



SPECIFICATION

[STW0Q2PA]

CUSTOMER

| Checked by | Approved by |
|------------|-------------|
| | |
| | |

SUPPLIER

| Drawn by | Approved by |
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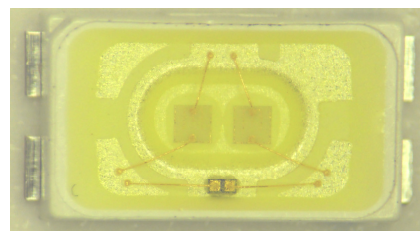
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STW0Q2PA

1. 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 bent 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.



Features

White colored SMT package.

- Pb-free Reflow Soldering Application
- Suitable for all SMT assembly methods ; Suitable for all soldering methods
- RoHS Compliant

Applications

- White Back-light unit
- Electric Signs and Signals
- Office Automation, Electrical Appliances, Industrial Equipment

2. Absolute maximum ratings*1

| Parameter | Symbol | Value | Unit |
|-----------------------|----------------|----------|------|
| Power Dissipation | P_d | 592 | mW |
| Forward Current | I_F | 160 | mA |
| Peak Forward Current | $I_{FM}^{[2]}$ | 300 | mA |
| Operating Temperature | T_{opr} | -40~+85 | °C |
| Storage Temperature | T_{stg} | -40~+100 | °C |
| Junction Temperature | T_j | 125 | °C |

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

[2] IFM was measured at $T_w \leq 1$ msec of pulse width and $D \leq 1/10$ of duty ratio.

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

3. Electric characteristics

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|--|-----------------|----------------------|------|------|------|------|
| Forward Voltage * ^[1] | V_F | $I_F=100\text{mA}$ | 2.9 | 3.2 | 3.4 | V |
| Reverse Voltage | V_R | $I_R=5\text{mA}$ | - | 0.9 | 1.2 | V |
| Luminous Intensity* ^[2] (4700~7000K) | I_v | $I_F=100\text{mA}$ | 9 | 10.5 | - | cd |
| Luminous flux | Φ | $I_F=100\text{mA}$ | - | 31.8 | - | lm |
| Viewing Angle ^[3] | $2\theta_{1/2}$ | $I_F=100\text{mA}$ | - | 120 | - | deg. |
| Color Rendering Index* | Ra | $I_F=100\text{mA}$ | - | 68 | - | - |
| ESD (HBM) | | 1.5k Ω ;100pF | 5 | - | - | KV |
| Thermal resistance ^[4] | R_{thJS} | $I_F=100\text{mA}$ | - | 15 | - | °C/W |

[1] Forward current is 50mA per die for parallel inner circuit.
Package Total Forward Current is 100mA

[2] 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.

[3] $2\theta_{1/2}$ is the off-axis where the luminous intensity is 1/2 of the peak intensity.

[4] Thermal resistance: R_{thJS} (Junction / solder), Metal PCB 25*25mm 1.6t

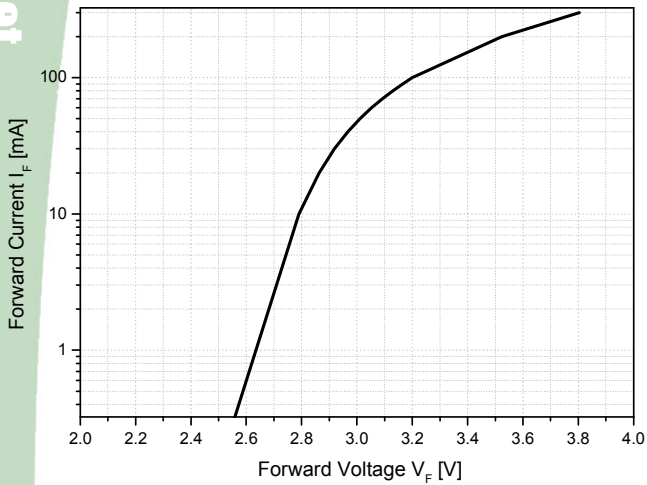
* Tolerance : $V_F : \pm 0.1\text{V}$, $I_v : \pm 10\%$, $R_a : \pm 3$, $x, y : \pm 0.01$

[Note] All measurements were made under the standardized environment of SSC.

