



# Ledman Optoelectronic Co.,Ltd.

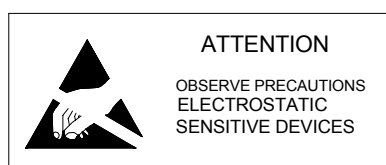
## SPECIFICATIONS FOR LEDMAN LAMP LED

Model No. : LL1502HGWW1-C01  
Document No. : LML-15-171  
Revision No. : 03

### Description:

- 5mm Round lamp
- Lens Color: Water Transparent
- Emission Color: White
- Viewing Angle :120°
- No Stopper

Dice Material: InGaN



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

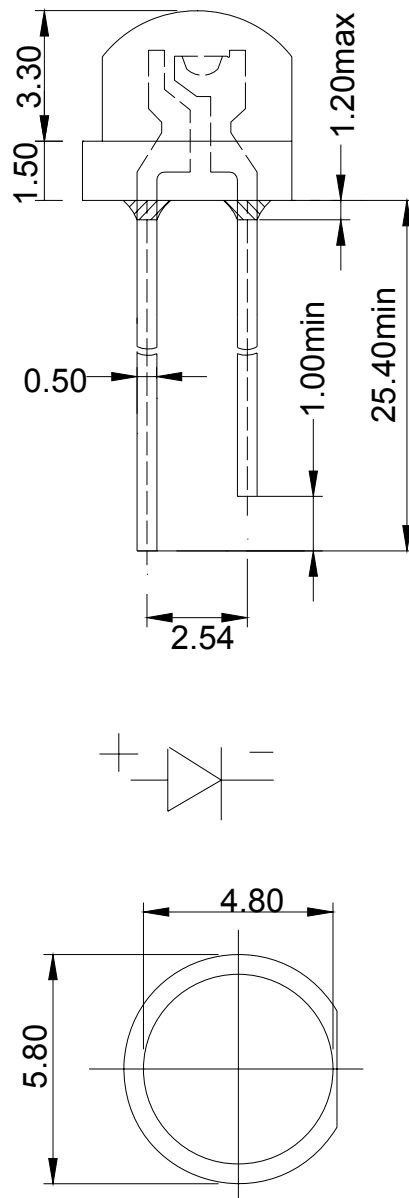
Tel: 86-755-86139688

Fax: 86-755-86139001



|               |      |                 |
|---------------|------|-----------------|
| Model         | No.: | LL1502HGWW1-C01 |
| Document No.: |      | LML-15-171      |
| Revision      | No.: | 03              |

## Outline Drawing



### NOTES:

1. All dimensions area in mm tolerance is  $\pm 0.25\text{mm}$  unless otherwise noted.
2. An epoxy meniscus may extend about 1.5mm down the leads.
3. Burr around bottom of epoxy may be 0.5mm max.



|               |                 |
|---------------|-----------------|
| Model No.:    | LL1502HGWW1-C01 |
| Document No.: | LML-15-171      |
| Revision No.: | 03              |

## Applications:

|   |                           |
|---|---------------------------|
| 1 | Indicators                |
| 2 | Illuminations             |
| 3 | Automobile's Applications |

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

| Items                      | Symbol    | Absolute maximum Rating                                                          | Unit             |
|----------------------------|-----------|----------------------------------------------------------------------------------|------------------|
| DC Forward Current         | $I_F$     | 30                                                                               | mA               |
| Peak Forward Current*      | $I_{FP}$  | 100                                                                              | mA               |
| Reverse Voltage            | $V_R$     | 5                                                                                | V                |
| Power Dissipation          | $P_D$     | 108                                                                              | mW               |
| Operation Temperature      | $T_{opr}$ | -20 ~ +75                                                                        | $^\circ\text{C}$ |
| Storage Temperature        | $T_{stg}$ | -30 ~ +80                                                                        | $^\circ\text{C}$ |
| Lead Soldering Temperature | $T_{sol}$ | Max.260 $^\circ\text{C}$ for 5 sec Max.<br>(3mm from the base of the epoxy bulb) |                  |

