

## Through Hole Lamp LTL-4221NHBP

### Through Hole Lamp

#### LTL-4221NHBP

| <u>Rev</u>                                          | <u>Description</u>                                     | <u>By</u> | <u>Date</u> |
|-----------------------------------------------------|--------------------------------------------------------|-----------|-------------|
|                                                     |                                                        |           |             |
|                                                     |                                                        |           |             |
|                                                     |                                                        |           |             |
|                                                     |                                                        |           |             |
|                                                     |                                                        |           |             |
|                                                     |                                                        |           |             |
| <b>Above data for PD and Customer tracking only</b> |                                                        |           |             |
| -                                                   | NPPR received and Upload on OPNC                       | Alice Su  | 02/07/2003  |
| A                                                   | Add packing spec                                       | Mina Lin  | 08/06/2004  |
| B                                                   | New data sheet format and update packing specification | Chalerm Y | 09/18/2014  |
|                                                     |                                                        |           |             |
|                                                     |                                                        |           |             |
|                                                     |                                                        |           |             |

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### 1. Description

CBI (Circuit Board Indicator) is a black plastic right angle Holder (Housing) which mates with Lite-On LED lamps. Lite-On CBI is available in a wide variety of packages, including top-view (Spacer) or right angle and horizontal or vertical arrays which is stackable and easy to assembly.

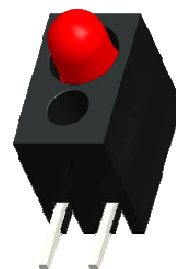
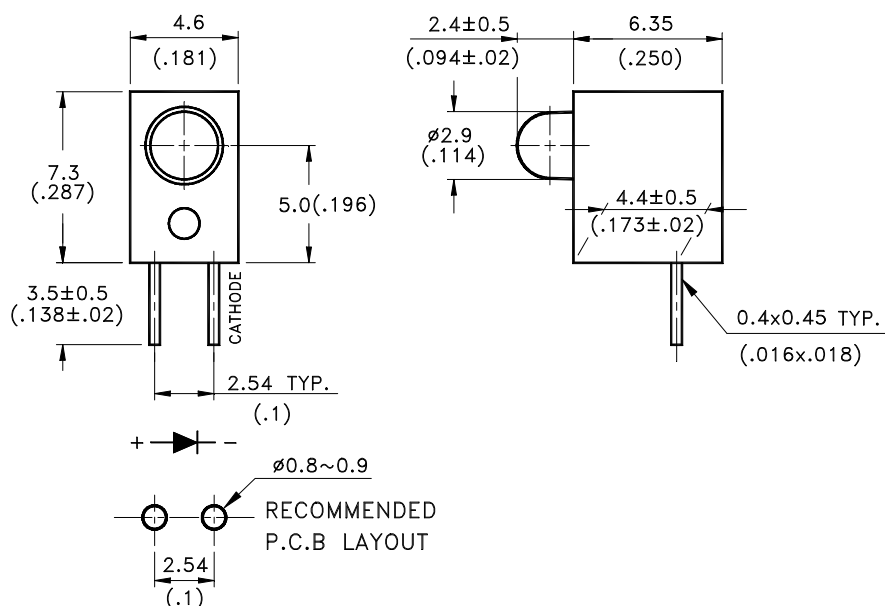
#### 1.1. Features

- Designed for ease in circuit board assembly.
- Black case enhance contrast ratio.
- Solid state light source.
- Low power consumption & High efficiency.
- Lead free product & RoHS Compliant.
- Red diffused lens.
- T-1 lamp: Emitted color is red 625nm chip.

#### 1.2. Applications

- Computer.
- Communication.
- Consumer.
- Industrial.

### 2. Outline Dimensions



#### Notes :

1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm (0.010") unless otherwise noted.
3. The Holder (Housing) material is plastic black.
4. The LED lamp is red with red diffused lens.
5. Specifications are subject to change without notice.

