



Ledman Optoelectronic Co.,Ltd.

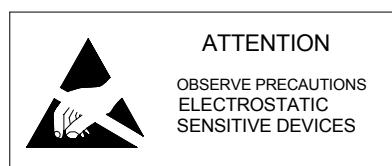
SPECIFICATIONS FOR LEDMAN SMD LED

Model No. : LS-DTHB-WSN3-03
Document No. : LMS-15-010
Revision No. : 03

Description:

- 5.0×5.0mm Top SMD
- Colloid Color: Yellow
- Emission Color: Warm-White
- Viewing Angle :120°

Dice Material: InGaN



Add: Building 8,Block 2,Baimang Baiwangxin Industrial Park, Xili Area,Nanshan District,Shenzhen, P.R.China

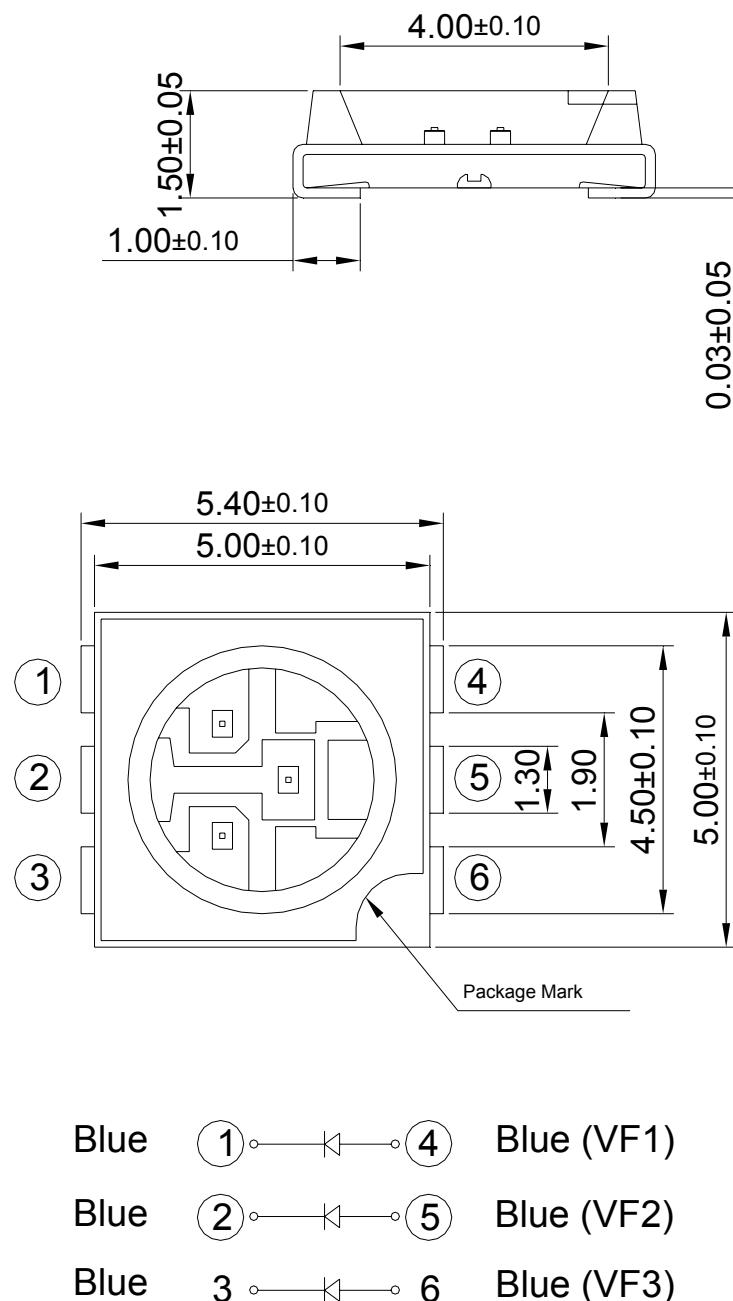
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Outline Drawing



NOTES:

All dimensions are in mm, tolerance is ± 0.05 mm unless otherwise noted.