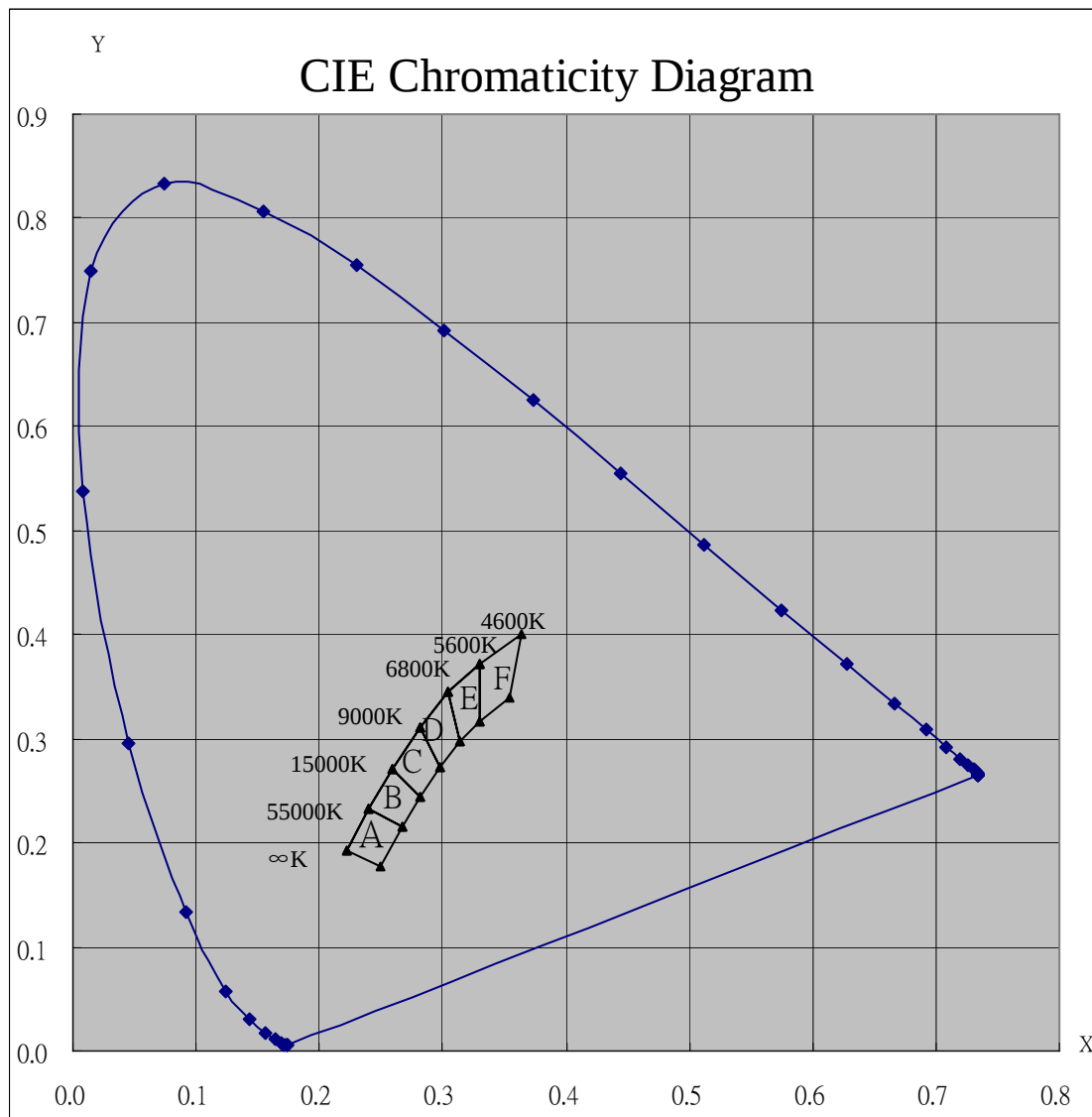
\*pulse width  $\leq 0.1\text{msec}$  duty  $\leq 1/10$

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

| Items                    | Symbol           | Condition           | Min. | Typ.   | Max. | Unit          |
|--------------------------|------------------|---------------------|------|--------|------|---------------|
| Forward Voltage          | $V_F$            | $I_F = 20\text{mA}$ | ---  | 3.2    | 3.6  | V             |
| Reverse Current          | $I_R$            | $V_R = 5\text{V}$   | ---  | ---    | 10   | $\mu\text{A}$ |
| Color Temperature        | CCT              | $I_F = 20\text{mA}$ | ---  | 6500   | ---  | K             |
| Chromaticity Coordinates | X                | $I_F = 20\text{mA}$ | ---  | 0.3130 | ---  | ---           |
|                          | Y                | $I_F = 20\text{mA}$ | ---  | 0.3290 | ---  | ---           |
| Luminous Intensity       | $I_v$            | $I_F = 20\text{mA}$ | ---  | 1700   | ---  | mcd           |
| 50% power Angle          | 2 $\theta_{H-H}$ | $I_F = 20\text{mA}$ | ---  | 120    | ---  | deg           |
|                          | 2 $\theta_{V-V}$ | $I_F = 20\text{mA}$ | ---  | ---    | ---  | deg           |