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### 3. Absolute Maximum Ratings at TA=25°C

| Parameter                                                                          | Maximum Rating           | Unit  |
|------------------------------------------------------------------------------------|--------------------------|-------|
| Power Dissipation                                                                  | 100                      | mW    |
| Peak Forward Current<br>(Duty Cycle $\leq 1/10$ , Pulse Width $\leq 10\text{ms}$ ) | 120                      | mA    |
| DC Forward Current                                                                 | 30                       | mA    |
| Derating Linear From 30°C                                                          | 0.4                      | mA/°C |
| Operating Temperature Range                                                        | -40°C to + 85°C          |       |
| Storage Temperature Range                                                          | -40°C to + 100°C         |       |
| Lead Soldering Temperature<br>[2.0mm (.079") From Body]                            | 260°C for 5 Seconds Max. |       |

### 4. Electrical / Optical Characteristics at TA=25°C

| Parameter                | Symbol          | Min. | Typ. | Max. | Unit          | Test Condition               |
|--------------------------|-----------------|------|------|------|---------------|------------------------------|
| Luminous Intensity       | IV              | 2.5  | 8.7  | 50   | mcd           | IF=10mA<br>Note 1,5          |
| Viewing Angle            | $2\theta_{1/2}$ |      | 60   |      | deg           | Note 2 (Fig.6)               |
| Peak Emission Wavelength | $\lambda_P$     |      | 635  |      | nm            | Measurement<br>@Peak (Fig.1) |
| Dominant Wavelength      | $\lambda_d$     | 615  | 625  | 632  | nm            | IF=10 mA, Note 4             |
| Spectral Line Half-Width | $\Delta\lambda$ |      | 40   |      | nm            |                              |
| Forward Voltage          | VF              |      | 2.0  | 2.6  | V             | IF=20mA                      |
| Reverse Current          | IR              |      |      | 100  | $\mu\text{A}$ | VR = 5V, Note 6              |

#### NOTE:

- Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
- $\theta_{1/2}$  is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
- Iv classification code is marked on each packing bag.
- The dominant wavelength,  $\lambda_d$  is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
- Iv guarantee must be included with  $\pm 15\%$  testing tolerance.
- Reverse voltage (VR) condition is applied for IR test only. The device is not designed for reverse operation.

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### 5. Typical Electrical / Optical Characteristics Curves

(25°C Ambient Temperature Unless Otherwise Noted)