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Applications:

| | |
|---|---------------------------|
| 1 | Indicators |
| 2 | Illuminations |
| 3 | LCD Back Lights |
| 4 | Automobile's Applications |

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

| Items | Symbol | Absolute maximum Rating | Unit |
|-----------------------|-----------|-------------------------|------|
| DC Forward Current | I_F | 3x30 | mA |
| Peak Forward Current* | I_{FP} | 3x100 | mA |
| Reverse Voltage | V_R | 5 | V |
| Power Dissipation | P_D | 3x110 | mW |
| Operation Temperature | T_{opr} | -20 ~ + 75 | °C |
| Storage Temperature | T_{stg} | -30 ~ + 80 | °C |

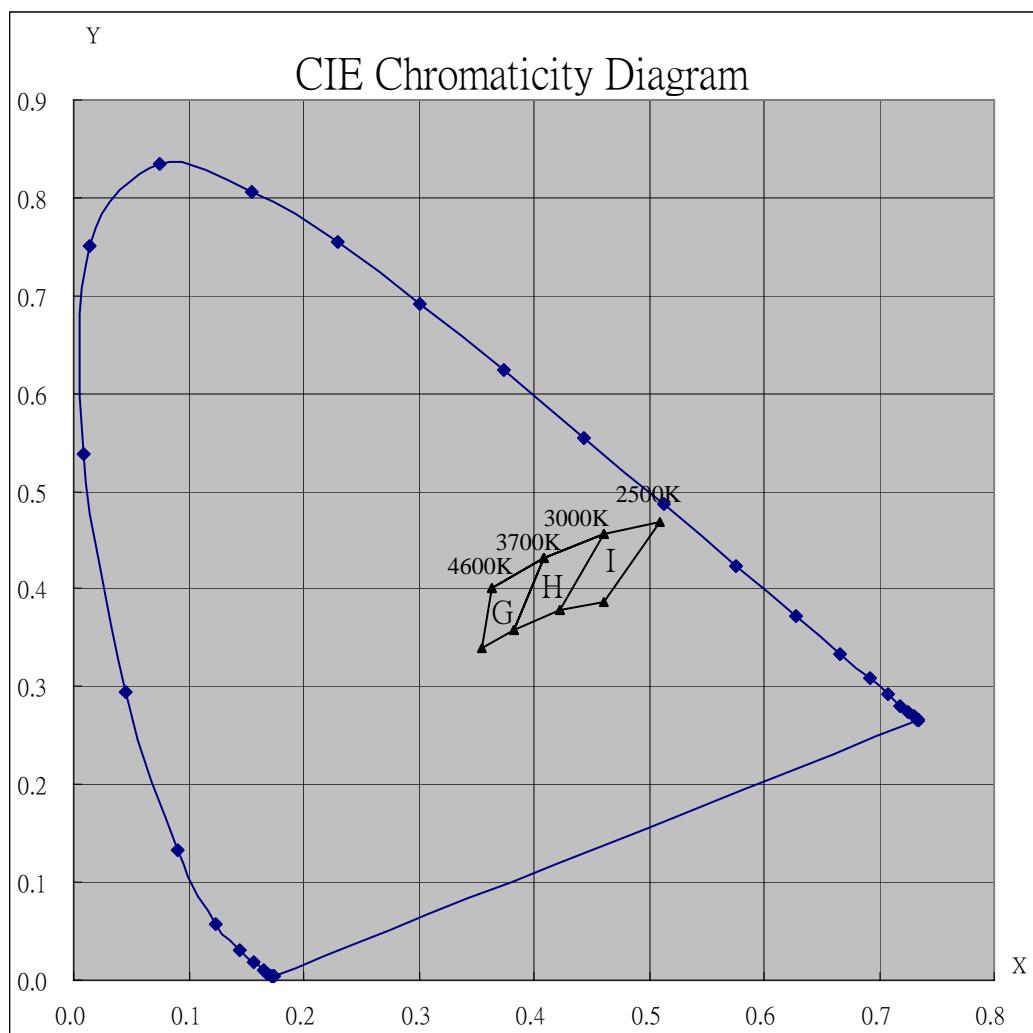
*pulse width $\leq 0.1\text{msec}$ duty $\leq 1/10$