### Important Notes:

- 1) All ranks will be included per delivery, rank ratio will be determined by Ledman.
- 2) Tolerance of measurement of luminous intensity is  $\pm 15\%$ .
- 3) Tolerance of measurement of  $V_F$  is  $\pm 0.05\text{ V}$ .
- 4) Color Coordinates Measurement allowance is  $\pm 0.015$ .
- 5) For reliability test conditions and data, Please refer to “**Reliability Test**” section on page 6.
- 6) For how to use Ledman LED product safely, Please refer to “**Application Notes**” section on page 8 and 9.
- 7) Packaging methods are available to be chosen , please refer to “**Packaging**” section on page 10 and 11 .
- 8) As we are making continuous efforts to improve the performance of LED, Specifications are subject to change without notice.
- 9) Information is tentative and subject to change without notice.



**Color Ranks(IF=20mA,Ta=25℃)**

| Color Ranks |   | CIE    |        |        |        | CCT          |
|-------------|---|--------|--------|--------|--------|--------------|
| A           | X | 0.2218 | 0.2400 | 0.2670 | 0.2500 | 55000K-∞K    |
|             | Y | 0.1928 | 0.2330 | 0.2150 | 0.1780 |              |
| B           | X | 0.2400 | 0.2591 | 0.2817 | 0.2670 | 15000-55000K |
|             | Y | 0.2330 | 0.2709 | 0.2433 | 0.2150 |              |
| C           | X | 0.2591 | 0.2813 | 0.2973 | 0.2817 | 9000K-15000K |
|             | Y | 0.2709 | 0.3100 | 0.2721 | 0.2433 |              |
| D           | X | 0.2813 | 0.3050 | 0.3135 | 0.2973 | 6800K-9000K  |
|             | Y | 0.3100 | 0.3450 | 0.2969 | 0.2721 |              |
| E           | X | 0.3050 | 0.3300 | 0.3300 | 0.3135 | 5600K-6800K  |
|             | Y | 0.3450 | 0.3716 | 0.3170 | 0.2969 |              |
| F           | X | 0.3300 | 0.3638 | 0.3540 | 0.3300 | 4600K-5600K  |
|             | Y | 0.3716 | 0.4001 | 0.3400 | 0.3170 |              |