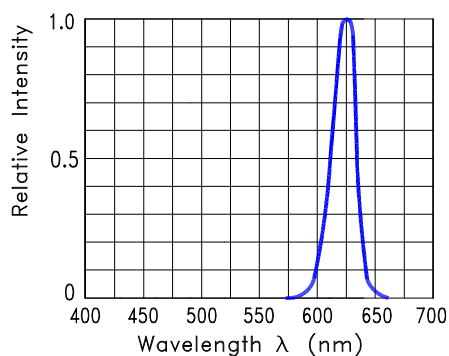


Fig.1 Relative Intensity VS. Wavelength

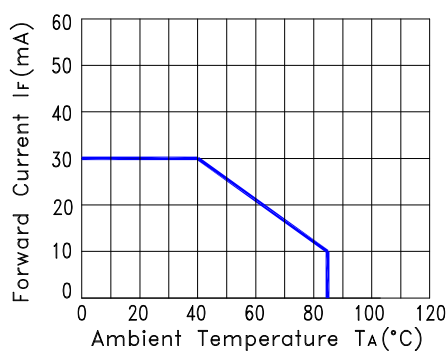


Fig.2 Forward Current Derating Curve

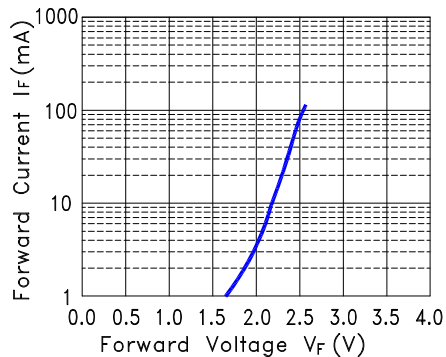


Fig.3 Forward Current vs. Forward Voltage

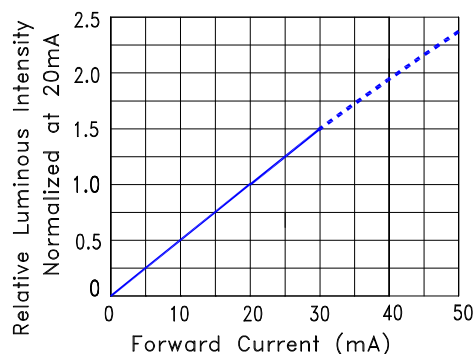


Fig.4 Relative Luminous Intensity vs. Forward Current

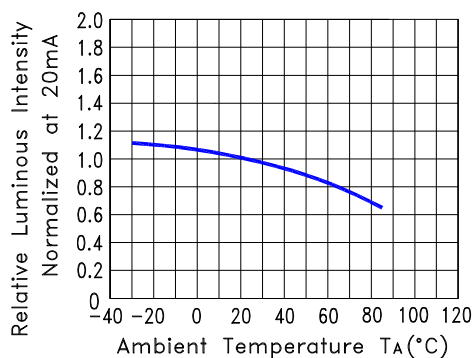


Fig.5 Relative Luminous Intensity VS. Ambient Temperature

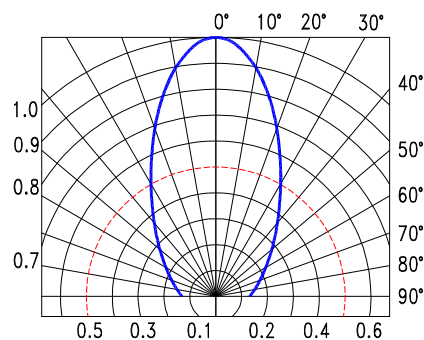
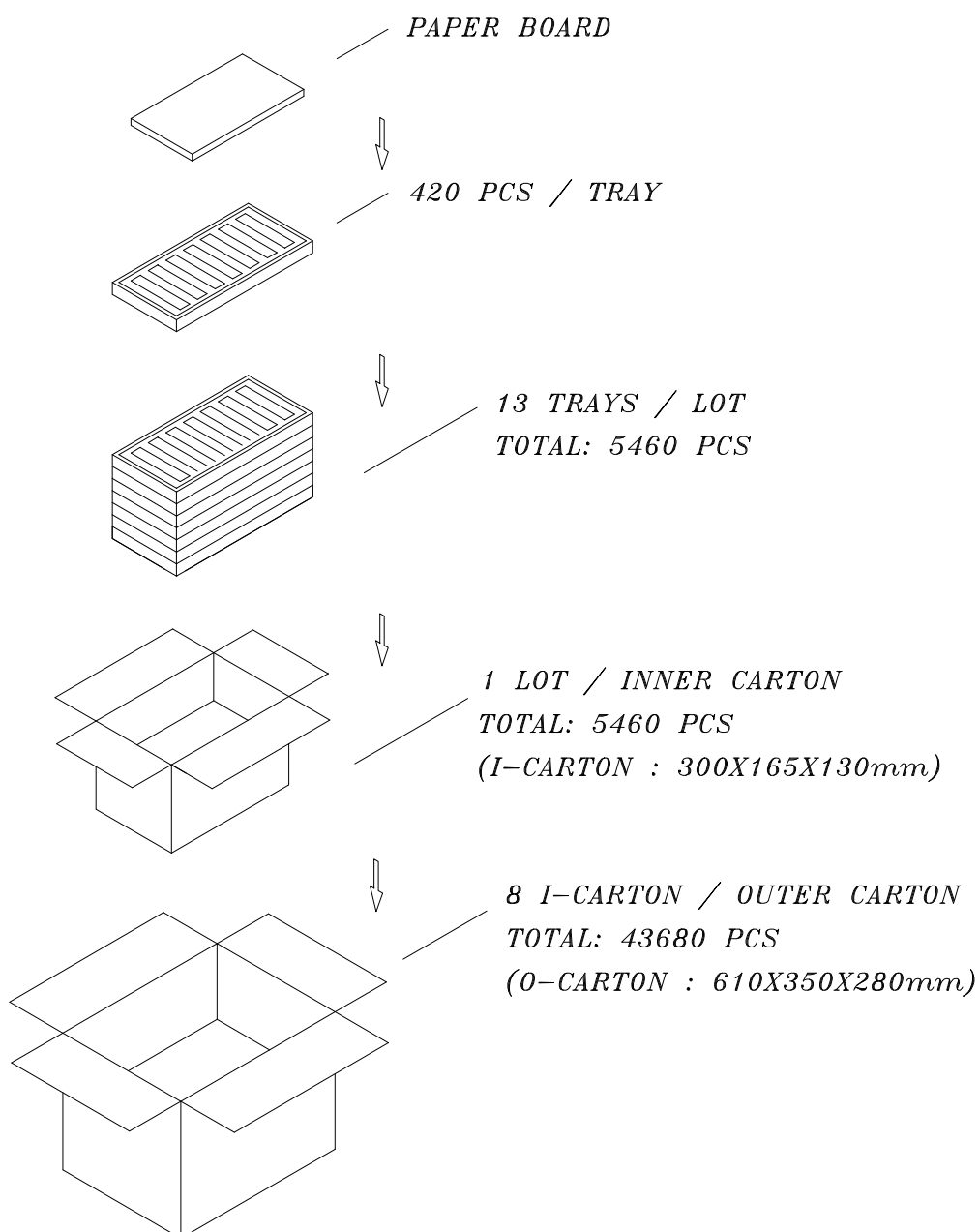