4. Optical characteristics

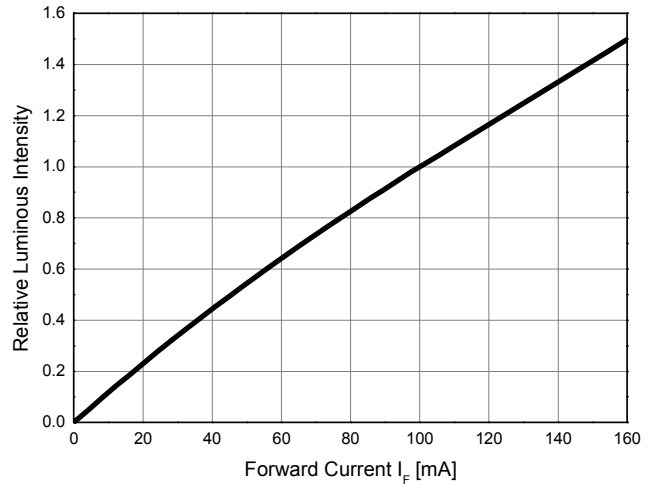
Forward Voltage vs. Forward Current

Ta=25°C



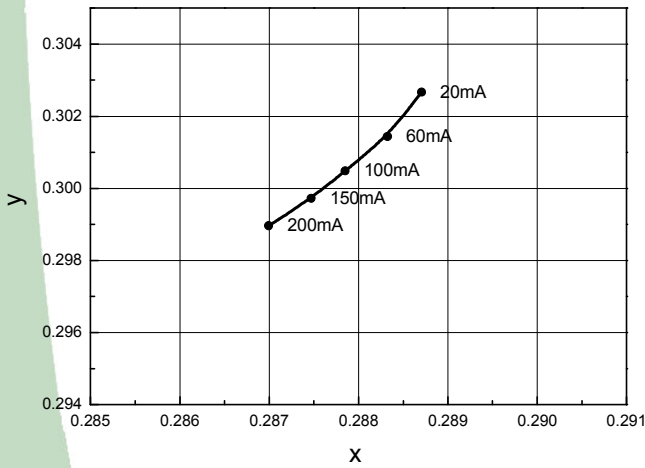
Forward Current vs. Relative Luminous Intensity

Ta=25°C



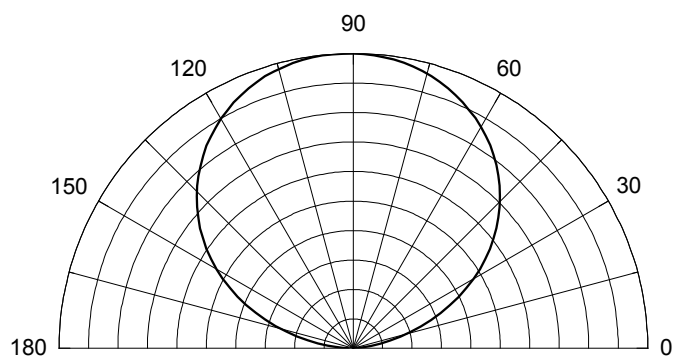
Forward Current vs. Chromaticity Coordinate

Ta=25°C



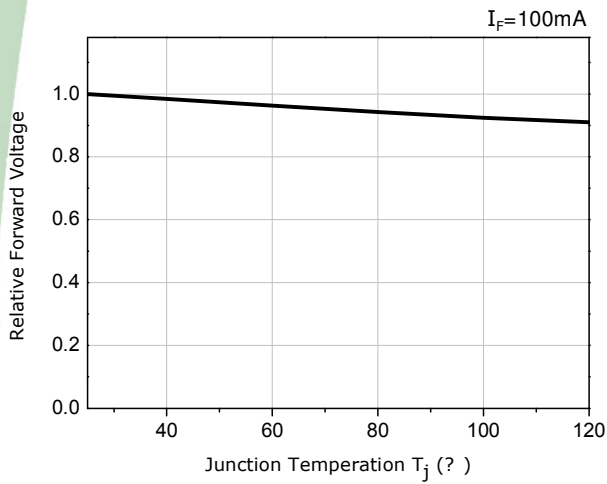
Directivity

Ta=25°C

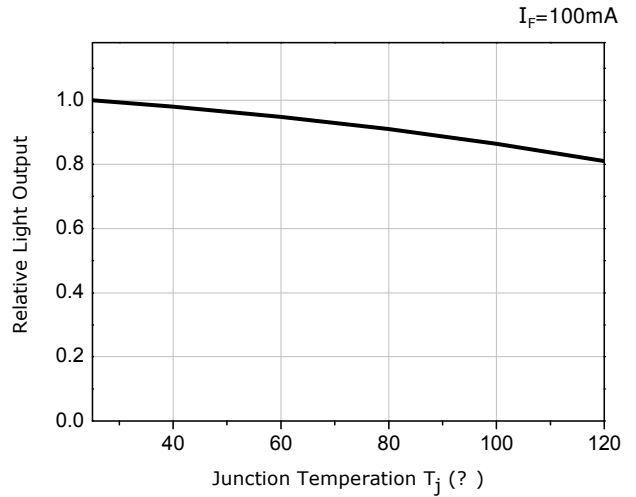


4. Optical characteristics

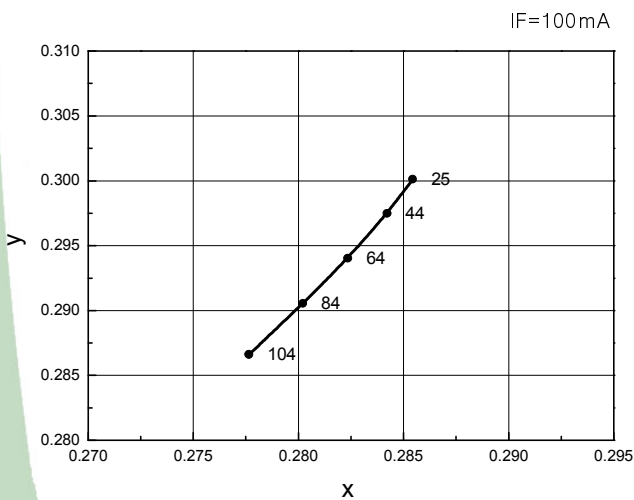
Forward Voltage Shift
vs. Junction Temperature