Measurement uncertainty of the color coordinates:±0.015



## Typical Optical-Electronic Characteristic Curves:

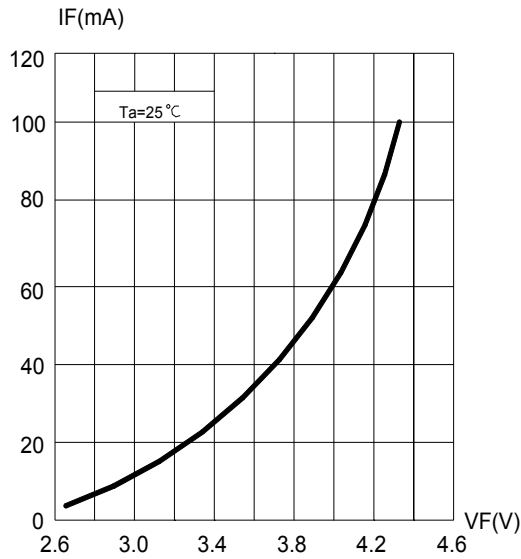


Fig.1 Forward Current vs. Forward Voltage

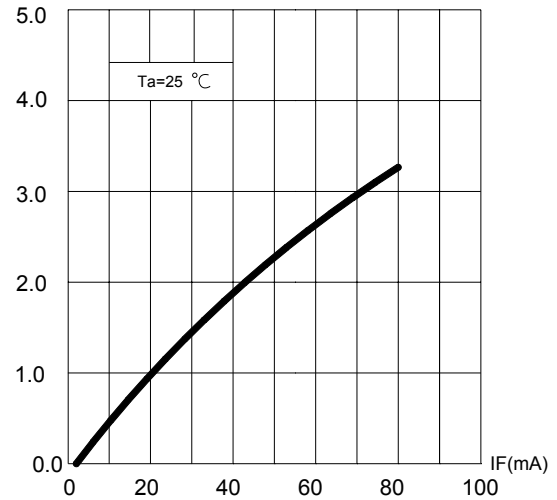


Fig.2 Relative Luminous Intensity vs. Forward Current

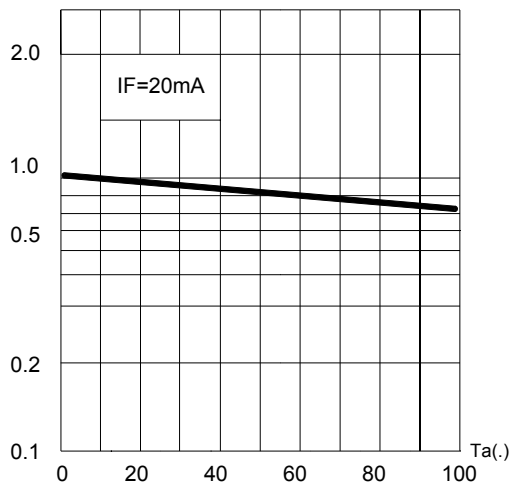


Fig.3 Relative Luminous Intensity vs. Ambient Temperature

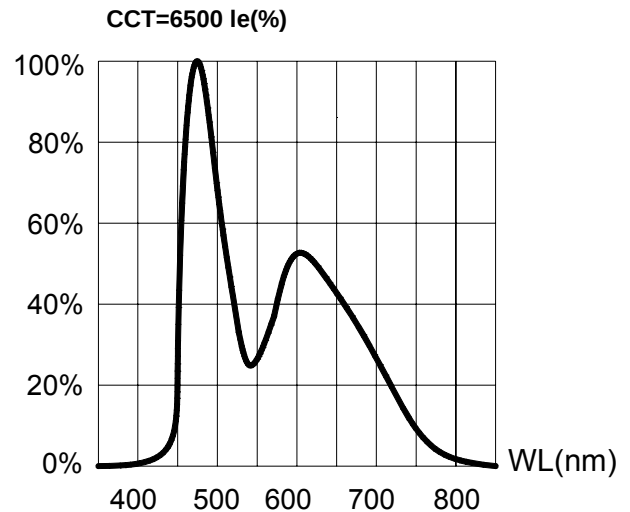


Fig.4 Intensity vs. Wavelength.

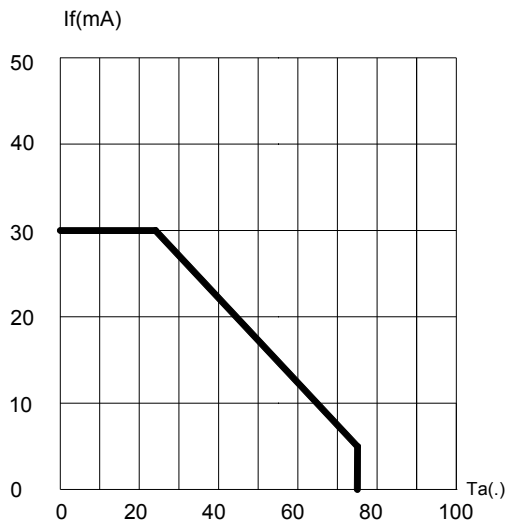


Fig.5 Maximum Forward Current vs. Ambient Temperature

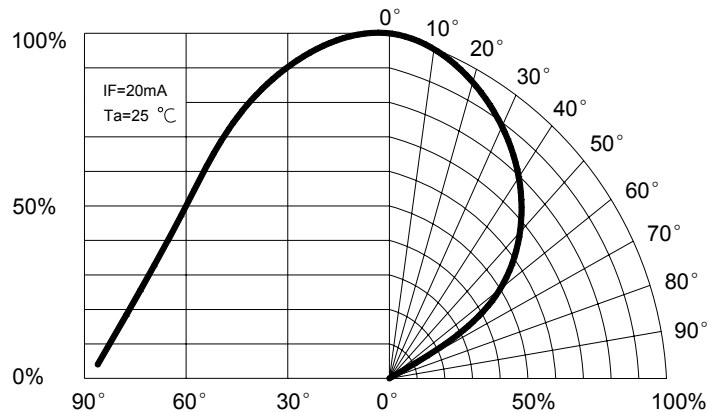


Fig.6 Relative Luminous Intensity vs. Radiation Angle



|               |                 |
|---------------|-----------------|
| Model No.:    | LL1502HGWW1-C01 |
| Document No.: | LML-15-171      |
| Revision No.: | 03              |

