

## 1. Description

The LOPL (LiteOn Power LED) Emitter I is a 1W power LED package which is a point light source with more energy efficient than incandescent and halogen lamps. It gives you total design freedom and unmatched brightness, creating a new opportunities for solid state lighting to displace conventional lighting technologies.

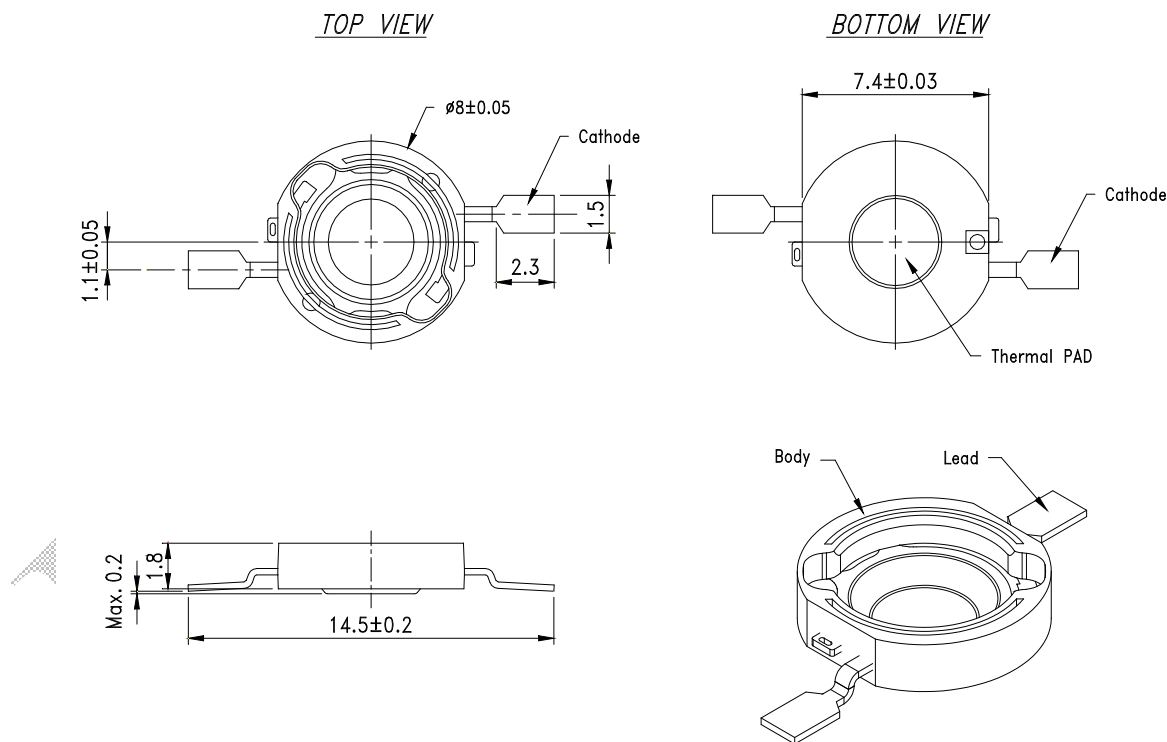
### Features

- High power LED light source
- Long life, up to 100k hours
- Instant light (less than 100 ns)
- Low voltage DC operated
- Low thermal resistance
- RoHS Compliant
- Lead free reflow solder compatible

### Applications

- Portable lights
- Traffic signaling
- Backlighting
- Interior & exterior automotive lighting
- Decorative and landscape lighting
- Medical illumination