Typical Electrical & Optical Characteristics ($T_a = 25^\circ\text{C}$)

| Items | Symbol | Condition | Min. | Typ. | Max. | Unit |
|--------------------------|-----------------|----------------------|------|--------|------|---------------|
| Forward Voltage | VF | $IF = 3x20\text{mA}$ | --- | 3.2 | 3.6 | V |
| Reverse Current | IR | $VR = 5\text{V}$ | --- | --- | 10 | μA |
| Luminous Flux | ΦV | $IF = 3x20\text{mA}$ | --- | 16000 | --- | mlm |
| Luminous Intensity | IV | $IF = 3x20\text{mA}$ | 4400 | 5500 | --- | mcd |
| Color Temperature | CCT | $IF = 3x20\text{mA}$ | --- | 3200 | --- | K |
| Chromaticity Coordinates | x | $IF = 3x20\text{mA}$ | --- | 0.4280 | --- | --- |
| | y | $IF = 3x20\text{mA}$ | --- | 0.4090 | --- | --- |
| 50% Power Angle | $2 \frac{1}{2}$ | $IF = 3x20\text{mA}$ | --- | 120 | --- | deg |

Important Notes:

- 1) All data will be included per delivery; rank ratio will be based on Dices distribution.
- 2) Tolerance of measurement of luminous intensity is $\pm 10\%$
- 3) Tolerance of measurement of V_f is $\pm 0.05\text{ V}$.
- 4) Color Coordinates Measurement allowance is ± 0.015 .
- 5) Reliability test conditions, Please refer to "Reliability Test" section on page 6.
- 6) How to use Ledman LED product safely ,Please refer to "Application Notes" section on page 8 to 10 .
- 7) Packaging methods are available for selection; please refer to "packing" section on page 11.
- 8) Specifications are subject to change without notice.
- 9) Do not handle the device by the SMD surface. Care must be taken to avoid damage to the SMD surface or the interior of the device that can be damaged by excessive force to the SMD surface.


Color Ranks(IF=20mA,Ta=25°C)

| Color Ranks | | CIE | | | | CCT |
|-------------|---|--------|--------|--------|--------|-------------|
| G | X | 0.3638 | 0.4087 | 0.3820 | 0.3540 | 3700K-4600K |
| | Y | 0.4001 | 0.4322 | 0.3580 | 0.340 | |
| H | X | 0.4087 | 0.4608 | 0.4226 | 0.3820 | 3000K-3700K |
| | Y | 0.4322 | 0.4570 | 0.3775 | 0.3580 | |
| I | X | 0.4608 | 0.5090 | 0.4600 | 0.4226 | 2500K-3000K |
| | Y | 0.4570 | 0.4689 | 0.3864 | 0.3775 | |

 Measurement uncertainty of the color coordinates: ± 0.015

Typical Optical-Electronic Characteristic Curves:

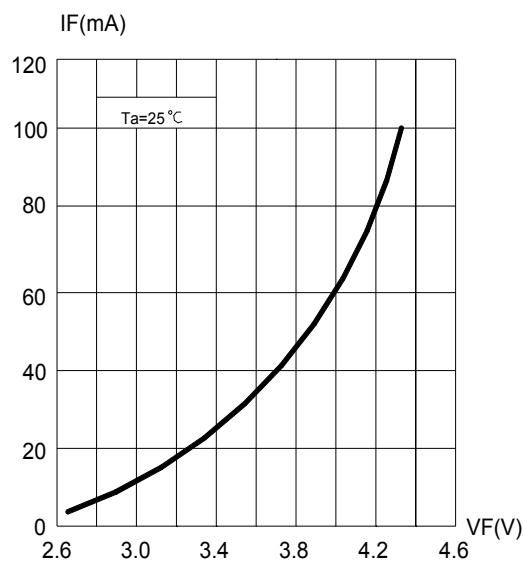


Fig.1 Forward Current vs. Forward Voltage

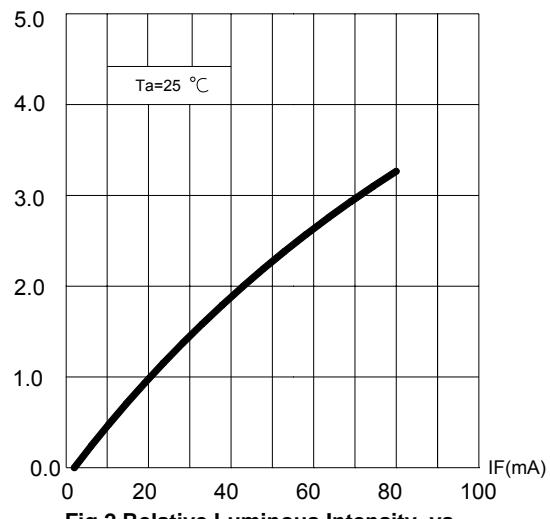


Fig.2 Relative Luminous Intensity vs. Forward Current

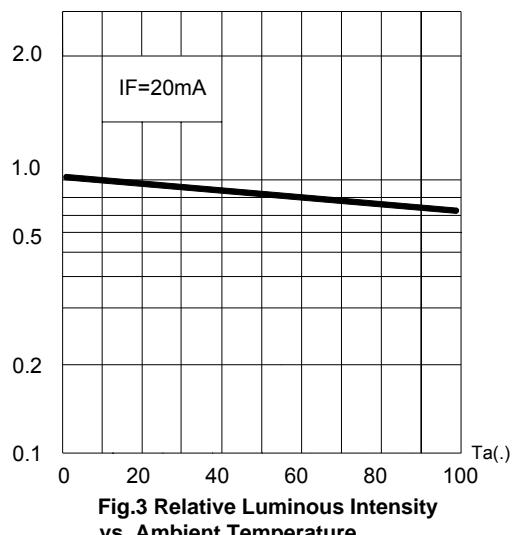


Fig.3 Relative Luminous Intensity vs. Ambient Temperature

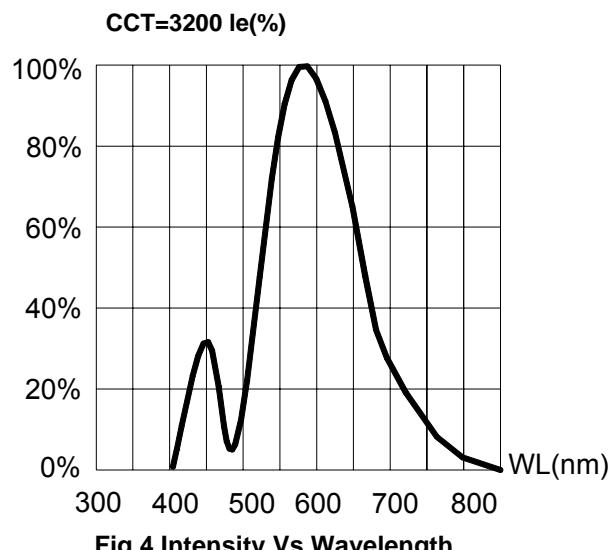


Fig.4 Intensity Vs. Wavelength.

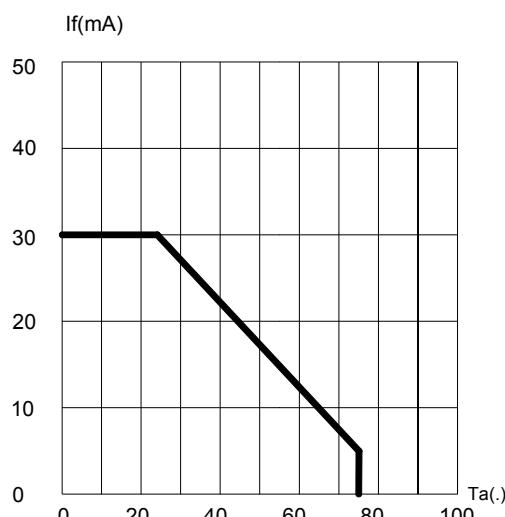


Fig.5 Maximum Forward Current vs. Ambient Temperature

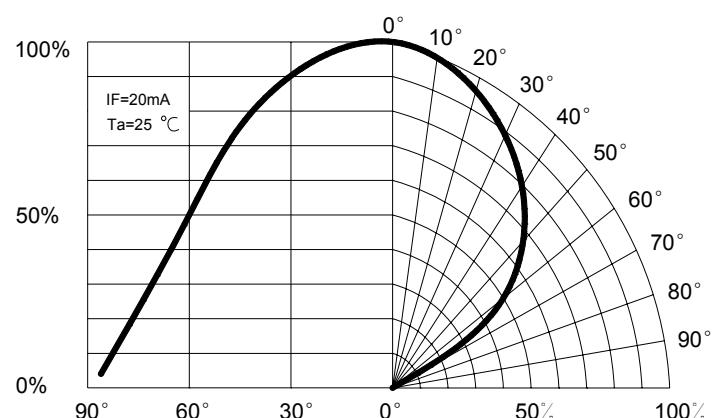


Fig.6 Relative Luminous Intensity vs. Radiation Angle



Reliability Test Standards

Test item:

| Type | Test item | Applicable standard | Test condition | Duration | Sampling number | Accept criteria |
|------------------------|---|--------------------------|--|--------------|-----------------|-----------------|
| environment test | Temperature cycles | JEITA ED-4701 100 105 | -40°C~25°C~100°C~25°C 30min 5min 30min 5min | 100cycles | 50 | 0/50 |
| | Thermal shock | MIL-STD-202G | -40°C~100°C 15min 15min | 300cycles | 50 | 0/50 |
| | High humidity heat cycles | JEITA ED-4701 200 203 | 30°C~65°C RH=90% 24hrs/1 cycle | 50cycles | 50 | 0/50 |
| | High temperature storage | JEITA ED-4701 200 201 | T _a =100°C | 1000hrs | 50 | 0/50 |
| | Low temperature storage | JEITA ED-4701 200 202 | T _a =-40°C | 1000hrs | 50 | 0/50 |
| | High temperature & high humidity storage | JEITA ED-4701 100 103 | T _a =60°C RH=90% | 1000hrs | 50 | 0/50 |
| life test | Normal temperature life test | | T _a =25°C I _F =30mA(R,G,Y)/20mA(W,B) | 1000hrs | 50 | 0/50 |
| | High temperature & high humidity life test | | T _a =60°C RH=90% I _F =20mA(R,G,Y)/15mA(W,B) | 1000hrs | 50 | 0/50 |
| | Low temperature life test | | T _a =-30°C I _F =20mA(R,G,Y)/15mA(W,B) | 1000hrs | 50 | 0/50 |
| | High temperature life test | | T _a =85°C I _F =20mA(R,G,Y)/15mA(W,B) | 1000hrs | 50 | 0/50 |
| destructive experiment | Resistance to soldering heat (Reflow soldering) | JEITA ED-4701 300 301 | T _{sol} =260°C, 10sec Pretreatment:30°C 70%RH 168hrs | 2 times | 10 | 0/10 |
| | Solderability | | T _{sol} =235°C±5°C, 5sec using flux | one time | 10 | 0/10 |
| ESD | Electrostatic discharge test | JEITA ED-4701 300 304 | Human body model 1000V forward and reverse | each 3 times | 10 | 0/10 |
| | Vibration | JEITA ED-4701 400 403 | 20G 20-2000HZ 4mins X,Y,Z 3directions | each 4cycles | 10 | 0/10 |
| | Drop | | 75CM | 3 times | 10 | 0/10 |

Failure Criteria:

| Item | Symbol | Test condition | Criteria for Judgment |
|--------------------|----------------|----------------------|--|
| Forward Voltage | V _F | I _F =20mA | Initial Data±10% |
| Reverse Current | I _R | V _R =5V | ≤ 10µA |
| Luminous Intensity | I _V | I _R =20mA | Single led degradation ≤ 50% and Average degradation ≤ 30% |
| Solderability | | | Over 95% |
| Vibration | | I _F =20mA | No dead lamps or visual damage |
| Drop | | I _F =20mA | No dead lamps or visual damage |

Remark: RH:Environment humidity; T_a:Environment temperature;T_{sol}:Tin temperature; I_F:Forward current; V_R:Reverse voltage.



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SMD LED Product Naming Rule

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Product development of serial number

Colloid colour

- 1:water transparent
- 2:white diffused
- 3:yellow
- 4:colored diffused

With or without lens

- L:with lens
- N:without lens

Gluewater code

- S:represent for silicone
- E:represent for epoxy

Emission Color

| | |
|--------------------|---------------|
| F:full color | R:red color |
| G:green color | B:blue color |
| A:amber color | C:white color |
| W:warm white color | |

Chip, code-named

Chip quality code

- O:represent for single crystal
- D:represent for double crystal
- T:represent for tricrystal

L/F code serious number

- A:represent for 3528 single crystal L/F
- B:represent for 3528 tricrystal L/F
- C:express 3020 single crystal L/F
- D:represent for 5050 tricrystal L/F

LED SMDseries

Ledman code



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Application Note Application Note

Features

The purpose of this document is to provide a clear understanding to the customers and users, on the ways how to use our SMD lamps appropriately.