Relative Light Output
vs. Junction Temperature

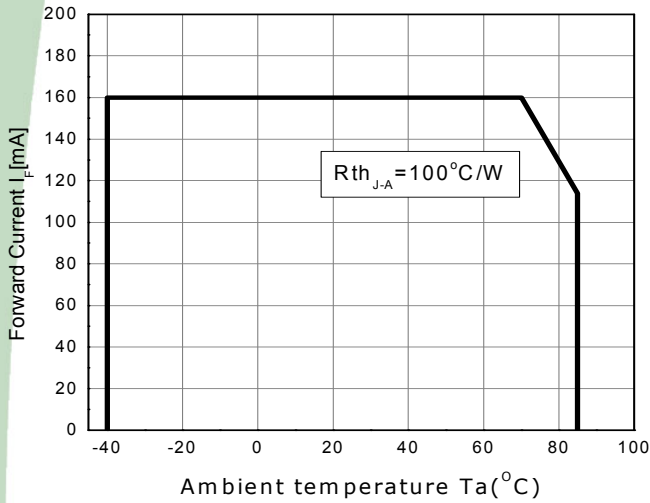


Junction Temperature (°C)
vs. Chromaticity Coordinate

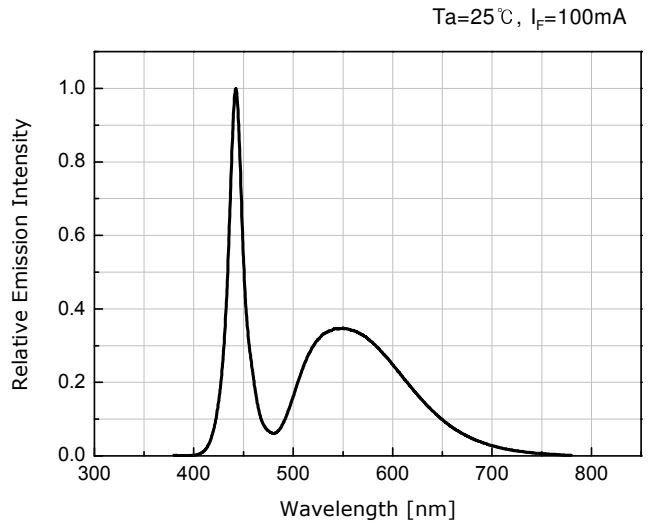


4. Optical characteristics

Ambient Temperature vs. Maximum Forward Current



Spectrum



5. Reliability Test Items and Conditions

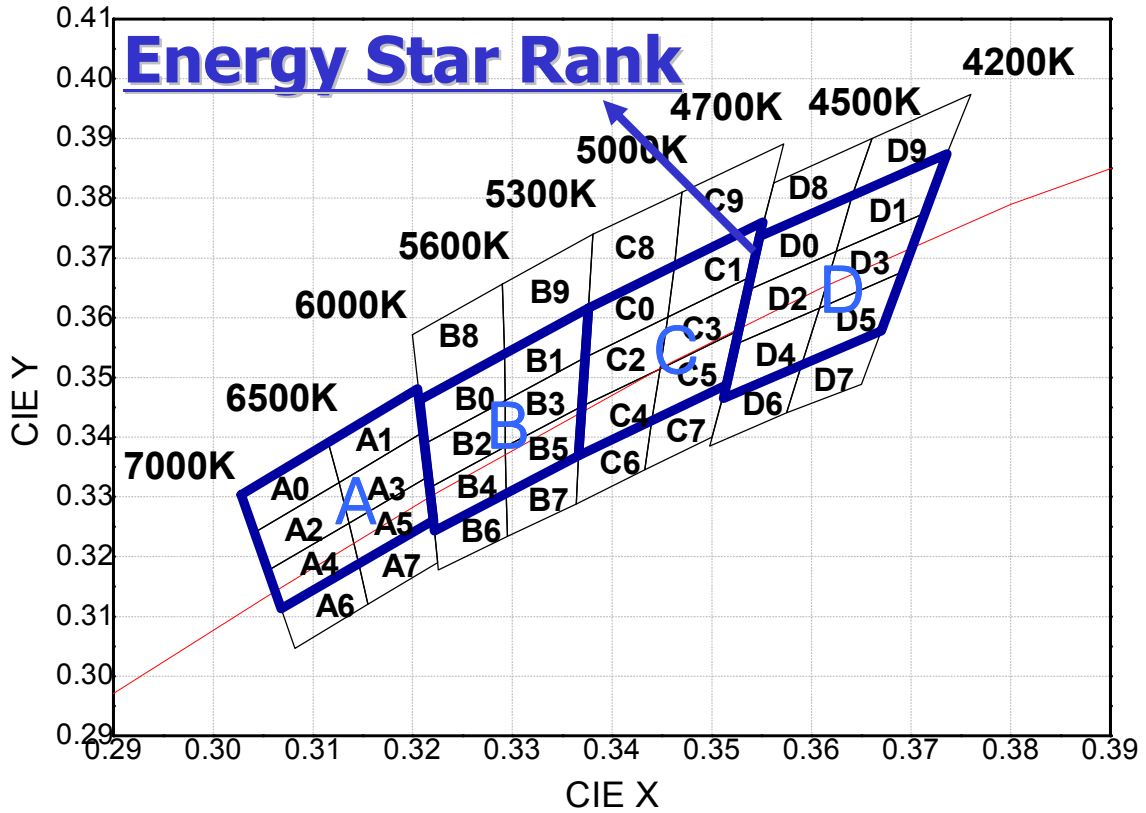
| Item | Reference | Test Conditions | Duration / Cycle | Number of Damaged |
|--|--------------------|--|------------------|-------------------|
| Thermal Shock | EIAJ ED-4701 | $T_a = -40^{\circ}\text{C}(30\text{min}) \sim 100^{\circ}\text{C}(30\text{min})$ | 100 Cycle | 0/22 |
| High Temperature Storage | EIAJ ED-4701 | $T_a = 100^{\circ}\text{C}$ | 1000 Hours | 0/22 |
| High Temp. High Humidity Storage | EIAJ ED-4701 | $T_a = 60^{\circ}\text{C}, \text{RH}=90\%$ | 1000 Hours | 0/22 |
| Low Temperature Storage | EIAJ ED-4701 | $T_a = -40^{\circ}\text{C}$ | 1000 Hours | 0/22 |
| Operating Endurance Test | Internal Reference | $T_a = 25^{\circ}\text{C}, I_F = 100\text{mA}$ | 1000 Hours | 0/22 |
| High Temperature High Humidity Life Test | Internal Reference | $T_a = 60^{\circ}\text{C}, \text{RH}=90\%, I_F = 100\text{mA}$ | 500 Hours | 0/22 |
| High Temperature Life Test | Internal Reference | $T_a = 85^{\circ}\text{C}, I_F = 100\text{mA}$ | 500 Hours | 0/22 |
| Low Temperature Life Test | Internal Reference | $T_a = -40^{\circ}\text{C}, I_F = 100\text{mA}$ | 1000 Hours | 0/22 |
| ESD(HBM) | MIL-STD-883D | 5KV at 1.5k Ω ; 100pF | 3 Time | 0/22 |
| Reflow | T_{sol} | 260 $^{\circ}\text{C} < 10\text{sec.}$ Reflow Soldering | 3 Time | 0/22 |

