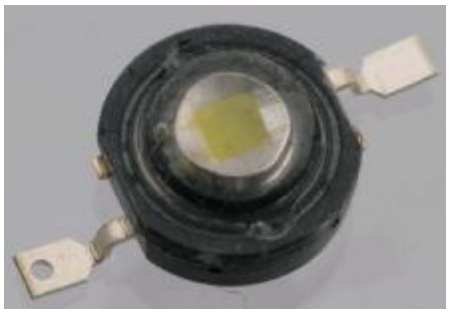
Lite-On Technology Corporation
OFFICE : 90, Chien I Road, Chung Ho Taipei, Taiwan, R.O.C.
TEL : +886-2-2222-6181 ~ 8
FAX : +886-2-2221-0660, +886-2-2221-2780,+886-2-2225-1518

HIGH POWER LED



LTPL-P011MS

DATA SHEET

Ver 1.1 Created Date: 2008/07/24

1. Description

The LTPL (LiteOn Power LED) is a revolutionary, energy efficient and ultra compact new light source, combining the lifetime and reliability advantages of Light Emitting Diodes with the brightness of conventional lighting. It gives you total design freedom and unmatched brightness, creating a new opportunities for solid state lighting to displace conventional lighting technologies.

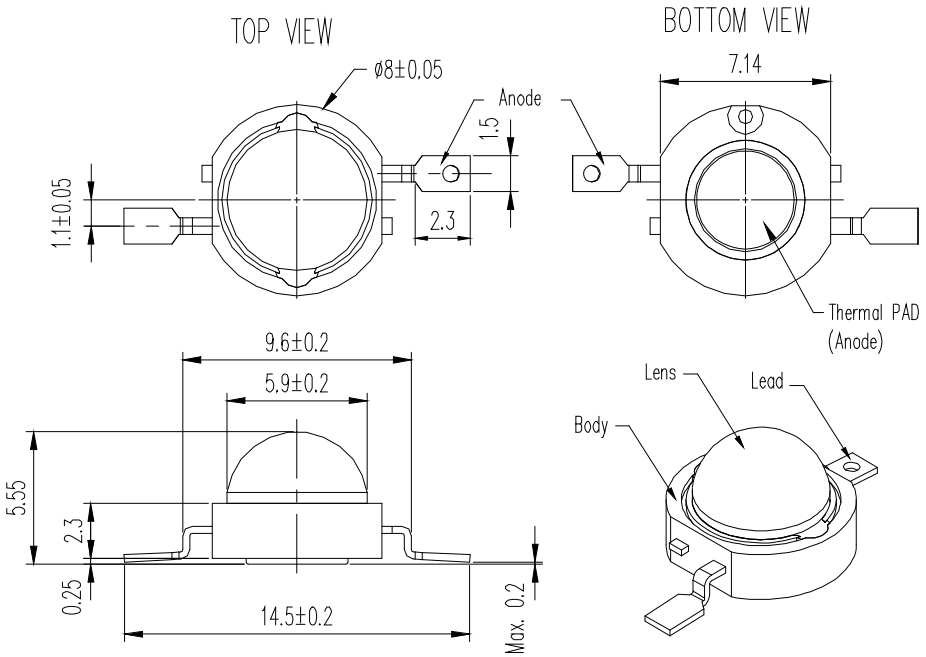
Features

- 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

- Reading lights (car, bus, aircraft)
- Portable (flashlight, bicycle)
- Downlighters/Orientation
- Decorative/Entertainment
- Bollards/Security/Garden
- Cove/Undershelf/Task
- Traffic signaling/Beacons/ Rail crossing and Wayside
- Indoor/Outdoor Commercial and Residential Architectural
- Edge_lit signs (Exit, point of sale)

2. Outline Dimensions



Notes

1. All dimensions are in millimeters.
2. Tolerance is ±0.2 mm (.008") unless otherwise noted.
3. The anode side is electrically connected to slug (thermal pad).

3. Rating and Characteristics

3.1. Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Rating	Unit
Power Dissipation	P_o	1.52	W
Forward Current	I_F	400	mA
Reverse Voltage	V_R	5	V
Junction Temperature	T_j	125	°C
Thermal Resistance, Junction-Case	$R_{th, J-C}$	9	°C/W
Operating Temperature Range	T_{opr}	-40 - 85	°C
Storage Temperature Range	T_{stg}	-40 - 120	°C

Notes

1. The Liteon LED offers performance with a JEDEC moisture sensitivity level of 2a and a floor life of four weeks before any bake out is required.
2. The maximum impact force is 5Kgf. Please also refer to precaution for further lens handling information.