Fig.6 Spatial Distribution

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### 6. Packing Specification



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### 7. Bin Table Specification

| Luminous Intensity, Unit: mcd, IF=10mA |      |      |
|----------------------------------------|------|------|
| Iv Bin Code                            | Min. | Max. |
| K5                                     | 2.50 | 3.75 |
| K4                                     | 3.75 | 5.62 |
| K3                                     | 5.62 | 8.74 |
| K2                                     | 8.74 | 12.6 |
| K1                                     | 12.6 | 19.0 |
| L1                                     | 19.0 | 29.0 |
| M1                                     | 29.0 | 50.0 |

Note: Tolerance of each bin limit is  $\pm 15\%$

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### 8. CAUTIONS

#### 8.1. Application

This LED lamp is good for application of indoor and outdoor sign, also ordinary electronic equipment.

#### 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 used within three months. 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 desiccators with nitrogen ambient.

#### 8.3. Cleaning

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LEDs if necessary.

#### 8.4. Lead Forming & Assembly

During lead forming, the leads should be bent at a point at least 3mm from the base of LED lens. Do not use the base of the lead frame as a fulcrum during forming. Lead forming must be done before soldering, at normal temperature. During assembly on PCB, use minimum clinch force possible to avoid excessive mechanical stress.

#### 8.5. Soldering

When soldering, leave a minimum of 2mm clearance from the base of the lens/Holder to the soldering point. Dipping the lens/Holder into the solder must be avoided. Do not apply any external stress to the lead frame during soldering while the LED is at high temperature.

#### Recommended soldering conditions:

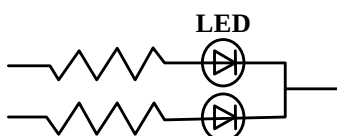
| Soldering iron |                                                       | Wave soldering   |                                                      |
|----------------|-------------------------------------------------------|------------------|------------------------------------------------------|
| Temperature    | 350°C Max.                                            | Pre-heat         | 100°C Max.                                           |
| Soldering time | 3 seconds Max.<br>(one time only)                     | Pre-heat time    | 120 seconds Max.                                     |
| Position       | No closer than 2mm<br>from the base of the epoxy bulb | Solder wave      | 260°C Max.                                           |
|                |                                                       | Soldering time   | 5 seconds Max.                                       |
|                |                                                       | Dipping Position | No lower than 2mm from the<br>base of the epoxy bulb |

Note: Excessive soldering temperature and/or time might result in deformation of the LED lens or catastrophic failure of the LED. IR reflow is not suitable process for through hole type LED lamp product. Max temperature of wave soldering is not means that Holder's HDT/Melting temperature.

#### 8.6. Drive Method

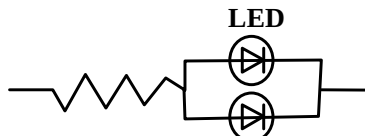
An LED is a current-operated device. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in Circuit A below.