□ CRITERIA FOR JUDGING THE DAMAGE

| Item | Symbol | Condition | Criteria for Judgment | |
|--------------------|--------|----------------------|--------------------------|--------------------------|
| | | | MIN | MAX |
| Forward Voltage | V_F | $I_F = 100\text{mA}$ | - | USL ^[1] × 1.2 |
| Luminous Intensity | I_V | $I_F = 100\text{mA}$ | LSL ^[2] × 0.7 | - |

Note : [1] USL : Upper Standard Level
 [2] LSL : Lower Standard Level

6. Color & Binning





6. Color & Binning

● COLOR RANK

<IF=100mA, Ta=25℃>

| 6500~7000K | | | | | | | | | |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| A0 | | A2 | | A4 | | A6 | | A8 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.3028 | 0.3304 | 0.3041 | 0.324 | 0.3055 | 0.3177 | 0.3068 | 0.3113 | 0.3082 | 0.3046 |
| 0.3041 | 0.324 | 0.3055 | 0.3177 | 0.3068 | 0.3113 | 0.3082 | 0.3046 | 0.3096 | 0.298 |
| 0.3126 | 0.3324 | 0.3136 | 0.3256 | 0.3146 | 0.3187 | 0.3155 | 0.312 | 0.3164 | 0.3046 |
| 0.3115 | 0.3393 | 0.3126 | 0.3324 | 0.3136 | 0.3256 | 0.3146 | 0.3187 | 0.3155 | 0.312 |
| 6000~6500K | | | | | | | | | |
| A1 | | A3 | | A5 | | | | | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | | | | |
| 0.3115 | 0.3393 | 0.3126 | 0.3324 | 0.3136 | 0.3256 | | | | |
| 0.3126 | 0.3324 | 0.3136 | 0.3256 | 0.3146 | 0.3187 | | | | |
| 0.321 | 0.3408 | 0.3216 | 0.3334 | 0.3221 | 0.3261 | | | | |
| 0.3205 | 0.3481 | 0.321 | 0.3408 | 0.3216 | 0.3334 | | | | |
| 5600~6000K | | | | | | | | | |
| B0 | | B2 | | B4 | | B6 | | B8 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.3207 | 0.3462 | 0.3212 | 0.3389 | 0.3217 | 0.3316 | 0.3222 | 0.3243 | 0.32 | 0.3572 |
| 0.3212 | 0.3389 | 0.3217 | 0.3316 | 0.3222 | 0.3243 | 0.3226 | 0.3178 | 0.3207 | 0.3462 |
| 0.3293 | 0.3461 | 0.3293 | 0.3384 | 0.3294 | 0.3306 | 0.3295 | 0.3234 | 0.3292 | 0.3539 |
| 0.3292 | 0.3539 | 0.3293 | 0.3461 | 0.3293 | 0.3384 | 0.3294 | 0.3306 | 0.329 | 0.3656 |
| 5300~5600K | | | | | | | | | |
| B1 | | B3 | | B5 | | B7 | | B9 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.3292 | 0.3539 | 0.3293 | 0.3461 | 0.3293 | 0.3384 | 0.3294 | 0.3306 | 0.329 | 0.3656 |
| 0.3293 | 0.3461 | 0.3293 | 0.3384 | 0.3294 | 0.3306 | 0.3295 | 0.3234 | 0.3292 | 0.3539 |
| 0.3373 | 0.3534 | 0.3369 | 0.3451 | 0.3366 | 0.3369 | 0.3364 | 0.3288 | 0.3376 | 0.3616 |
| 0.3376 | 0.3616 | 0.3373 | 0.3534 | 0.3369 | 0.3451 | 0.3366 | 0.3369 | 0.3381 | 0.374 |