## Reliability Test Standards

| Type                   | Test item                                  | Applicable standard      | Test condition                                                          | Duration        | Sampling number | Accept criteria |
|------------------------|--------------------------------------------|--------------------------|-------------------------------------------------------------------------|-----------------|-----------------|-----------------|
| environment test       | Temperature cycles                         | JEITA ED-4701<br>100 105 | -40℃~25℃~100℃~25℃<br>30min 5min 30min 5min                              | 100cycles       | 100             | 0/100           |
|                        | Thermal shock                              | MIL-STD-202G             | -40℃~100℃<br>15min 15min                                                | 300cycles       | 100             | 0/100           |
|                        | High humidity heat cycles                  | JEITA ED-4701<br>200 203 | 30℃~65℃<br>RH=90% 24hrs/1 cycle                                         | 50cycles        | 100             | 0/100           |
|                        | High temperature storage                   | JEITA ED-4701<br>200 201 | T <sub>a</sub> =100℃                                                    | 1000hrs         | 100             | 0/100           |
|                        | Low temperature storage                    | JEITA ED-4701<br>200 202 | T <sub>a</sub> =-40℃                                                    | 1000hrs         | 100             | 0/100           |
|                        | High temperature & high humidity storage   | JEITA ED-4701<br>100 103 | T <sub>a</sub> =60℃ RH=90%                                              | 1000hrs         | 100             | 0/100           |
| life test              | Normal temperature life test               |                          | T <sub>a</sub> =25℃<br>I <sub>F</sub> =30mA(R,G,Y)/20mA(W,B)            | 1000hrs         | 100             | 0/100           |
|                        | High temperature & high humidity life test |                          | T <sub>a</sub> =60℃ RH=90%<br>I <sub>F</sub> =20mA(R,G,Y)/15mA(W,B)     | 1000hrs         | 100             | 0/100           |
|                        | Low temperature life test                  |                          | T <sub>a</sub> =-30℃<br>I <sub>F</sub> =20mA(R,G,Y)/15mA(W,B)           | 1000hrs         | 100             | 0/100           |
| destructive experiment | Resistance to soldering heat               | JEITA ED-4701<br>300 302 | T <sub>sol</sub> =260℃±5℃, 10sec<br>3mm from the base of the epoxy bulb | one time        | 20              | 0/20            |
|                        | Solderability                              | JEITA ED-4701<br>300 303 | T <sub>sol</sub> =235℃±5℃, 5sec<br>using flux                           | one time        | 20              | 0/20            |
| ESD                    | Electrostatic discharge test               | JEITA ED-4701<br>300 304 | Human body model 1000V<br>forward and reverse                           | each<br>3 times | 10              | 0/10            |
| physical experiment    | Vibration                                  | JEITA ED-4701<br>400 403 | 20G 20-2000HZ 4mins<br>X,Y,Z 3directions                                | each<br>4cycles | 10              | 0/10            |
|                        | Drop                                       |                          | 75CM                                                                    | 3 times         | 10              | 0/10            |