## 2. Outline Dimensions



### Notes

1. All dimensions are in millimeters.
2. Tolerance is  $\pm 0.2$  mm (.008") unless otherwise noted.

### 3. Rating and Characteristics

#### 3.1 Absolute Maximum Ratings at Ta=25°C

| Parameter                           | Symbol        | Rating              | Unit |
|-------------------------------------|---------------|---------------------|------|
| Power Dissipation                   | $P_o$         | 1.5                 | W    |
| Forward Current                     | $I_F$         | 350                 | mA   |
| Forward Pulse Current               | $I_{FP}$      | 500                 | mA   |
| Reverse Voltage                     | $V_R$         | 5                   | V    |
| Junction Temperature                | $T_j$         | 125                 | °C   |
| Thermal Resistance, Junction-Case   | $R_{th, J-C}$ | 15.0                | °C/W |
| Operating Temperature Range         | $T_{opr}$     | -40 - 80            | °C   |
| Storage Temperature Range           | $T_{stg}$     | -40 - 120           | °C   |
| Soldering Condition <sup>1, 2</sup> | $T_{sol}$     | 260°C For 5 Seconds |      |

#### Notes

1. Proper current derating must be observed to maintain junction temperature below the maximum. For more information, consult the LOPL Emitters application notes, available upon request.
2. Measured at leads, during lead soldering and heat pad attach, body temperature must not exceed 150°C. LOPL Emitters can be soldered by general IR reflow, or select heating the leads by hot bar reflow or hand soldering.

### 3.2 Electro-Optical Characteristics at Ta=25°C

| Parameter                                                           | Symbol   | MIN. | TYP. | MAX. | Test Condition                | Unit                       |
|---------------------------------------------------------------------|----------|------|------|------|-------------------------------|----------------------------|
| Forward Voltage                                                     | $V_F$    | 3.03 | 3.80 | 4.23 | $I_F = 350\text{mA}$          | V                          |
| Reverse Current                                                     | $I_R$    |      |      | 100  | $V_R = 5\text{V}$             | $\mu\text{A}$              |
| Luminous Flux <sup>1, 3</sup>                                       | $\Phi_V$ | 30.6 | 43.0 |      | $I_F = 350\text{mA}$          | lm                         |
| Color Rendering Index                                               | CRI      |      | 85   |      | $I_F = 350\text{mA}$          | %                          |
| Chromaticity Coordinates <sup>2, 3</sup>                            | x        |      | 0.33 |      | $I_F = 350\text{mA}$          |                            |
|                                                                     | y        |      | 0.32 |      |                               |                            |
| Temperature Coefficient of Chromaticity Coordinates <sup>2, 3</sup> | $TC_x$   |      | -0.1 |      | $I_F = 350\text{mA}, T_{opr}$ | $10^{-3}/^{\circ}\text{C}$ |
|                                                                     | $TC_y$   |      | -0.2 |      |                               |                            |
| Temperature Coefficient of $V_F$                                    | $TC_V$   |      | -2.0 |      | $I_F = 350\text{mA}, T_{opr}$ | mV/ $^{\circ}\text{C}$     |

#### Notes

- Luminous flux is the total luminous flux output as measured with an integrating sphere.
- The chromaticity coordinates (x, y) is derived from the CIE 1931 chromaticity diagram.
- IS CAS140B is for the luminous flux (lm) and the CIE1931 chromaticity coordinates (x, y) testing.  
The chromaticity coordinates (x, y) guarantee should be added  $\pm 0.01$  tolerance.

