# HLMP-KA45

T-1 (3 mm) High Intensity InGaN Lamp

## Data Sheet

### Description

This blue LED is designed in an industry standard T-1 package with clear and non-diffused optics. This lamp is ideal for use as indicators and for general purpose lighting.

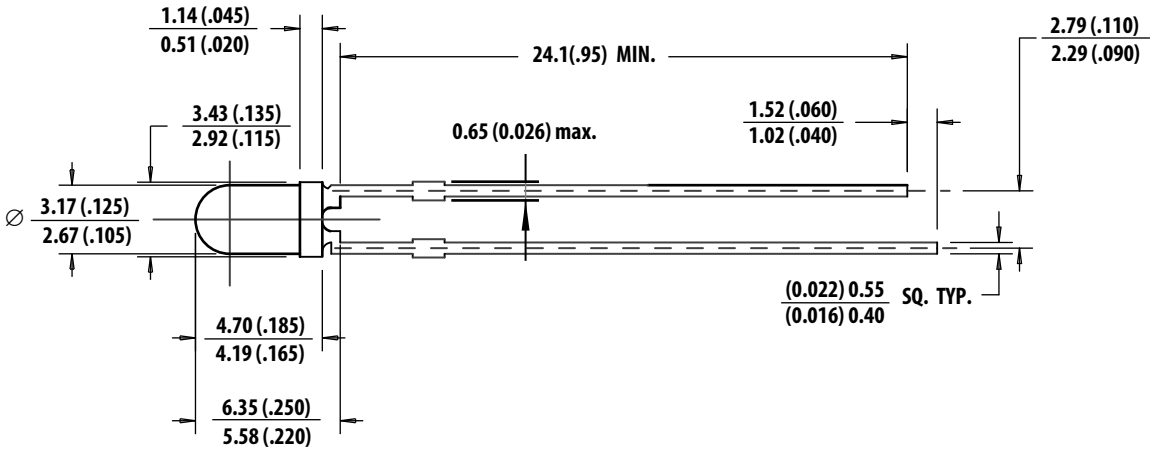
### Applications

- Status indicators
- Small message panel
- Running and decorative lights for commercial use
- Back-lighting
- Consumer audio

### Features

- Popular T1 diameter package
- General purpose leads
- Reliable and rugged
- Binned for color and intensity
- InGaN blue dice

### Package Dimensions




Notes:
1. All dimensions are in mm (inches).
2. An epoxy meniscus may extend about 1 mm (0.040") down the leads.
3. For PCB hole recommendations, see the Precautions section.

***CAUTION:*** *Devices are Class 1C HBM ESD sensitive per JEDEC Standard. Please observe appropriate precautions during handling and processing. For additional details, refer to Application Note AN-1142.*

## Ordering Information

HLMP-X X XX – X X X XX

**Mechanical Option**
00: Bulk

**Color Bin Selection**
0: Full color bin distribution

**Maximum Iv Bin Options**
0: Open (No maximum limit)
Others: Please refer to the Iv Bin Table

**Minimum Iv Bin Options**
Please refer to the Iv Bin Table

**Viewing Angle**
45:50 degree

**Color**
A: Blue

**Package**
K: T-1

## Absolute Maximum Ratings at $T_A = 25\ °C$

| Parameter | HLMP-KA45 (Blue) | Unit |
|---|---|---|
| DC Forward Current[1] | 30 | mA |
| Peak Pulsed Forward Current [2] | 100 | mA |
| Power Dissipation | 116 | mW |
| LED Junction Temperature | 115 | °C |
| Operating Temperature Range | –35 to +85 | °C |
| Storage Temperature Range | –35 to +85 | °C |

Note:
1. Derate linearly as shown in Figure 4.
2. Duty factor = 10%, Frequency = 1 kHz.

## Device Selection Guide

| Part Number | Color and Dominant Wavelength $\lambda_d$ (nm) Typ. | Luminous Intensity Iv (mcd) at 20 mA Min. | Luminous Intensity Iv (mcd) at 20 mA Max. |
|---|---|---|---|
| HLMP-KA45-E0000 | Blue 470 | 85 | – |
| HLMP-KA45-J0000 | Blue 470 | 240 | – |
| HLMP-KA45-NQ000 | Blue 470 | 680 | 1500 |

Notes:
1. The luminous intensity is measured on the mechanical axis of the lamp package.
2. The optical axis is closely aligned with the package mechanical axis.
3. The dominant wavelength, $\lambda_d$ is derived from the CIE Chromaticity Diagram and represents the color of the lamp.