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

Parameter		Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
Forward Voltage		V_F	2.79	3.70	4.23	I_F= 350mA	V
Reverse Current		I_R			100	V_R = 5V	μA
Luminous Flux [1, 3]	Bin Q0	Φ_V	30.6	35.2	39.8	I_F = 350mA	lm
	Bin R0		39.8	45.8	51.7		
Efficiency	Bin Q0	η		27.2		I_F = 350mA	lm/W
	Bin R0			35.4			
Color Rendering Index		CRI		80		I_F = 350mA	%
View Angle		$2\theta_{1/2}$		120		I_F = 350mA	°
Chromaticity Coordinates [2, 3]		x		0.41		I_F = 350mA	
		Y		0.40			

Notes

1. Luminous flux is the total luminous flux output as measured with an integrating sphere.
2. The chromaticity coordinates (x, y) is derived from the CIE 1931 chromaticity diagram.
3. 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 ± 0.01 tolerance.

3.3. Typical Electrical / Optical Characteristics Curves

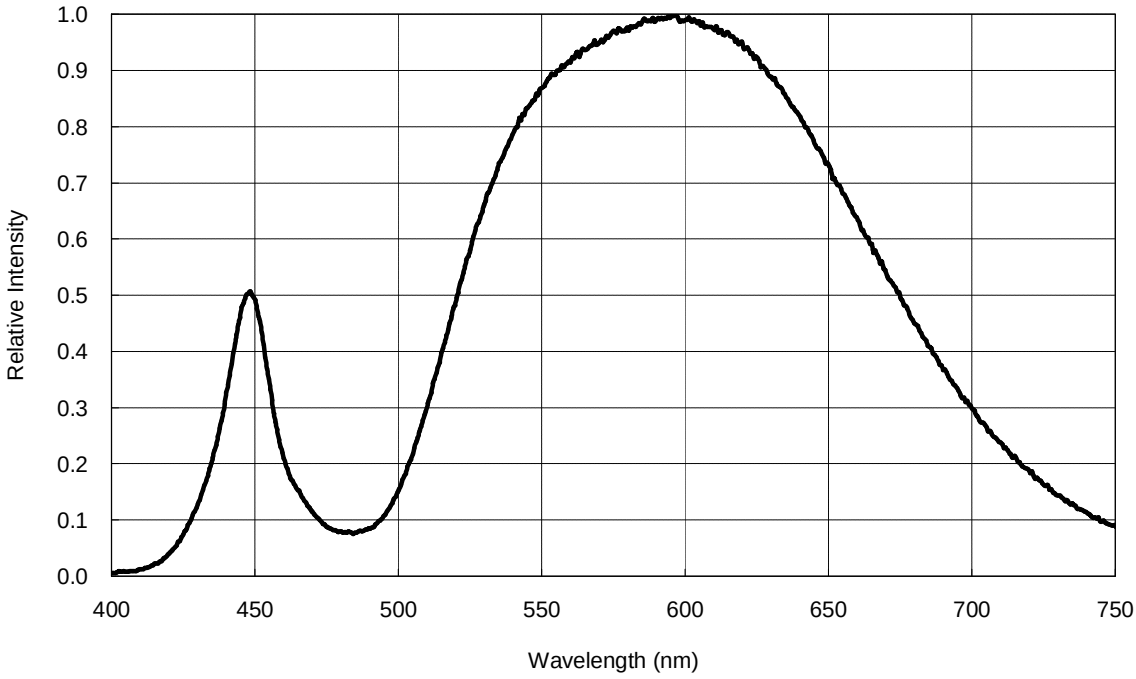


Fig 1. Relative Spectrum of Emission

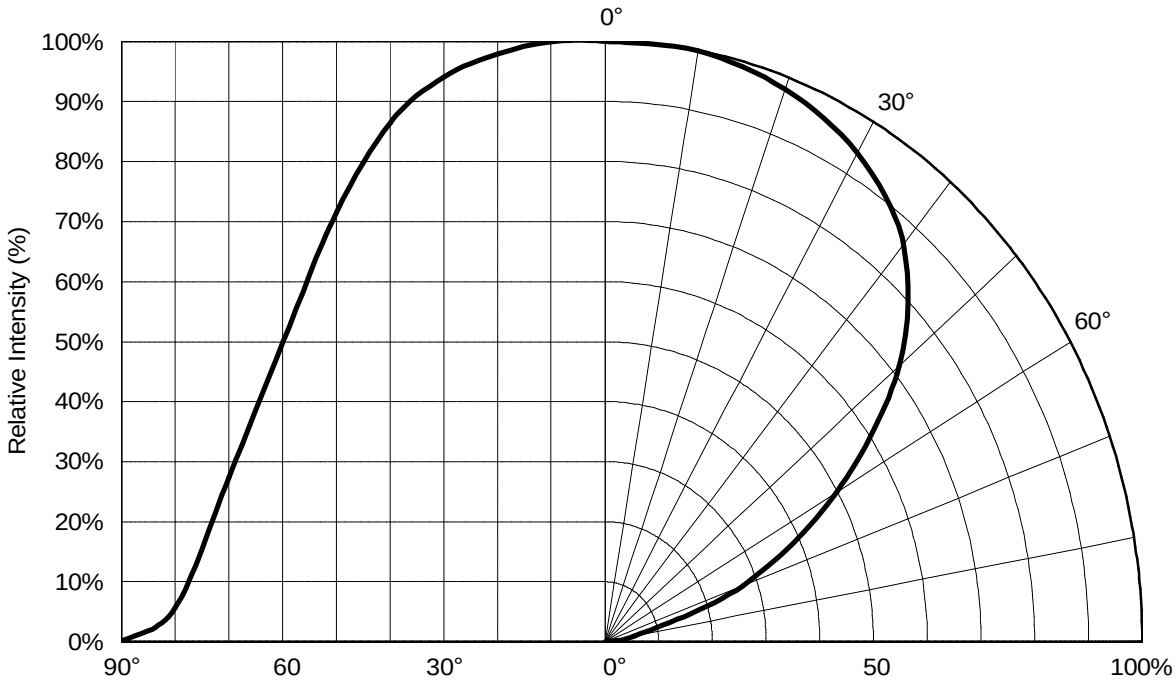


Fig 2. Radiation Characteristics

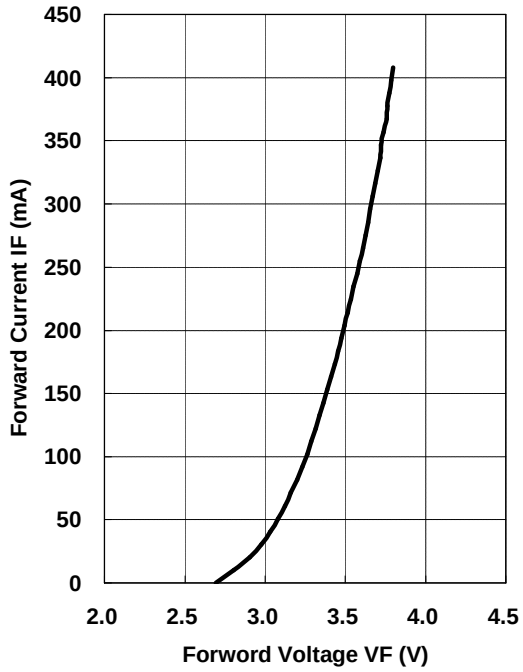


Fig 3. Forward Current

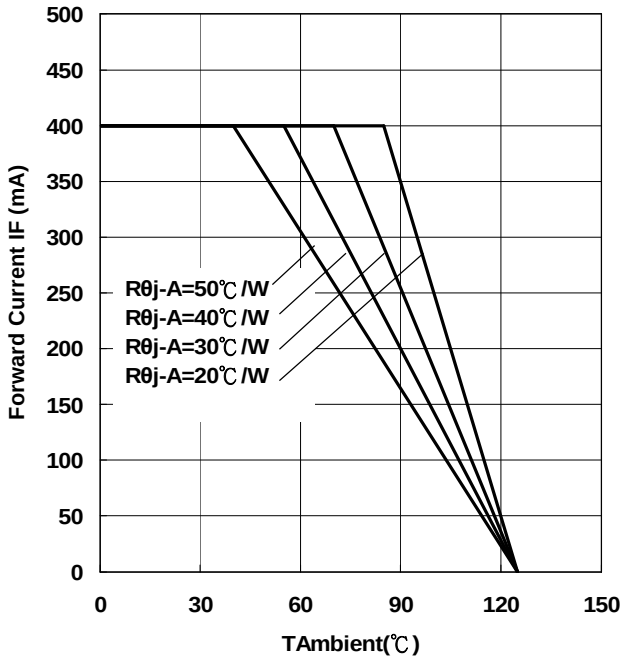


Fig 4. Forward Current Derating Curve

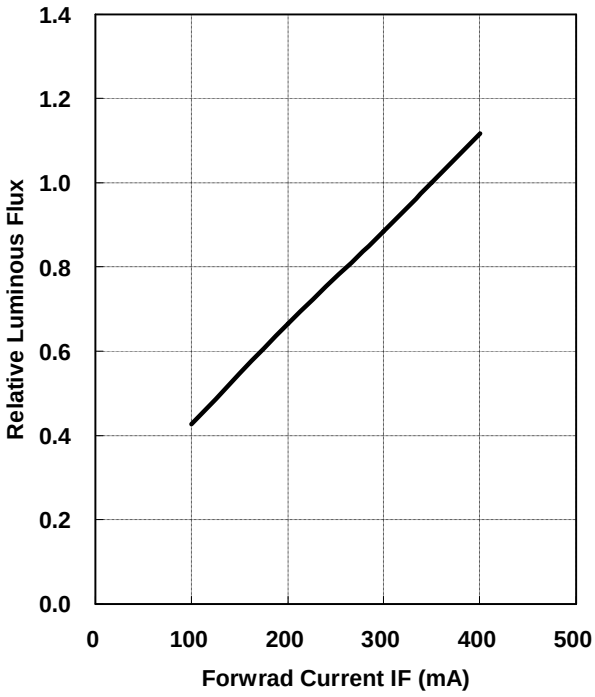


Fig 5. Relative Luminous Flux

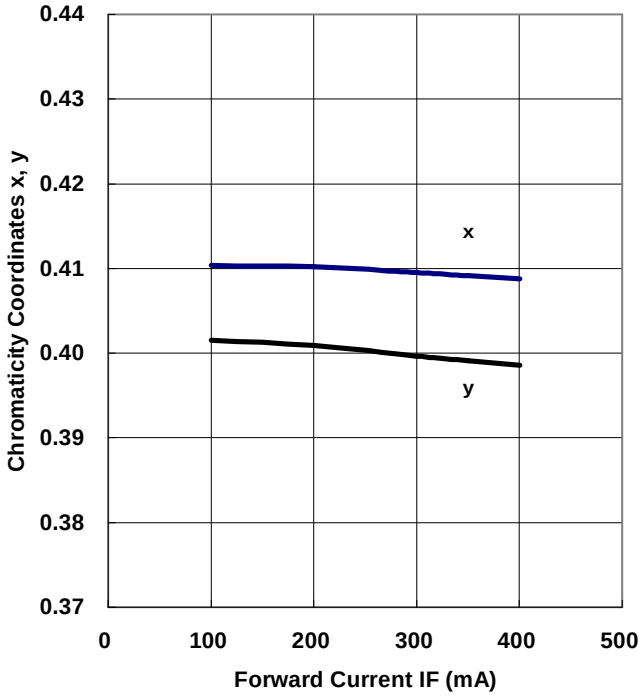


Fig 6. Chromaticity Coordinate Shift

4. Category Code Table

LTPL-P011MS | **R0** | **J** | **U1**

Chromaticity Coordinate Categories