* Measurement Uncertainty of the Color Coordinates : ± 0.007



6. Color & Binning

● COLOR RANK

<IF=100mA, Ta=25℃>

| 5000~5300K | | | | | | | | | |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| C0 | | C2 | | C4 | | C6 | | C8 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.3376 | 0.3616 | 0.3373 | 0.3534 | 0.3369 | 0.3451 | 0.3366 | 0.3369 | 0.3381 | 0.374 |
| 0.3373 | 0.3534 | 0.3369 | 0.3451 | 0.3366 | 0.3369 | 0.3364 | 0.3288 | 0.347 | 0.381 |
| 0.3456 | 0.3601 | 0.3448 | 0.3514 | 0.344 | 0.3428 | 0.3433 | 0.3345 | 0.3463 | 0.3687 |
| 0.3463 | 0.3687 | 0.3456 | 0.3601 | 0.3448 | 0.3514 | 0.344 | 0.3428 | 0.3376 | 0.3616 |
| 4700~5000K | | | | | | | | | |
| C1 | | C3 | | C5 | | C7 | | C9 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.3463 | 0.3687 | 0.3456 | 0.3601 | 0.3448 | 0.3514 | 0.344 | 0.3428 | 0.347 | 0.381 |
| 0.3456 | 0.3601 | 0.3448 | 0.3514 | 0.344 | 0.3428 | 0.3433 | 0.3345 | 0.3572 | 0.3891 |
| 0.3539 | 0.3669 | 0.3526 | 0.3578 | 0.3514 | 0.3487 | 0.35 | 0.34 | 0.3552 | 0.376 |
| 0.3552 | 0.376 | 0.3539 | 0.3669 | 0.3526 | 0.3578 | 0.3514 | 0.3487 | 0.3463 | 0.3687 |
| 4500~4700K | | | | | | | | | |
| D0 | | D2 | | D4 | | D6 | | D8 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.3548 | 0.3736 | 0.3536 | 0.3646 | 0.3523 | 0.3555 | 0.3511 | 0.3465 | 0.3562 | 0.3826 |
| 0.3536 | 0.3646 | 0.3523 | 0.3555 | 0.3511 | 0.3465 | 0.3498 | 0.3385 | 0.3548 | 0.3736 |
| 0.3625 | 0.3711 | 0.3608 | 0.3616 | 0.359 | 0.3521 | 0.3575 | 0.3441 | 0.3641 | 0.3804 |
| 0.3641 | 0.3804 | 0.3625 | 0.3711 | 0.3608 | 0.3616 | 0.359 | 0.3521 | 0.3661 | 0.39 |
| 4200~4500K | | | | | | | | | |
| D1 | | D3 | | D5 | | D7 | | D9 | |
| CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y | CIE X | CIE Y |
| 0.3641 | 0.3804 | 0.3625 | 0.3711 | 0.3608 | 0.3616 | 0.359 | 0.3521 | 0.3661 | 0.39 |
| 0.3625 | 0.3711 | 0.3608 | 0.3616 | 0.359 | 0.3521 | 0.3575 | 0.3441 | 0.3641 | 0.3804 |
| 0.3714 | 0.3775 | 0.3692 | 0.3677 | 0.367 | 0.3578 | 0.365 | 0.3489 | 0.3736 | 0.3874 |
| 0.3736 | 0.3874 | 0.3714 | 0.3775 | 0.3692 | 0.3677 | 0.367 | 0.3578 | 0.376 | 0.3974 |

* Measurement Uncertainty of the Color Coordinates : ± 0.007

7. Bin Code Description

| Bin Code | | |
|--------------------|-----|-----------------|
| Luminous Intensity | CIE | Forward Voltage |
| T0 | B0 | Z1 |

| Luminous Intensity (mcd) @ $I_F = 100\text{mA}$ | | | [note] Flux (lm) |
|--|-------|-------|---------------------|
| Bin Code | Min. | Max. | Typ |
| S0 | 9000 | 9500 | 28.9 |
| S5 | 9500 | 10000 | 30 |
| T0 | 10000 | 10500 | 31 |
| T5 | 10500 | 11000 | 32.5 |
| V0 | 11000 | 11500 | 33.5 |

| Color Rank @ $I_F = 100\text{mA}$ |
|--------------------------------------|
| A~D |

