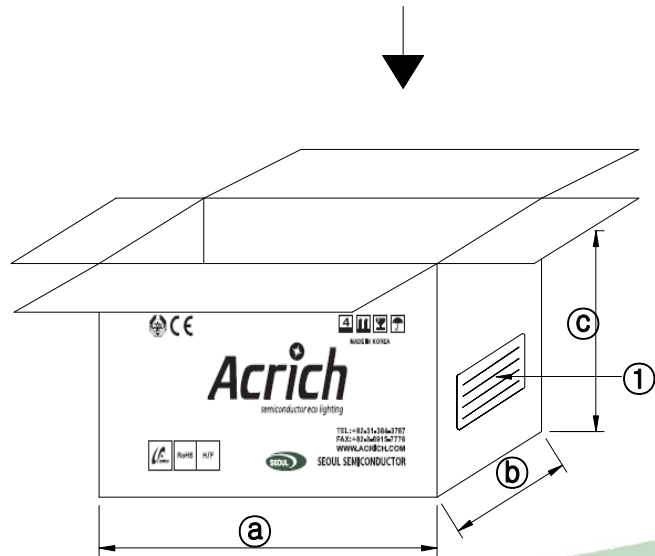
Outer Box Structure

Material : Paper(SW3B(B))

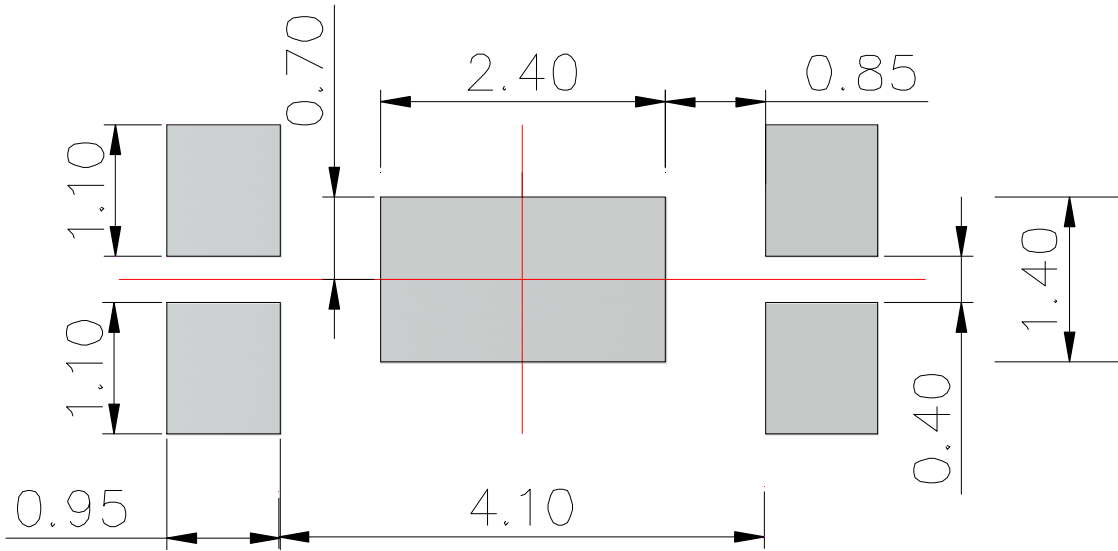
| TYPE | SIZE (mm) | | |
|-------|-----------|-----|-----|
| | a | b | c |
| 7inch | 245 | 220 | 102 |
| | 245 | 220 | 142 |

① SIDE

RANK: XXXX
 QUANTITY : XXXX
 LOT NUMBER : XXXXXXXXXXXX
 PART NUMBER : XXXXXXXX
 SEOUL SEMICONDUCTOR CO., LTD.



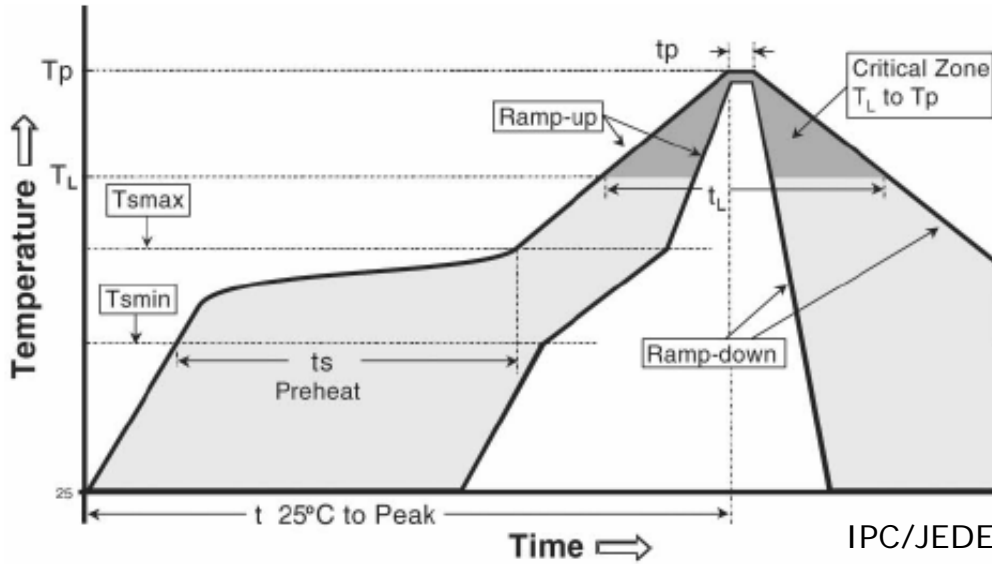
9. Recommended solder pad



Notes :

- [1] All dimensions are in millimeters.
- [2] Scale : none
- [3] Undefined tolerance is $\pm 0.1\text{mm}$
This drawing without tolerances are for reference only.