Description

Generally, SMD can be used the same way as other general-purpose semiconductors. When using Ledman's SMD LED, the following precautions must be taken to protect the SMD.

1. Cleaning

- ✧ Don't use unspecified chemical liquids to clean the SMD LED; the chemical could harm the SMD LED. When washing is necessary, please immerse the SMD LED in alcohol at normal room temperature for less than 1 minute and dry at normal room temperature for 15 minutes before use.
- ✧ The influence of ultrasonic cleaning on the SMD LED depending on factors such as ultrasonic power and the way SMD LED are mounted. Ultrasonic cleaning shall be pre-qualified to ensure this will not cause damage to the SMD LED.

2. Moisture Proof Packing

- ✧ In order to prevent moisture absorption into SMD LED during the transportation and storage, SMD LED is packed in a moisture barrier bag. Desiccants and a humidity indicator are packed together with SMD LED as the secondary protection. The indication of humidity indicator card provides the information of humidity within SMD packing.

3. Storage

- ✧ Shelf life in original sealed bag at storage condition of <40°C and <90%RH is 12 months. Baking is required whenever shelf life is expired.
- ✧ Before opening the packaging , Please check whether bag leak air or not.
- ✧ After bag opening, the SMD LED must be stored under the condition < 30°C and < 60%RH. Under this condition, SMD LED must be used (subject to reflow) within 24 hours after bag opening, and re-baking is required when exceeding 24 hours.
- ✧ For baking, place SMD LED in oven at temperature $70^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and relative humidity $\leq 10\%$ RH, for 24 hours.
- ✧ Take out the material from packaging bag for re-bake. Do not open the door of oven frequently during the baking process.



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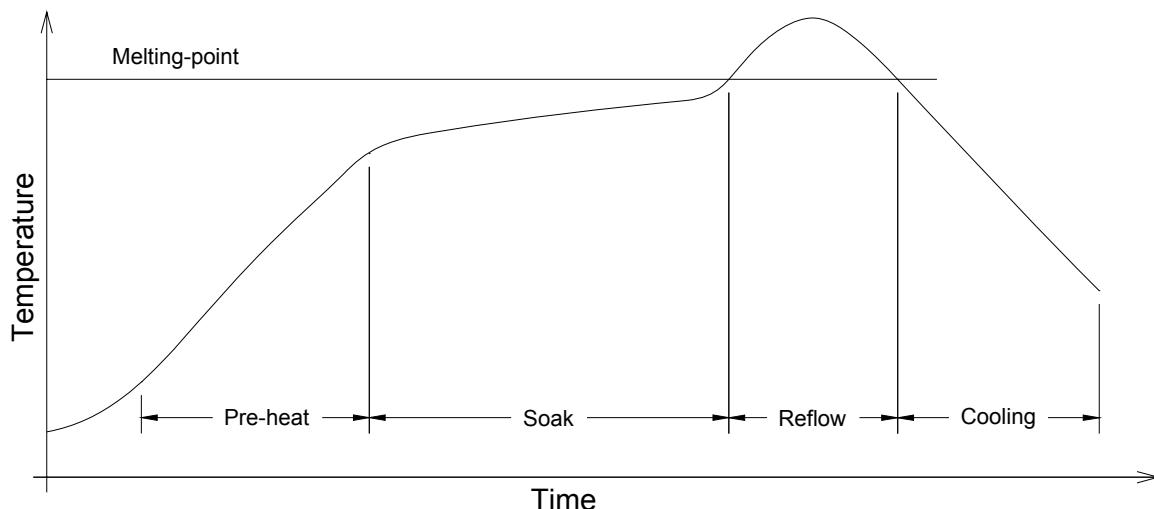
4. Soldering

. Manual soldering by soldering iron

- ✧ The use of a soldering iron of less than 25W is recommended and the temperature of the iron must be kept at below 315°C, with soldering time within 2 seconds.
- ✧ The epoxy resin of SMD LED should not be in contact with tip of soldering iron.
- ✧ No mechanical stress should be exerted on the resin portion of SMD LED during soldering.
- ✧ Handling of SMD LED should be done when the package has been cooled down to below 40°C or less. This is to prevent the SMD LED failures due to thermal-mechanical stress during handling.