### Failure Criteria:

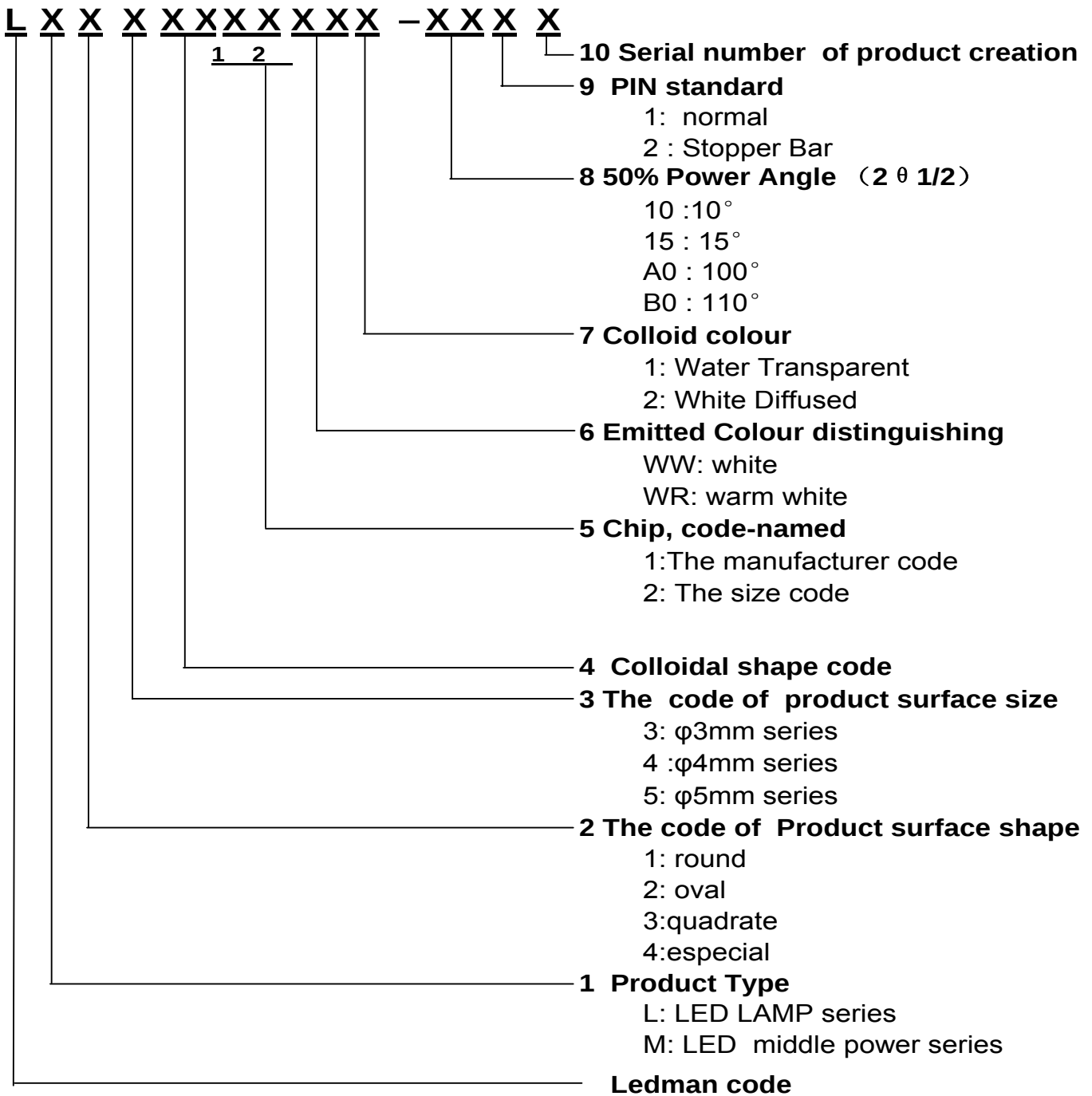
| Item               | Symbol         | Test Condition       | Criteria for Judgment                                         |
|--------------------|----------------|----------------------|---------------------------------------------------------------|
| Forward Voltage    | V <sub>F</sub> | I <sub>F</sub> =20mA | Initial Data±10%                                              |
| Reverse Current    | I <sub>R</sub> | V <sub>R</sub> =5V   | ≦ 10μA                                                        |
| Luminous Intensity | I <sub>V</sub> | I <sub>F</sub> =20mA | Single led degradation ≦ 50% and<br>Average degradation ≦ 30% |
| Solderability      |                |                      | Over 95%                                                      |
| Vibration          |                | I <sub>F</sub> =20mA | No dead lamps or visual damage                                |
| Drop               |                | I <sub>F</sub> =20mA | No dead lamps or visual damage                                |

Remark: RH:Environment humidity; T<sub>a</sub>:Environment temperature; T<sub>sol</sub>:Tin temperature; I<sub>F</sub>:Forward current; V<sub>R</sub>:Reverse voltage.



|               |      |                 |
|---------------|------|-----------------|
| Model         | No.: | LL1502HGWW1-C01 |
| Document No.: |      | LML-15-171      |
| Revision      | No.: | 03              |

## Lamp LED Product Naming Rule





|               |      |                 |
|---------------|------|-----------------|
| Model         | No.: | LL1502HGWW1-C01 |
| Document No.: |      | LML-15-171      |
| Revision      | No.: | 03              |