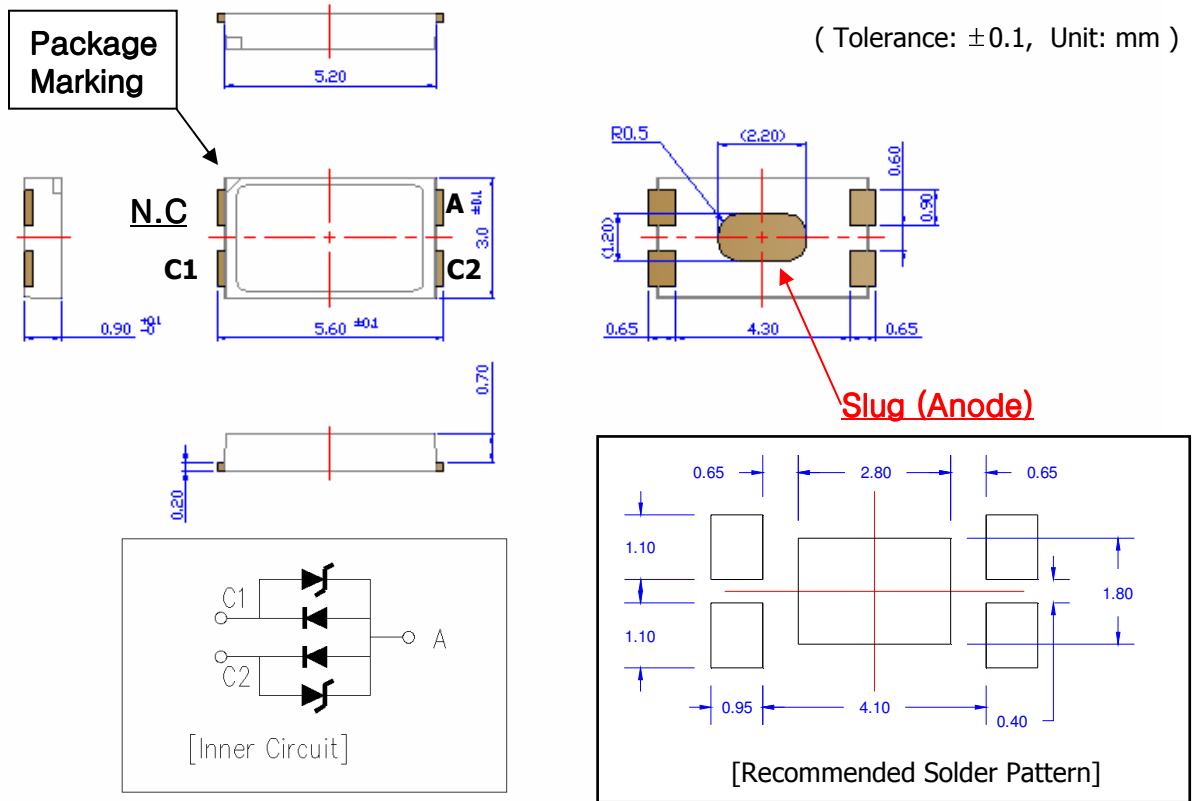
| Forward Voltage (V) @ $I_F = 100\text{mA}$ | | |
|---|------|------|
| Bin Code | Min. | Max. |
| Y3 | 2.9 | 3.0 |
| Z1 | 3.0 | 3.1 |
| Z2 | 3.1 | 3.2 |
| Z3 | 3.2 | 3.3 |
| A1 | 3.3 | 3.4 |

- Available ranks
- Not yet available ranks

| CCT | IV Rank | | | | |
|-----------------------|---------|----|----|----|----|
| 5300~7000 K (CIE A,B) | S0 | S5 | T0 | T5 | V0 |
| 4200~5300 K (CIE C,D) | S0 | S5 | T0 | T5 | V0 |

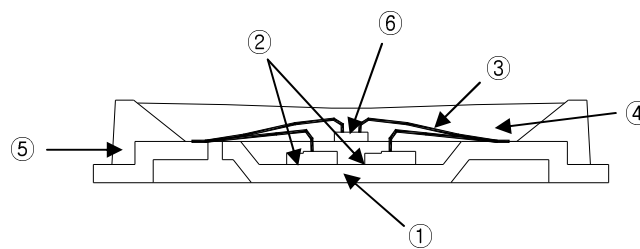
[Note] All measurements were made under the standardized environment of SSC.
In order to ensure availability, single color rank will not be orderable.