Code	x	y	Code	x	y	Code	x	y
S1	0.438	0.412	S2	0.454	0.446			
(2950)	0.429	0.394	(2950)	0.438	0.412			
	0.444	0.399		0.453	0.416			
	0.453	0.416		0.471	0.451			
T1	0.424	0.406	T2	0.438	0.44			
(3150)	0.416	0.389	(3150)	0.424	0.406			
	0.429	0.394		0.438	0.412			
	0.438	0.412		0.454	0.446			
U1	0.387	0.374	U2	0.409	0.4	U3	0.392	0.391
(3500)	0.383	0.36	(3370)	0.402	0.382	(3640)	0.387	0.374
	0.41	0.374		0.416	0.389		0.402	0.382
	0.416	0.389		0.424	0.406		0.409	0.4
U4	0.402	0.423						
(3500)	0.392	0.391						
	0.424	0.406						
	0.438	0.44						

Forward Voltage Categories

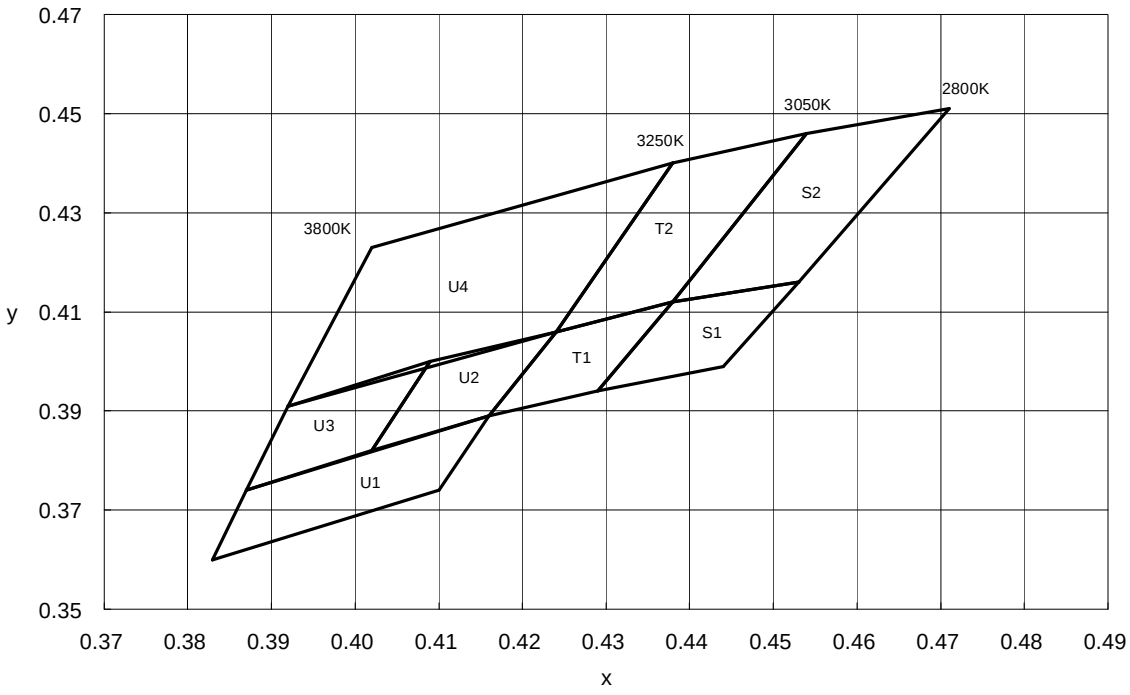
Code	Min	Max
G	2.79	3.03
H	3.03	3.27
J	3.27	3.51
K	3.51	3.75
L	3.75	3.99
M	3.99	4.23