## Application Note

- 1.Storage condition : 10℃-26℃ , 40%-65% RH. Store the product in sealed package.
2. It is recommended to use a wrist band or an antistatic glove when handling the LEDs. Operation tables must be earthed, and in order to avoid the oxidizing of the Lamp leads make sure you will seal the package soon after it is opened.
3. Please pay attention to antistatic steps during Insertation Procedure:
  - A : The equipments should be properly earthed.
  - B : The wrist bands are OK ,make sure the metal on the wrist band contacts closely with the skin.
  - C : It is recommended that workers wear antistatic gloves when inserting LEDs.
  - D : The operation table needs to be covered by antistatic rubberized fabric which is earthed.
  - E : LEDs should be used within 24 hours after opening the package. Otherwise the lamp leads might be oxidized.
4. Four methods to solder LED lamp: hand soldering, dip soldering and wave soldering.
  - A : Hand soldering: in general, the temperature of soldering iron can be set at around 315℃. Ideally the soldering time is within 3 seconds, and it must be no longer than 5 seconds .Soldering should be less than 3 times for a LED. The temperature of the soldering iron which might vary, is generally set according to the ingredients of the tin soldering wire.
  - B : Dip soldering: the temperature is set according to the ingredients of the tin soldering wire. Set the soldering time to be 3 seconds or less.
  - C : Wave soldering: it is a more advanced soldering technology. The choice of flux is very important as different types of flux have different requirement as to cleanness of the soldering point. The pre-heating time can also have effect on the soldering quality. Normally, the liquid tin needs to be regularly checked and replaced. The temperature of the oven needs to be adjusted according to the ingredients of tin, but it can not be higher than 260℃± 5℃, and the soldering time should be less than 5 seconds.

All the equipments/operation tables need to be earthed while soldering.

The static electricity of equipments/operation tables should not exceed 30 V, and of the human body no more than 50 V. Recommend to choose constant temperature soldering iron for manual soldering.

In the cold and dry seasons, you need minimize personnel moving in workshops in order to avoid generating static electricity.
5. With increase on forward current and temperature, LED's life time will decrease .The electricity leakage will increase significantly as a result of temperature increase, and result in a quick degradation of the LED's life time. Please refer to Ledman's specification sheets.
6. A grounding circuit is necessary in the design of PCB. Pay special attention to the environment: -20℃ to 70℃,50%RH to 80%RH, otherwise electro-static discharge might break down the LEDs and large current might cause the invalidation of the LEDs.  
when Ta = 25℃, blue and green LEDs with 12 mil chip:



|               |      |                 |
|---------------|------|-----------------|
| Model         | No.: | LL1502HGWW1-C01 |
| Document No.: |      | LML-15-171      |
| Revision      | No.: | 03              |

The maximum value of the constant current should not exceed 30 mA, with 9mil chip should not exceed 15 mA.

Red and yellow LEDs with 12 mil chip:

The maximum value of the constant current should not exceed 50 mA, with 9mil chip should not exceed 30 mA.

7. Pay particular attention to the use of white-light LEDs:

A: Do not mix white-light LEDs of different Bins, specially of the Color Ranks.

B: LEDs with different forward voltages can not be used in parallel.

C: Recommend to drive with constant current.