8. Outline Dimension



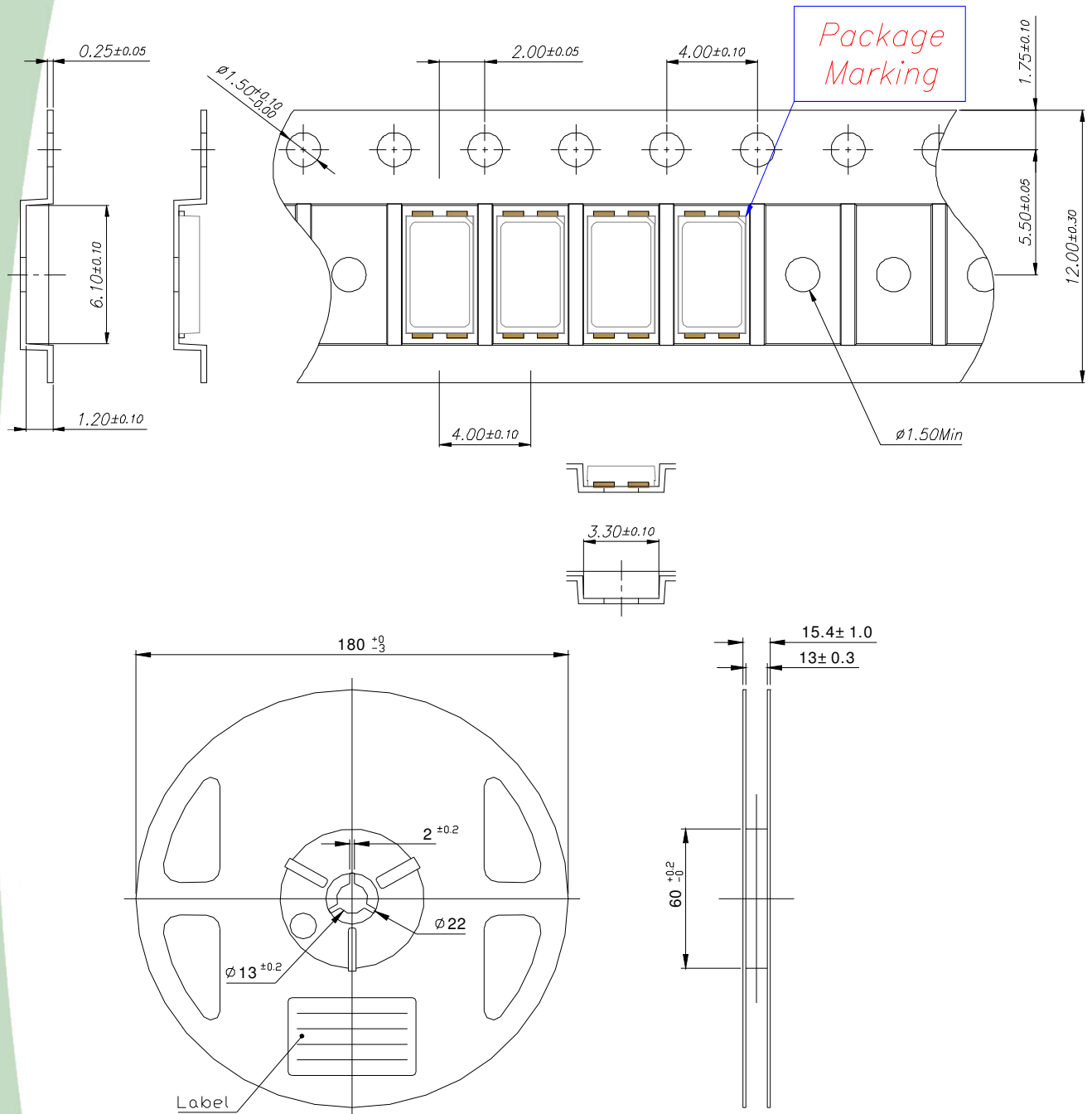
[Note] Forward current is 50mA per die for parallel inner circuit.
 Package Total Forward Current is 100mA

9. 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 | - |

10. Reel Structure



(Tolerance: ± 0.2 , Unit: mm)

- (1) Quantity : 3,500pcs/Reel
- (2) Cumulative Tolerance : Cumulative Tolerance/10 pitches to be ± 0.2 mm
- (3) Adhesion Strength of Cover Tape : Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at the angle of 10° to the carrier tape
- (4) Package : P/N, Manufacturing data Code No. and quantity to be indicated on a damp proof Package

Rev. 03

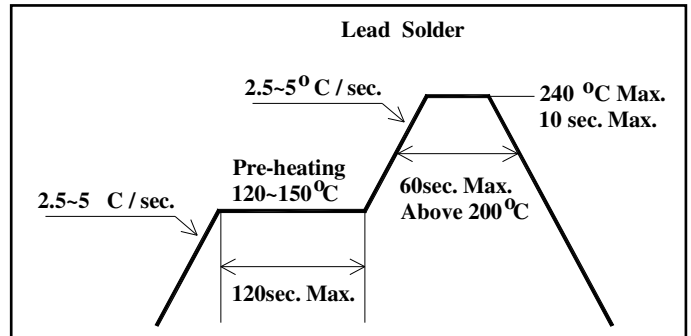
MAY, 2011

Document No. : SSC- QP- 7- 07- 24

11. Soldering

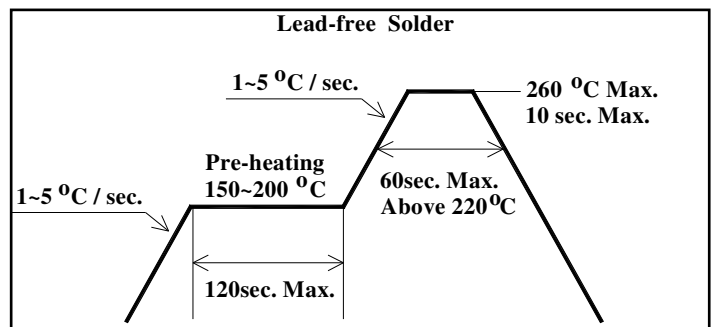
(1) Lead Solder

| Lead Solder | |
|--------------------------|---------------|
| Pre-heat | 120~150 ℃ |
| Pre-heat time | 120 sec. Max. |
| Peak-Temperature | 240 ℃ Max. |
| Soldering time Condition | 10 sec. Max. |



(2) Lead-Free Solder

| Lead Free Solder | |
|--------------------------|---------------|
| Pre-heat | 150~200 ℃ |
| Pre-heat time | 120 sec. Max. |
| Peak-Temperature | 260 ℃ Max. |
| Soldering time Condition | 10 sec. Max. |



(3) Hand Soldering conditions

Do not exceed 4 seconds at maximum 315°C under soldering iron.