CCT Bin Grade Spec	
S:	2800-3050 K
T:	3050- 3250 K
U:	3250-3800 K

Luminous Flux Categories

Code	Min	Max
Q0	30.6	39.8
R0	39.8	51.7

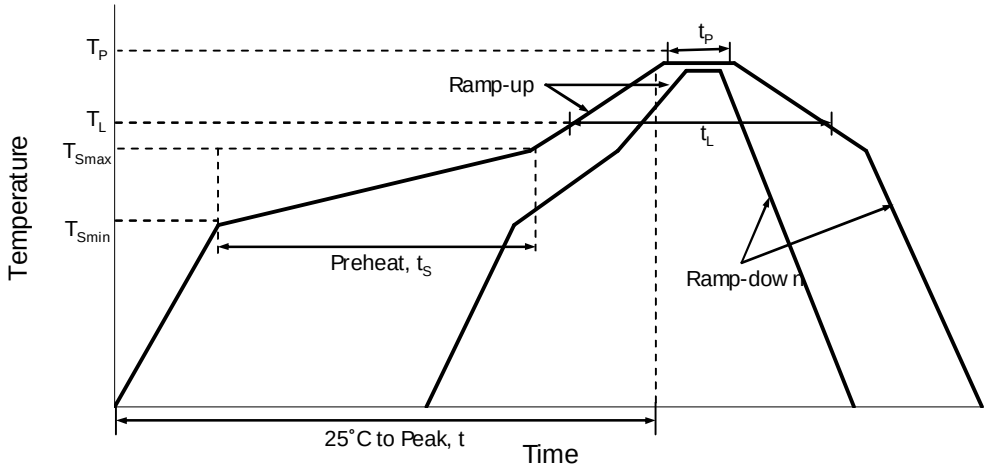
C.I.E. 1931 Chromaticity Diagram



Note

1. The chromaticity coordinates (x, y) is derived from the CIE 1931 chromaticity diagram.

5. Reflow Soldering Characteristics



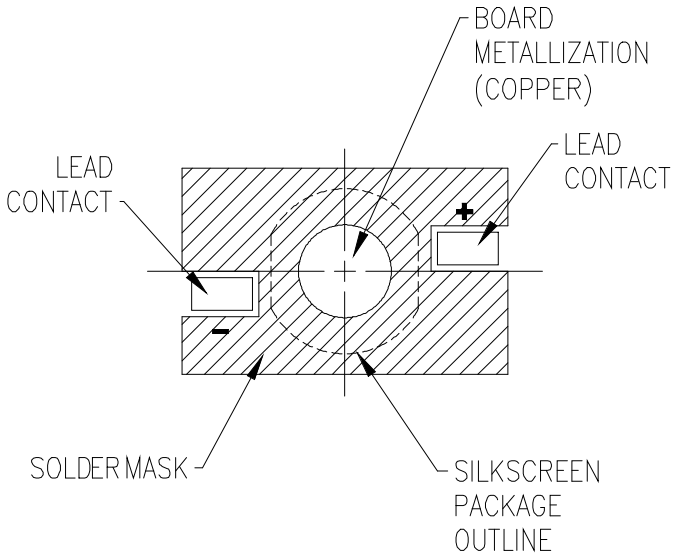
Profile Feature	**Lead Free Assembly**
Average Ramp-Up Rate (T_{Smax} to T_P)	3°C / second max
Preheat Temperature Min (T_{Smin})	150°C
Preheat Temperature Max (T_{Smax})	200°C
Preheat Time (t_{Smin} to t_{Smax})	60 – 180 seconds
Time Maintained Above Temperature (T_L)	217°C
Time Maintained Above Time (t_L)	60 – 150 seconds
Peak / Classification Temperature (T_P)	260°C
Time Within 5°C of Actual Peak Temperature (t_P)	5 seconds
Ramp – Down Rate	6°C / second max
Time 25°C to Peak Temperature	8 minutes max

Notes:

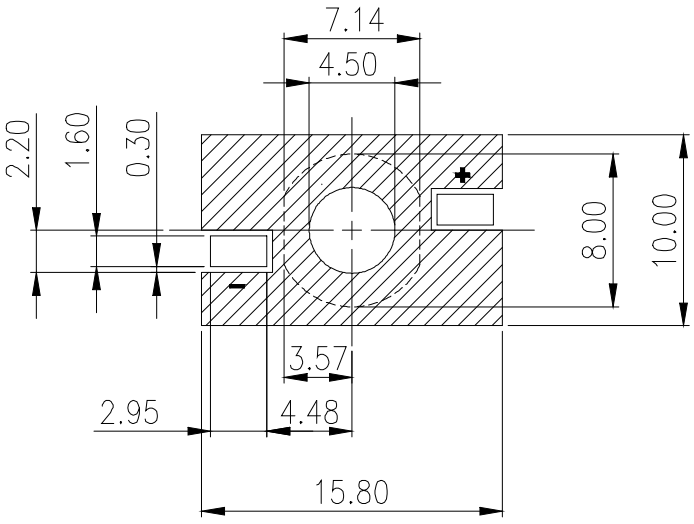
1. The LEDs can be soldered using the reflow soldering or hand soldering method. The recommended hand soldering condition is 350°C max. and 2secs max. for one time only.
2. All temperatures refer to topside of the package, measured on the package body surface.
3. The soldering condition referring to J-STD-020B. If the LEDs were unpacked more than 24hrs, baking the LEDs at 60℃ for 60 mins before soldering process.
4. The soldering profile could be further referred to different soldering grease material characteristic. The grease vendor will provide this information.
5. A rapid-rate process is not recommended for the LEDs cooling down from the peak temperature.
6. Although the recommended reflow conditions are specified above, the reflow or hand soldering condition at the lowest possible temperature is desirable for the LEDs.
7. LiteOn cannot make a guarantee on the LEDs which have been already assembled using the dip soldering method

6. Recommend Solder Pad

(I) Solder Pad Design



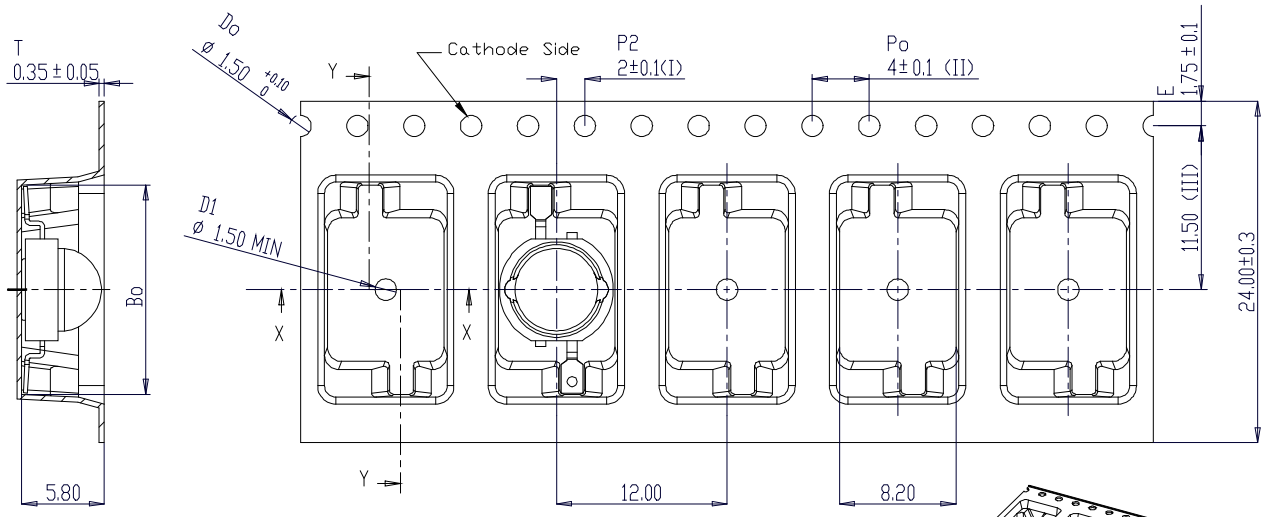
(II) Solder Pad Layout



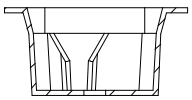
Notes:

1. All dimensions are in millimeters
2. The circle metallization board and lead contact pad is electrically isolated.

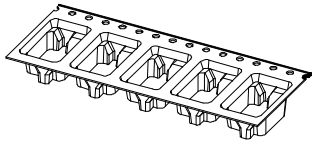
7. Package Dimensions of Tape and Reel



SECTION Y-Y
SCALE 3 : 1

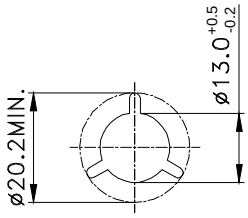


SECTION X-X
SCALE 3 : 1

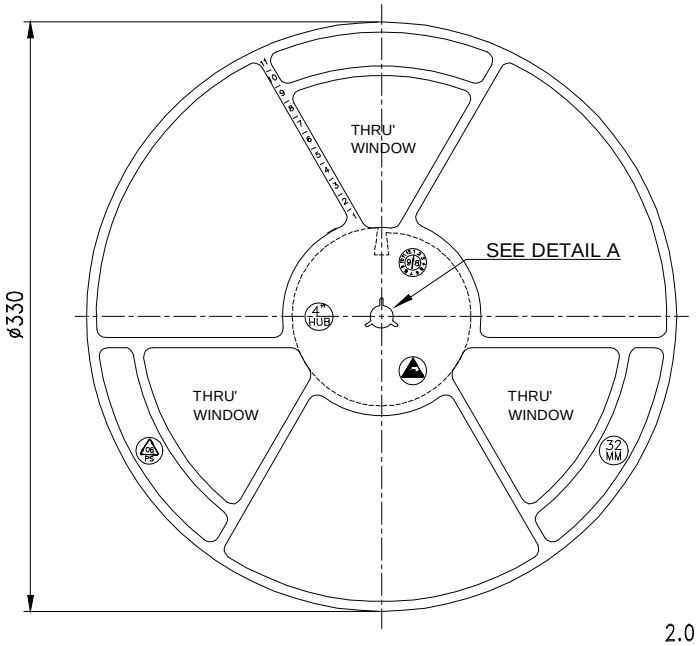


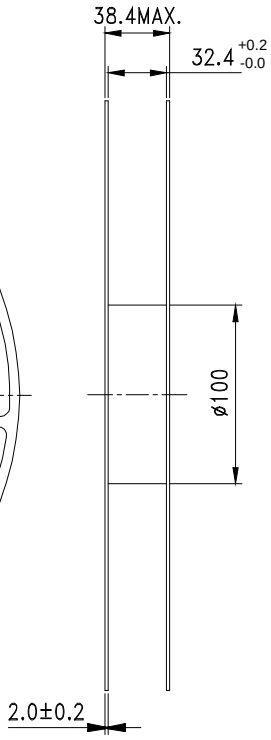
(I) Measured from centreline of sprocket hole to centreline of pocket.
(II) Cumulative tolerance of 10 sprocket holes is ± 0.20 .
(III) Measured from centreline of sprocket hole to centreline of pocket.
(IV) Other material available.

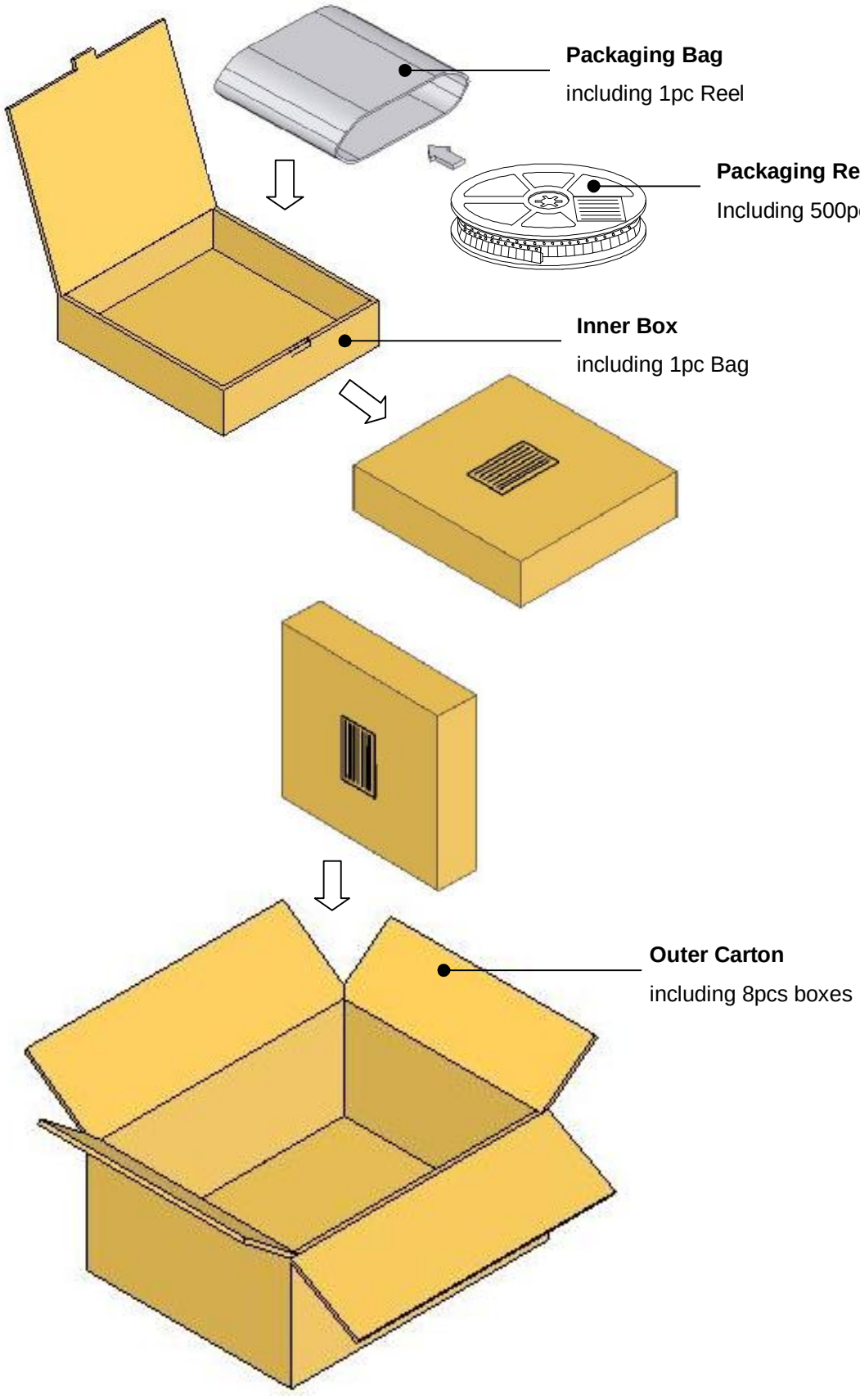
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.