### 3.3 Typical Electrical / Optical Characteristics Curves

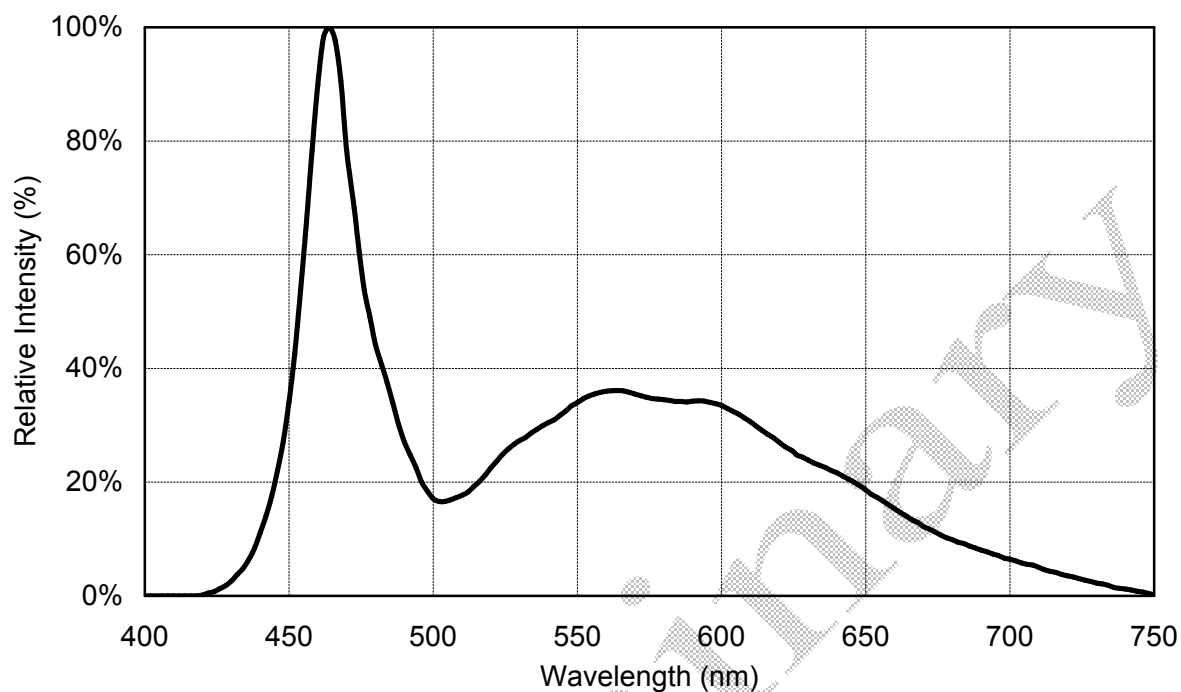


Fig 1. Relative Spectrum of Emission

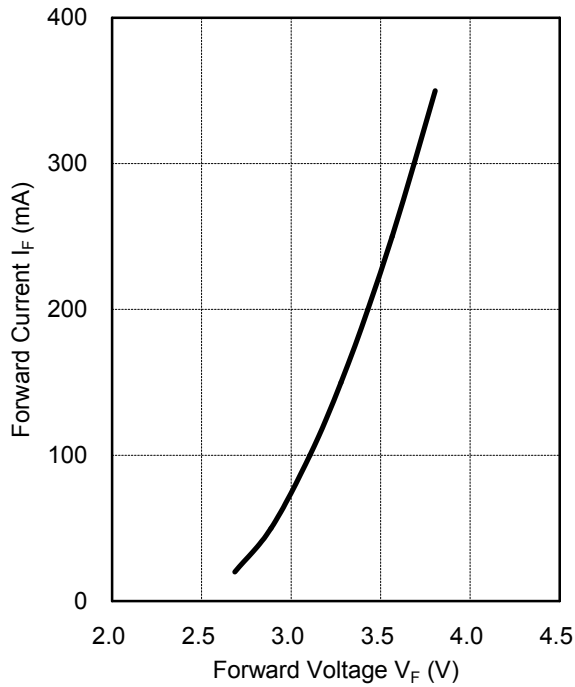


Fig 2. Forward Current

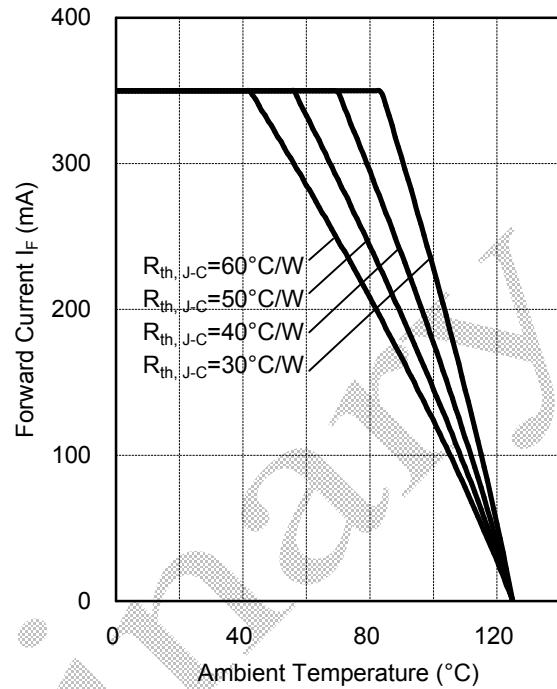


Fig 3. Forward Current Derating Curve

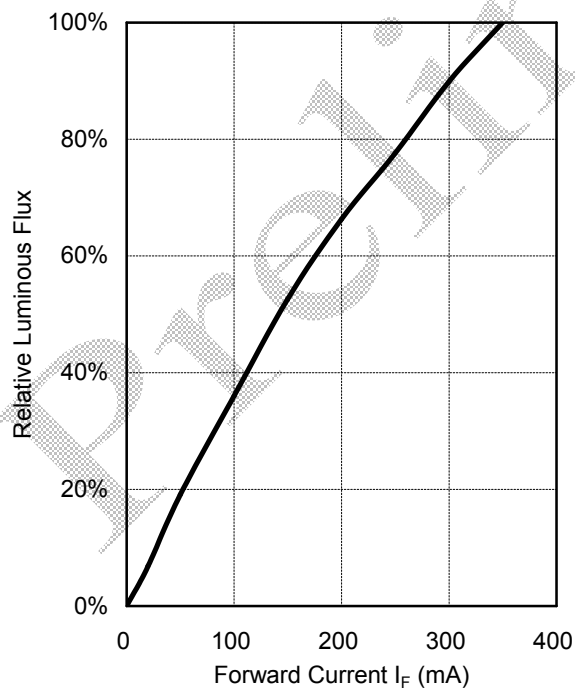


Fig 4. Relative Luminous Flux

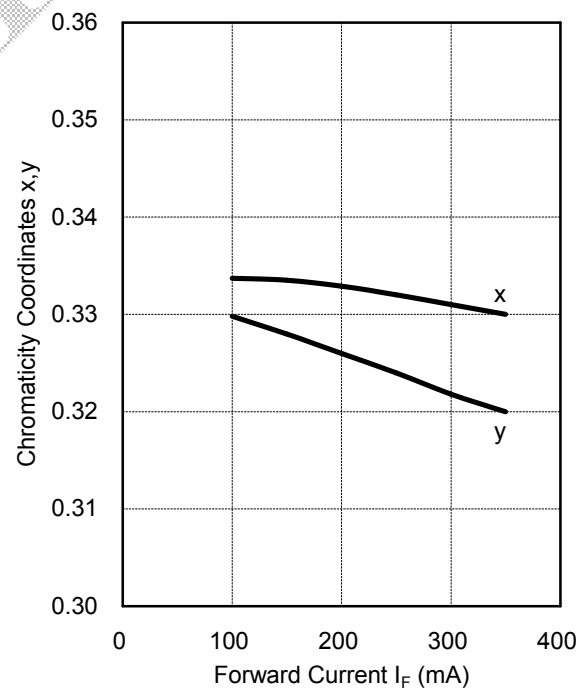


Fig 5. Chromaticity Coordinate Shift

## 4. Category Code Table

| R | L | W4 |
|---|---|----|
|---|---|----|