Circuit model (A)



(A) Recommended circuit

Circuit model (B)



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

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### 8.7. 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 LEDs plastic lens as a result of friction between LEDs during storage and handing

**Suggested checking list:**

#### Training and Certification

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

#### Static-Safe Workstation & Work Areas

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

#### Personnel Grounding

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

Note: \*50V for Blue LED.

#### Device Handling

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

#### Others

- 8.7.5.1. Audit result reported to entity ESD control coordinator?
- 8.7.5.2. Corrective action from previous audits completed?
- 8.7.5.3. Are audit records complete and on file?



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### 9. Reliability Test

| Classification     | Test Item                              | Test Condition                                                                                                | Sample Size                       | Reference Standard                                                                                           |
|--------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------|
| Endurance Test     | Operation Life                         | Ta = Under Room Temperature<br>IF= Per Data Sheet Maximum Rating<br>Test Time= 1000hrs                        | 22 PCS<br>(CL=90%;<br>LTPD=10%)   | MIL-STD-750D:1026 (1995)<br>MIL-STD-883G:1005 (2006)                                                         |
|                    | High Temperature High Humidity storage | Ta = 60°C<br>RH = 90%<br>Test Time= 240hrs                                                                    | 22 PCS<br>(CL=90%;<br>LTPD=10%)   | MIL-STD-202G:103B (2002)<br>JEITA ED-4701:100 103 (2001)                                                     |
|                    | High Temperature Storage               | Ta= 105 ± 5°C<br>Test Time= 1000hrs                                                                           | 22 PCS<br>(CL=90%;<br>LTPD=10%)   | MIL-STD-750D:1031 (1995)<br>MIL-STD-883G:1008 (2006)<br>JEITA ED-4701:200 201 (2001)                         |
|                    | Low Temperature Storage                | Ta= -55 ± 5°C<br>Test Time= 1000hrs                                                                           | 22 PCS<br>(CL=90%;<br>LTPD=10%)   | JEITA ED-4701:200 202 (2001)                                                                                 |
| Environmental Test | Temperature Cycling                    | 100°C ~ 25°C ~ -40°C ~ 25°C<br>30mins 5mins 30mins 5mins<br>Test time: 30 Cycles                              | 22 PCS<br>(CL=90%;<br>LTPD=10%)   | MIL-STD-750D:1051 (1995)<br>MIL-STD-883G:1010 (2006)<br>JEITA ED-4701:100 105 (2001)<br>JESD22-A104C (2005)  |
|                    | Thermal Shock                          | 100 ± 5°C ~ -30°C ± 5°C<br>15mins 15mins<br>Test time: 30 Cycles                                              | 22 PCS<br>(CL=90%;<br>LTPD=10%)   | MIL-STD-750D:1056 (1995)<br>MIL-STD-883G:1011 (2006)<br>MIL-STD-202G:107G (2002)<br>JESD22-A106B (2004)      |
|                    | Solder Resistance                      | T. sol = 260 ± 5°C<br>Dwell Time= 10±1 seconds<br>3mm from the base of the epoxy bulb                         | 11 PCS<br>(CL=90%;<br>LTPD=18.9%) | MIL-STD-750D:2031(1995)<br>JEITA ED-4701: 300 302 (2001)                                                     |
|                    | Solderability                          | T. sol = 245 ± 5°C<br>Dwell Time= 5 ± 0.5 seconds<br>(Lead Free Solder, Coverage ≥ 95% of the dipped surface) | 11 PCS<br>(CL=90%;<br>LTPD=18.9%) | MIL-STD-750D:2026 (1995)<br>MIL-STD-883G:2003 (2006)<br>MIL-STD-202G:208H (2002)<br>IPC/EIA J-STD-002 (2004) |
|                    | Soldering Iron                         | T. sol = 350 ± 5°C<br>Dwell Time= 3.5 ± 0.5 seconds                                                           | 11 PCS<br>(CL=90%;<br>LTPD=18.9%) | MIL-STD-202G:208H (2002)<br>JEITA ED-4701:300 302 (2001)                                                     |

### 10. Others

The appearance and specifications of the product may be modified for improvement, without prior notice.