10. Soldering



IPC/JEDEC J-STD-020

| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|--|------------------------------------|------------------------------------|
| Average ramp-up rate (T_{smax} to T_p) | 3° C/second max. | 3° C/second max. |
| Preheat - Temperature Min (T _{smin}) - Temperature Max (T _{smax}) - Time (T _{smin} to T _{smax}) (t _s) | 100 °C 150 °C 60-120 seconds | 150 °C 200 °C 60-180 seconds |
| Time maintained above: - Temperature (T _L) - Time (t _L) | 183 °C 60-150 seconds | 217 °C 60-150 seconds |
| Peak Temperature (T _p) | 215 °C | 260 °C |
| Time within 5°C of actual Peak Temperature (t _p) ² | 10-30 seconds | 20-40 seconds |
| Ramp-down Rate | 6 °C/second max. | 6 °C/second max. |
| Time 25°C to Peak Temperature | 6 minutes max. | 8 minutes max. |

*** Caution**

1. Reflow soldering is recommended not to be done more than two times. In the case of more than 24 hours passed soldering after first, LEDs will be damaged.
2. Repairs should not be done after the LEDs have been soldered. When repair is unavoidable, suitable tools must be used.
3. Die slug is to be soldered.
4. When soldering, do not put stress on the LEDs during heating.
5. After soldering, do not warp the circuit board.

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11. Precaution for use

(1) Storage

To avoid the moisture penetration, we recommend store in a dry box with a desiccant . The recommended storage temperature range is 5C to 30C and a maximum humidity of RH50%.

(2) Use Precaution after Opening the Packaging

Use proper SMD techniques when the LED is to be soldered dipped as separation of the lens may affect the light output efficiency.

Pay attention to the following:

a. Recommend conditions after opening the package

- Sealing

- Temperature : 5 ~ 40℃ Humidity : less than RH30%

b. If the package has been opened more than 4 week(MSL_2a) or the color of the desiccant changes, components should be dried for 10-12hr at 60±5℃

(3) Do not apply mechanical force or excess vibration during the cooling process to normal temperature after soldering.

(4) Do not rapidly cool device after soldering.

(5) Components should not be mounted on warped (non coplanar) portion of PCB.

(6) Radioactive exposure is not considered for the products listed here in.

(7) Gallium arsenide is used in some of the products listed in this publication. These products are dangerous if they are burned or shredded in the process of disposal. It is also dangerous to drink the liquid or inhale the gas generated by such products when chemically disposed of.

(8) This device should not be used in any type of fluid such as water, oil, organic solvent and etc. When washing is required, IPA (Isopropyl Alcohol) should be used.

(9) When the LEDs are in operation the maximum current should be decided after measuring the package temperature.

(10) LEDs must be stored properly to maintain the device. If the LEDs are stored for 3 months or more after being shipped from SSC, a sealed container with a nitrogen atmosphere should be used for storage.

(11) The appearance and specifications of the product may be modified for improvement without notice.

(12) Long time exposure of sunlight or occasional UV exposure will cause lens discoloration.

(13) VOCs (Volatile organic compounds) emitted from materials used in the construction of fixtures can penetrate silicone encapsulants of LEDs and discolor when exposed to heat and photonic energy. The result can be a significant loss of light output from the fixture.

Knowledge of the properties of the materials selected to be used in the construction of fixtures can help prevent these issues.

(14) Attaching LEDs, do not use adhesives that outgas organic vapor.

(15) The driving circuit must be designed to allow forward voltage only when it is ON or OFF.

If the reverse voltage is applied to LED, migration can be generated resulting in LED damage.

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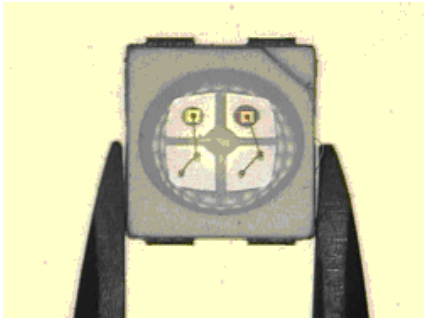
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12. Handling of Silicone Resin LEDs

(1) During processing, mechanical stress on the surface should be minimized as much as possible. Sharp objects of all types should not be used to pierce the sealing compound.



(2) In general, LEDs should only be handled from the side. By the way, this also applies to LEDs without a silicone sealant, since the surface can also become scratched.



(3) When populating boards in SMT production, there are basically no restrictions regarding the form of the pick and place nozzle, except that mechanical pressure on the surface of the resin must be prevented. This is assured by choosing a pick and place nozzle which is larger than the LED's reflector area.

(4) Silicone differs from materials conventionally used for the manufacturing of LEDs. These conditions must be considered during the handling of such devices. Compared to standard encapsulants, silicone is generally softer, and the surface is more likely to attract dust.

As mentioned previously, the increased sensitivity to dust requires special care during processing. In cases where a minimal level of dirt and dust particles cannot be guaranteed, a suitable cleaning solution must be applied to the surface after the soldering of components.

(5) SSC suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package or resin. Ultrasonic cleaning is not recommended. Ultrasonic cleaning may cause damage to the LED.

(6) Please do not mold this product into another resin (epoxy, urethane, etc) and do not handle this product with acid or sulfur material in sealed space.