### Chromaticity Coordinate Categories

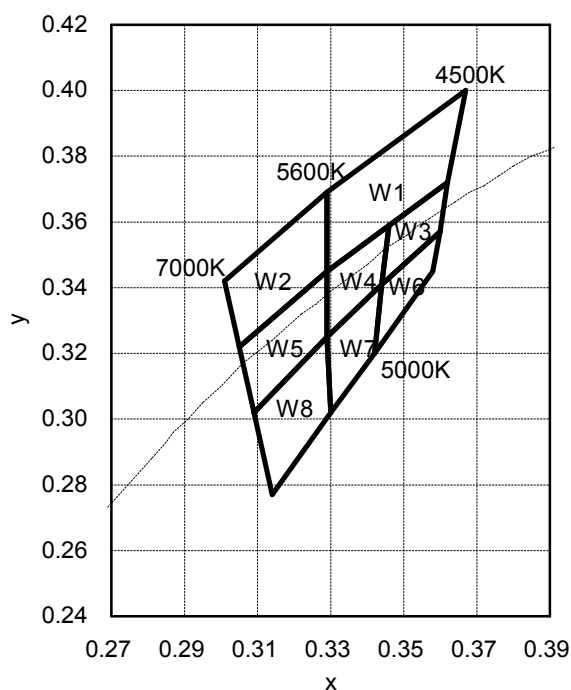
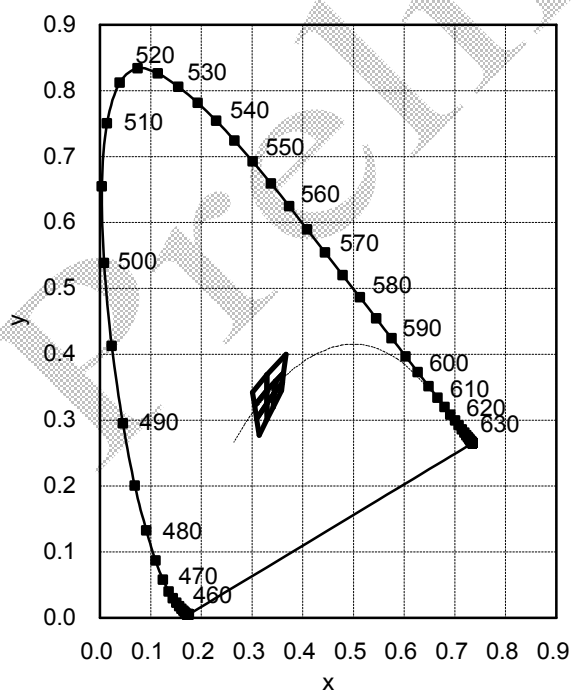
| Code    | x     | y     | Code    | x     | y     |
|---------|-------|-------|---------|-------|-------|
| W1      | 0.367 | 0.400 | W2      | 0.329 | 0.369 |
| (5500K) | 0.362 | 0.372 | (6300K) | 0.329 | 0.345 |
|         | 0.329 | 0.345 |         | 0.305 | 0.322 |
|         | 0.329 | 0.369 |         | 0.301 | 0.342 |
| W3      | 0.362 | 0.372 | W4      | 0.346 | 0.359 |
| (4800K) | 0.360 | 0.357 | (5350K) | 0.344 | 0.341 |
|         | 0.344 | 0.341 |         | 0.329 | 0.325 |
|         | 0.346 | 0.359 |         | 0.329 | 0.345 |
| W5      | 0.329 | 0.345 | W6      | 0.360 | 0.357 |
| (6300K) | 0.329 | 0.325 | (4800K) | 0.358 | 0.345 |
|         | 0.309 | 0.302 |         | 0.342 | 0.320 |
|         | 0.305 | 0.322 |         | 0.344 | 0.341 |
| W7      | 0.344 | 0.341 | W8      | 0.329 | 0.325 |
| (5350K) | 0.342 | 0.320 | (6300K) | 0.330 | 0.302 |
|         | 0.330 | 0.302 |         | 0.314 | 0.277 |
|         | 0.329 | 0.325 |         | 0.309 | 0.302 |