ARBOR HOLE
DETAIL A
SCALE 3:1






Packaging Bag
including 1pc Reel
Packaging Reel
Including 500pcs products
Inner Box
including 1pc Bag
Outer Carton
including 8pcs boxes

8. Cautions

8.1. Application

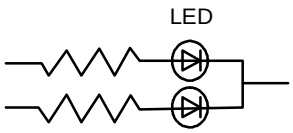
The LEDs described here are intended to be used for ordinary electronic equipment (such as office equipment, communication equipment and household applications).Consult Liteon's Sales in advance for information on applications in which exceptional reliability is required, particularly when the failure 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

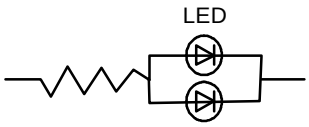
The storage ambient for the LEDs should not exceed 30°C temperature or 70% relative humidity.
It is recommended that LEDs out of their original packaging are soldered within one week.
For extended storage out of their original packaging, it is recommended that the LEDs were stored in a sealed container with appropriate desiccant, or a desiccators with nitrogen ambient. LEDs stored out of their original packaging for more than a week should be baked at about 60℃ 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)

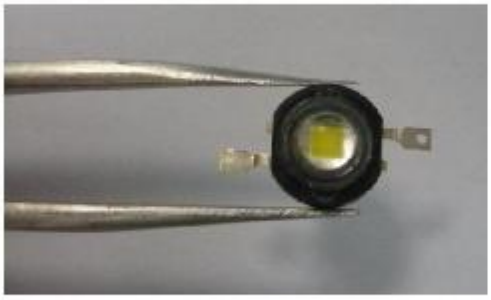
Static Electricity or power surge will damage the LED. Suggestions to prevent ESD damage:

- 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. Lens handling remark

The LED should only be picked up by making contact with the sides of the LED body. It should not put any pressure on the lens either by finger or any hand tool. Do not puncture or push the lens. Below figure illustrate correct and incorrect handling.

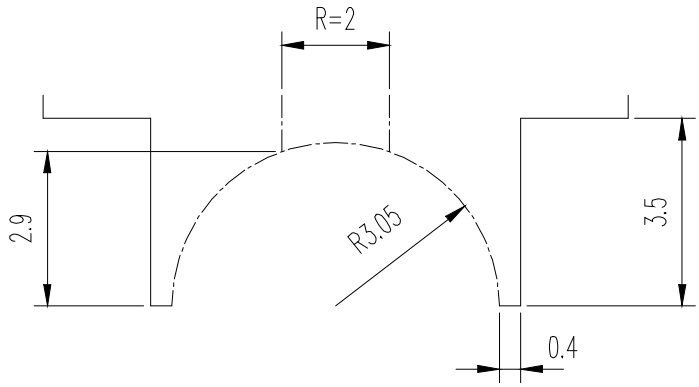


Picture 1. Correct handling of Liteon LED

Picture 2. Incorrect handling of Liteon LED

I Pick and place remark

Automated pick-and-place equipment provides the best placement of Liteon LED. Below figure showed an example of a pick-and-place nozzle suitable for Liteon LED. All dimensions are in millimeters.



Picture 3. Pick-and-place collet

8.6. Suggested Checking List

Training and Certification

1. Working area is ESD-certified.
2. Training records and re-certification dates monitored.

Static-Safe Workstation & Work Areas

1. Static-safe working stations 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.
3. Garments, hairs or anything closer than 1 ft to ESD items measure less than 100V.
4. The wrist strap or heel strap/conductive shoes are checked daily and result recorded.
5. All wrist strap or heel strap checkers calibration up to date.

Device Handling

1. Each ESDS items identified by EIA-471 labels on item or packaging..
2. No static charge generators (e.g. plastics) inside shielding containers with ESDS items.
3. All flexible conductive and dissipative package materials are inspected before reuse or recycles