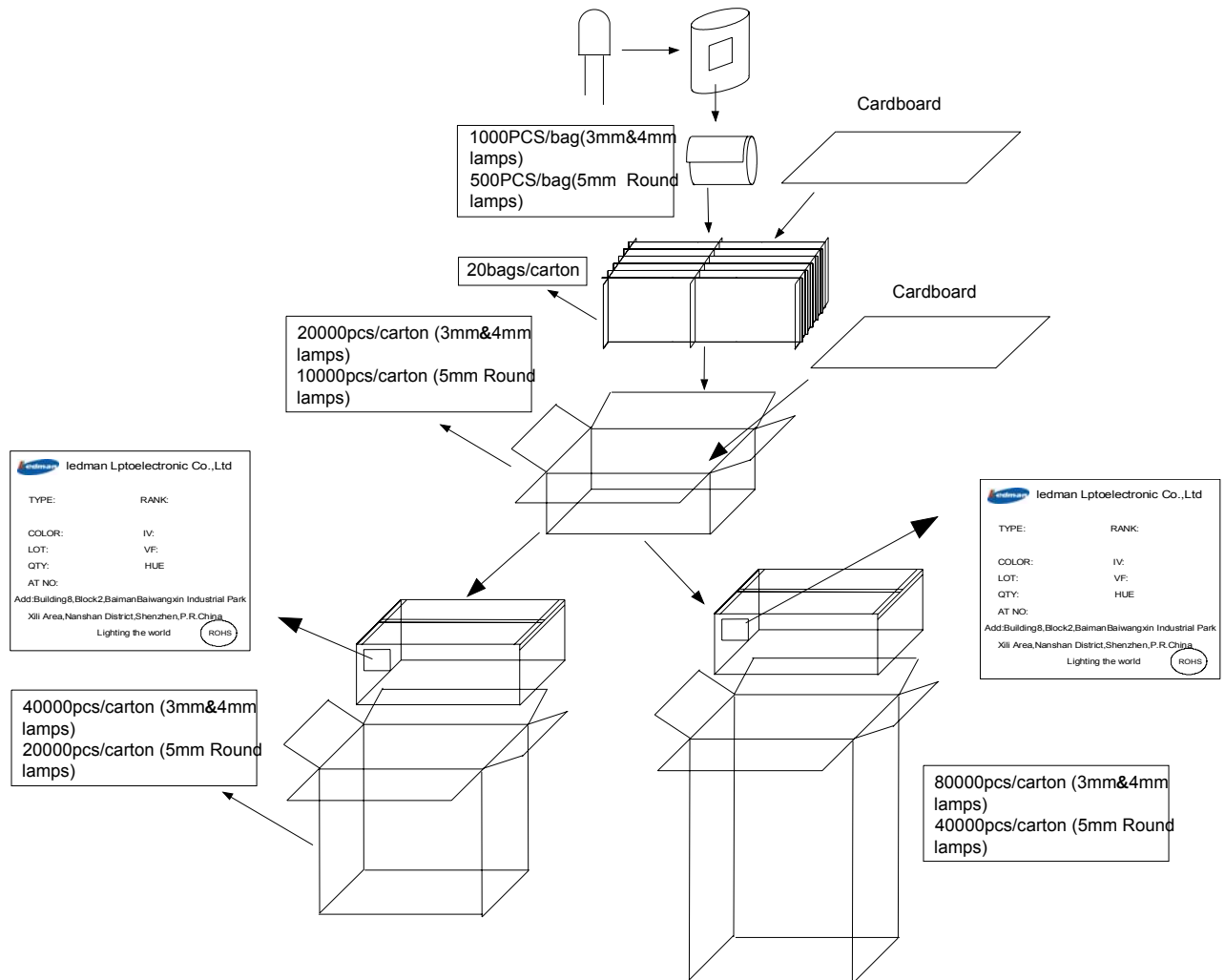
8. When the LEDs are shaping up, the distance between the bending points of the LED leads and the bottom of the lens should be at least 3 mm. Do not bend the LED leads while soldering or after soldering. If you must bend it, please do it before soldering.

Please read carefully about the working environment and parameters of LEDs before use.



## Packaging

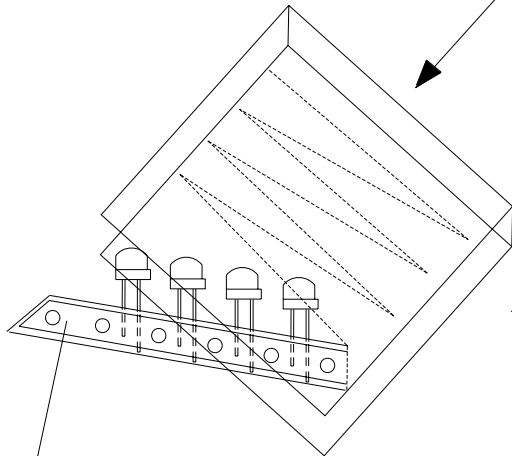
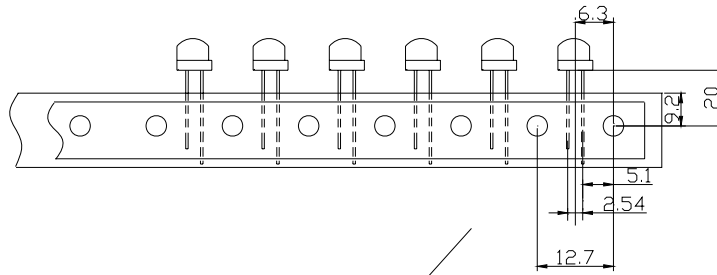
### 1. Antistatic bag packaging:





|               |                 |
|---------------|-----------------|
| Model No.:    | LL1502HGWW1-C01 |
| Document No.: | LML-15-171      |
| Revision No.: | 03              |

## 2. Brede packaging:



A space of to 15 or more elements is left

3030pcs/carton(Φ 5mm Round lamp)