### Forward Voltage Categories

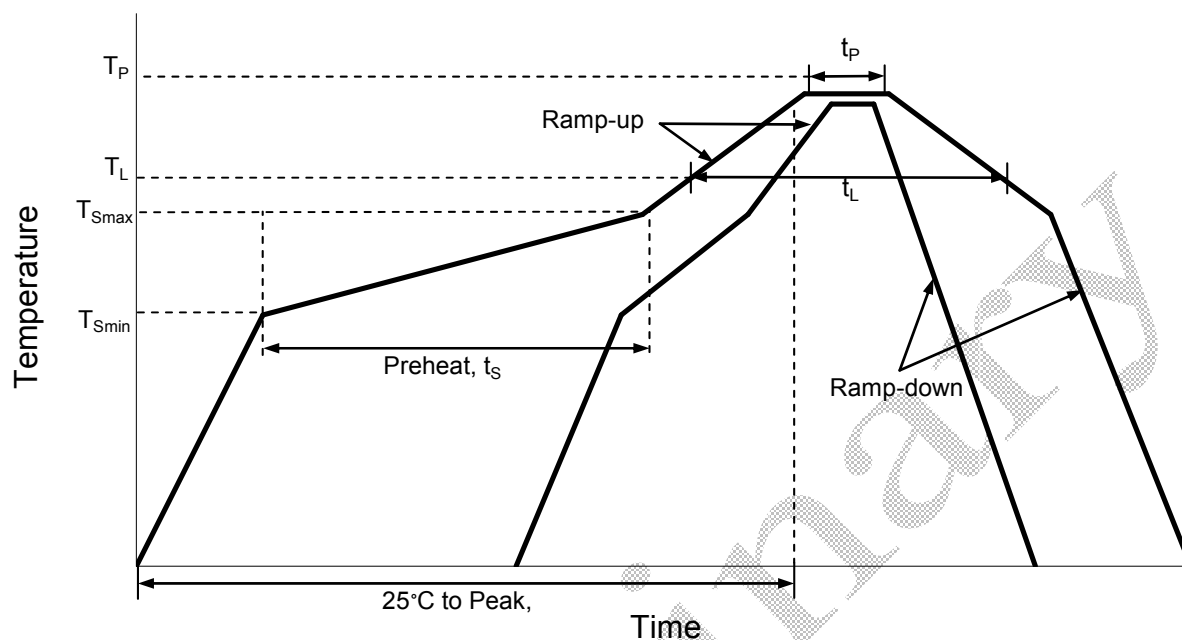
| Code | Min  | Max  |
|------|------|------|
| H    | 3.03 | 3.27 |
| J    | 3.27 | 3.51 |
| K    | 3.51 | 3.75 |
| L    | 3.75 | 3.99 |
| M    | 3.99 | 4.23 |

### Luminous Flux Categories

| Code | Min  | Max  |
|------|------|------|
| Q    | 30.6 | 39.8 |
| R    | 39.8 | 51.7 |
| S    | 51.7 | 67.2 |