. Reflow Soldering

- ✧ The temperature (Top surface of SMD LED) profile is as below:

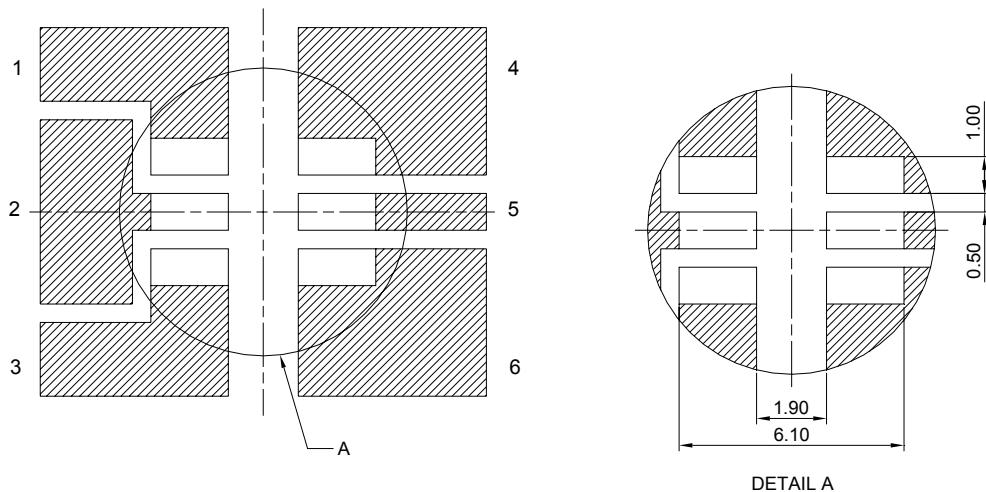


| Solder = Sn63-Pb37 | Solder = Lead-free |
|---|---|
| Average ramp-up rate = 4°C/s max. | Average ramp-up rate = 4°C/s max |
| Preheat temperature = 100°C ~150°C | Preheat temperature = 150°C ~200°C |
| Preheat time = 100s max. | Preheat time = 100s max. |
| Ramp-down rate = 6°C/s max. | Ramp-down rate = 6°C/s max. |
| Peak temperature = 230°C max. | Peak temperature = 250°C max. |
| Time within 5°C of actual Peak Temperature = 10s max. | Time within 5°C of actual Peak Temperature = 10s max. |
| Duration above 183°C is 80s max. | Duration above 217°C is 80s max. |



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- ◊ Recommended solder pad design for heat dissipation:



Note:
Metal area at 1,2,3 should
not be less than 16mm² each
for sufficient heat dissipation.

- ◊ Modification is not recommended on SMD LED after soldering. If modification cannot be avoided, the modifications must be pre-qualified to avoid damaging SMD LED.
- ◊ Reflow soldering should not be done more than one time.
- ◊ No stress should be exerted on the package during soldering.
- ◊ PCB should not be wrapped after soldering; this is to allow natural cooling of the PCB board and SMD LED.

5. Electrostatic Discharge and Surge current

- ◊ Electrostatic discharge (ESD) or surge current (EOS) may damage SMD LED.
- ◊ Precautions such as ESD wrist strap, ESD shoe strap or antistatic gloves must be worn whenever handling of SMD LED.
- ◊ All devices, equipment and machinery must be properly grounded.
- ◊ It is recommended to perform electrical test to screen out ESD failures at final inspection.
- ◊ It is important to eliminate the possibility of surge current during circuitry design

6. Heat Management

Heat management of SMD LED must be taken into consideration during the design stage of SMD LED application. The current should be de-rated appropriately by referring to the de-rating curve attached on each product specification.



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Packaging

- ◆ The boxes are not water-resistant, and they must be kept away from water and moisture.
- ◆ The LEDs are packed in cardboard boxes after packaging in normal or anti-electrostatic bags.
- ◆ Cardboard boxes will be used to protect the LEDs from mechanical shocks during transportation.
- ◆ The polyethylene bag back is applied in SMD LED.
- ◆ 900+1(spare) pcs per reel.
- ◆ 10 reel per B carton.
- ◆ 20 reel per C carton