(4) The encapsulated material of the LEDs is silicone.

Precautions should be taken to avoid the strong pressure on the encapsulated part.

So when using the chip mounter, the picking up nozzle that does not affect the silicone resign should be used.

(5) It is recommended that the customer use the nitrogen reflow method.

(6) Repairing should not be done after the LEDs have been soldered.

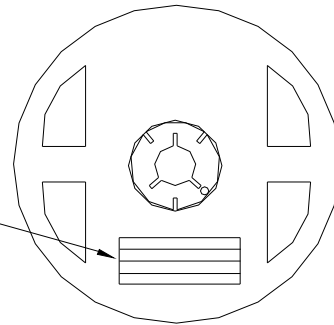
(7) Reflow soldering should not be done more than two times.

In the case of more than 24 hours passed soldering after first, LEDs will be damaged.

12. Packing

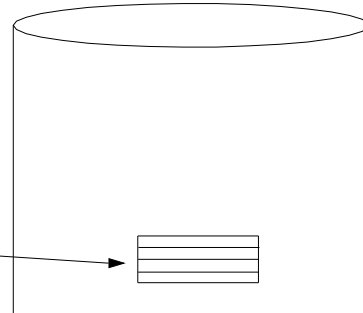
Reel

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.



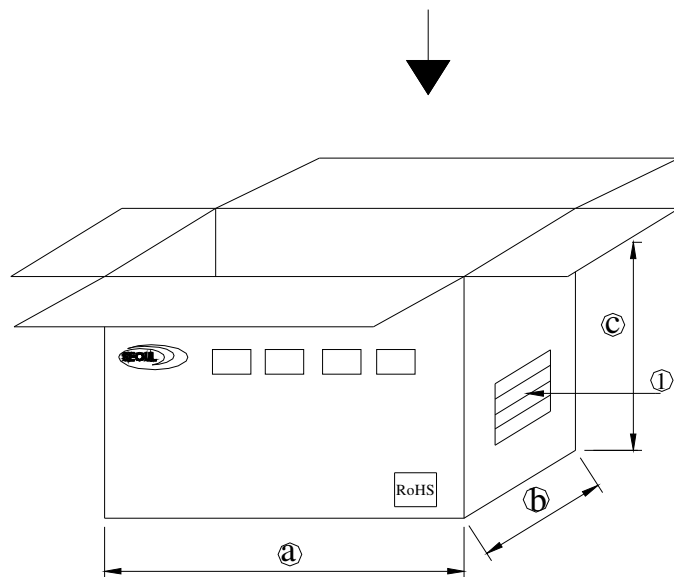
Outer Box Structure

Material : Paper(SW3B(B))

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

① SIDE

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



13. precaution for use

(1) Storage

In order to avoid the absorption of moisture, it is recommended to store in a dry box (or a desiccator) with a desiccant. Otherwise, to store them in the following environment is recommended.

Temperature : 5°C ~30°C Humidity : maximum 70%RH

(2) Attention after open.

LED is correspond to SMT, when LED be soldered dip, interfacial separation may affect the light transmission efficiency, causing the light intensity to drop.

Attention in followed; Keeping of a fraction

Temperature : 5 ~ 40°C Humidity : less than 10%

(3) In the case of more than 1 week passed after opening or change color of indicator on desiccant, components shall be dried 10-12hr. at 60± 5°C.

(4) Silver plating might be tarnished in the environment that contains corrosive gases and materials. Also any product that has tarnished lead might be decreased the solder-ability and optical-electrical properties compare to normal ones.
Please do not expose the product in the corrosive environment during the storage.

(5) Any mechanical force or any excess vibration shall not be accepted to apply during cooling process to normal temperature after soldering.

(6) Quick cooling shall be avoided.

(7) Components shall not be mounted on warped direction of PCB.

(8) Anti radioactive ray design is not considered for the products.

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

(10) When the LEDs are illuminating, operating current should be decided after considering the ambient maximum temperature.

(11) The LEDs must be soldered within seven days after opening the moisture-proof packing.

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

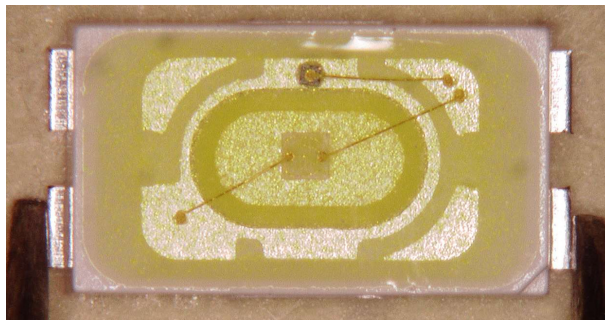
(13) The appearance and specifications of the product may be modified for improvement without notice.

13. 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.