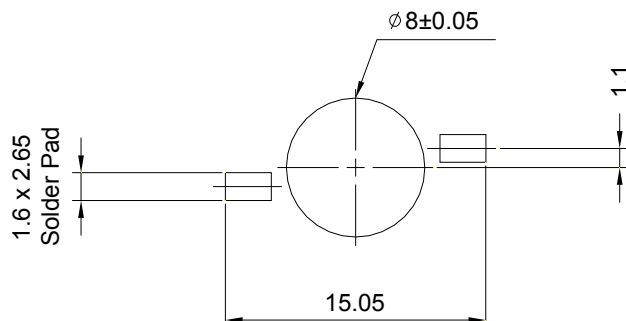
## 5. Reflow Soldering Characteristics



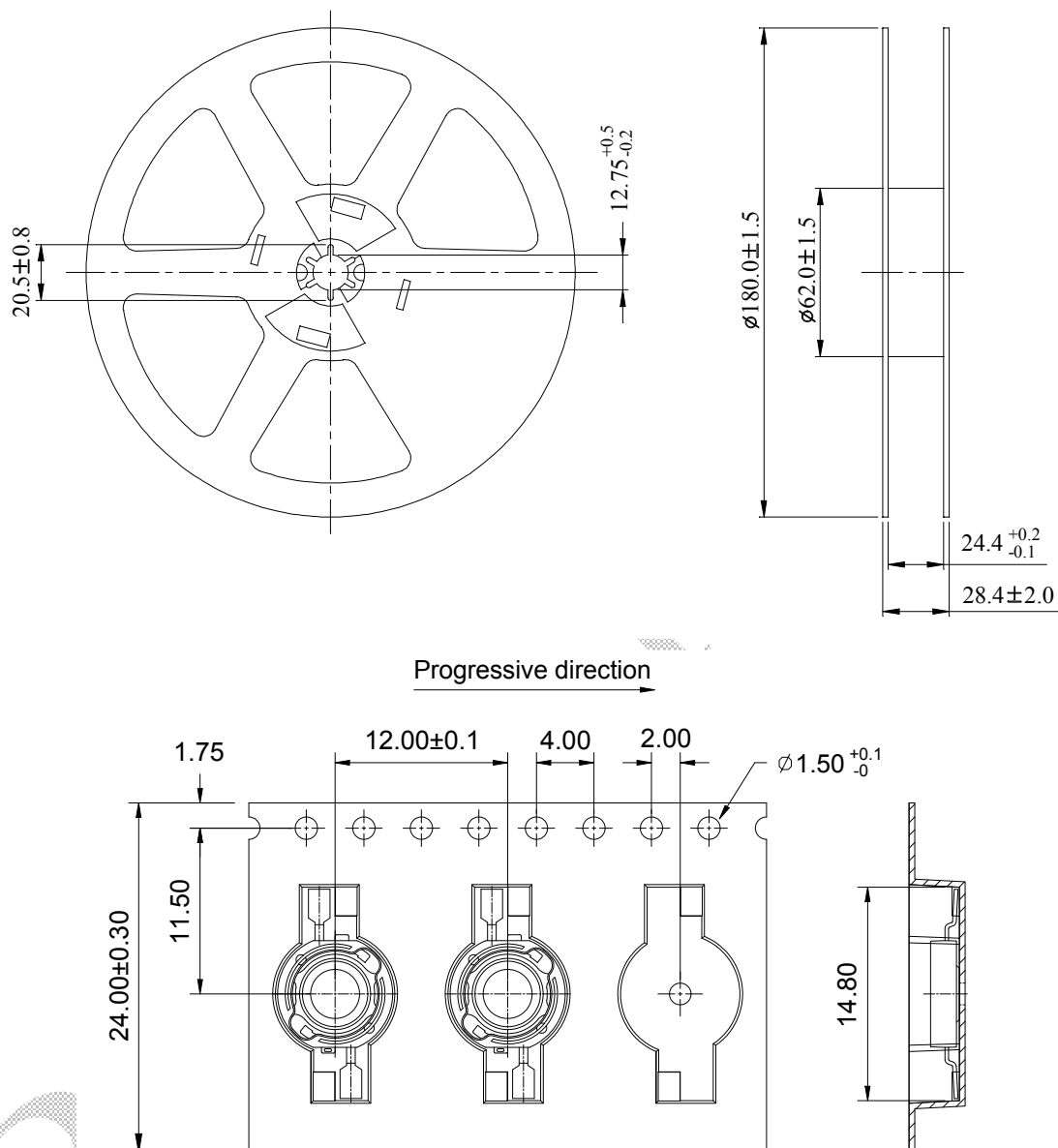
| Profile Feature                                              | Lead Free Assembly |
|--------------------------------------------------------------|--------------------|
| Average Ramp-Up Rate (T <sub>Smax</sub> to T <sub>P</sub> )  | 3°C / second max   |
| Preheat Temperature Min (T <sub>Smin</sub> )                 | 150°C              |
| Preheat Temperature Max (T <sub>Smax</sub> )                 | 200°C              |
| Preheat Time (t <sub>Smin</sub> to t <sub>Smax</sub> )       | 60 – 180 seconds   |
| Time Maintained Above Temperature (T <sub>L</sub> )          | 217°C              |
| Time Maintained Above Time (t <sub>L</sub> )                 | 60 – 150 seconds   |
| Peak / Classification Temperature (T <sub>P</sub> )          | 260°C              |
| Time Within 5°C of Actual Peak Temperature (t <sub>p</sub> ) | 20 – 40 seconds    |
| Ramp – Down Rate                                             | 6°C / second max   |
| Time 25°C to Peak Temperature                                | 8 minutes max      |

Notes: All temperatures refer to topside of the package, measured on the package body surface.

## 6. Recommend Solder Pad



## 7. Package Dimensions of Tape and Reel



**Note:**

1. 500 pcs per reel.
2. Drawings not to scale.
3. The tolerance unless mentioned is ±0.1mm, Unit=mm.

## 8. Cautions

### 8.1 Application

The LEDs described here are intended to be used for ordinary electronic equipment (such as office equipment, communication equipment and household applications). Consult Liteon's Sales in advance for information on applications in which exceptional reliability is required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as in aviation, transportation, traffic control equipment, medical and life support systems and safety devices).

### 8.2 Storage

The storage ambient for the LEDs should not exceed 30°C temperature or 70% relative humidity.

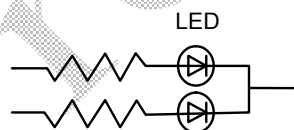
It is recommended that LEDs out of their original packaging are soldered within one week.

For extended storage out of their original packaging, it is recommended that the LEDs be stored in a sealed container with appropriate desiccant, or in a desiccators with nitrogen ambient.

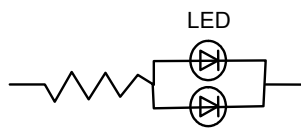
LEDs stored out of their original packaging for more than a week should be baked at about 60 deg C for at least 24 hours before solder assembly.

### 8.3 Drive Method

An LED is a current-operated device. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in Circuit A below.



Circuit model A



Circuit model B

(A) Recommended circuit.

(B) The brightness of each LED might appear different due to the differences in the I-V characteristics of those LEDs.

## 8.4 ESD (Electrostatic Discharge)

Static Electricity or power surge will damage the LED. Suggestions to prevent ESD damage:

- Use a conductive wrist band or anti-electrostatic glove when handling these LEDs.
- All devices, equipment, and machinery must be properly grounded.
- Work tables, storage racks, etc. should be properly grounded.
- Use ion blower to neutralize the static charge which might have built up on surface of the LED's plastic lens as a result of friction between LEDs during storage and handling.

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward voltage, or "no light up" at low currents. To verify for ESD damage, check for "light up" and  $V_F$  of the suspect LEDs at low currents. The  $V_F$  of "good" LEDs should be  $>2.0V@0.1mA$  for InGaN product.

## 8.5 Suggested Checking List

### Training and Certification

1. Everyone working in a static-safe area is ESD-certified?
2. Training records kept and re-certification dates monitored?

### Static-Safe Workstation & Work Areas

1. Static-safe workstation or work-areas have ESD signs?
2. All surfaces and objects at all static-safe workstation and within 1 ft measure less than 100V?
3. All ionizer activated, positioned towards the units?
4. Each work surface mats grounding is good?

### Personnel Grounding

1. Every person (including visitors) handling ESD sensitive (ESDS) items wear wrist strap, heel strap or conductive shoes with conductive flooring?
2. If conductive footwear used, conductive flooring also present where operator stand or walk?
3. Garments, hairs or anything closer than 1 ft to ESD items measure less than 100V?
4. Every wrist strap or heel strap/conductive shoes checked daily and result recorded for all DLs?
5. All wrist strap or heel strap checkers calibration up to date?

**Device Handling**

1. Every ESDS items identified by EIA-471 labels on item or packaging?
2. All ESDS items completely inside properly closed static-shielding containers when not at static-safe workstation?
3. No static charge generators (e.g. plastics) inside shielding containers with ESDS items?
4. All flexible conductive and dissipative package materials inspected before reuse or recycles?

**Others**

1. Audit result reported to entity ESD control coordinator?
2. Corrective action from previous audits completed?
3. Are audit records complete and on file?

Preliminary