## Electrical /Optical Characteristics Table at $T_A = 25\ ^\circ C$

| Parameter | Symbol | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_F$ | 2.8 | 3.2 | 3.8 | V | $I_F = 20$ mA |
| Capacitance | C | | 40 | | pF | $V_F = 0$, f = 1 MHz |
| Thermal Resistance | $R\theta_{J\text{-}PIN}$ | | 465 | | °C/W | LED Junction-to-Cathode Lead |
| Viewing Angle | $2\theta_{1/2}$ | | 50 | | deg | |
| Dominant Wavelength | $\lambda_d$ | | 470 | | nm | $I_F = 20$ mA |
| Peak Wavelength | $\lambda_P$ | | 464 | | nm | Peak of Wavelength of Spectral Distribution at $I_F = 20$ mA |
| Spectral Halfwidth | $\Delta\lambda_{1/2}$ | | 24 | | nm | Wavelength Width at Spectral Distribution ½ Power Point at $I_F = 20$ mA |

Notes:
1. $2\ \theta_{1/2}$ is the off-axis angle where the luminous intensity is 1/2 the on axis intensity.
2. The dominant wavelength, $\lambda_d$, is derived from the Chromaticity Diagram and represents the color of the lamp.

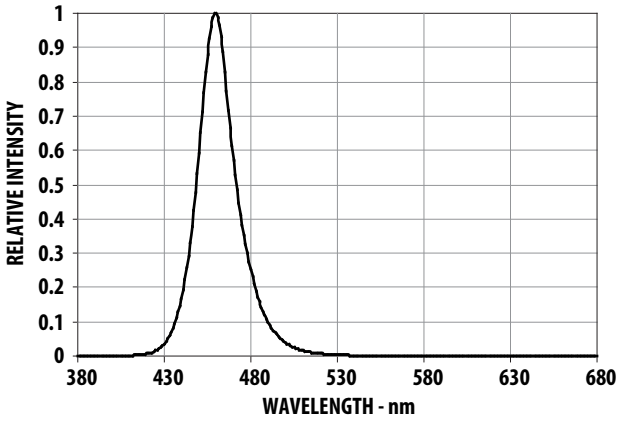



Figure 1. Relative Intensity vs. Wavelength

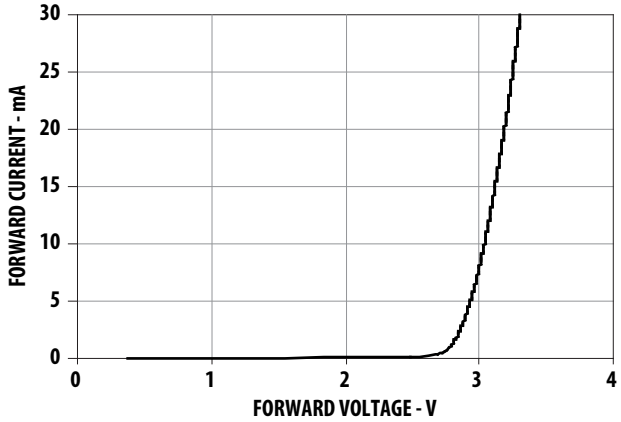



Figure 2. Forward Current vs. Forward Volatge

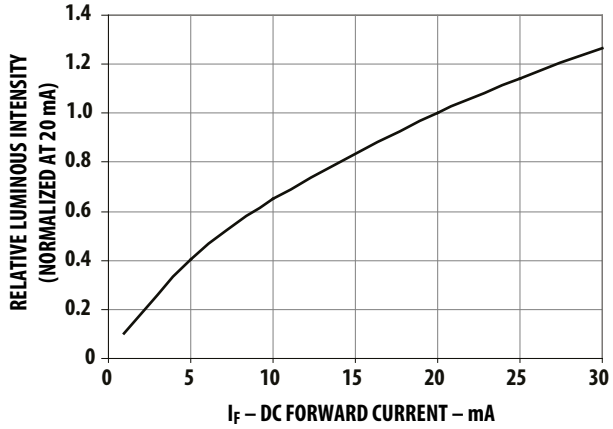



Figure 3. Relative luminous intensity vs. forward current

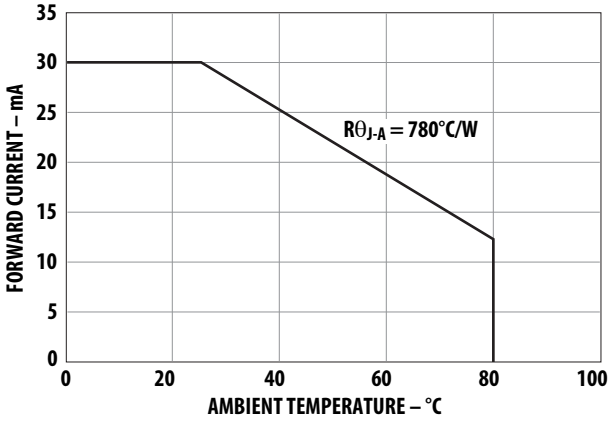



Figure 4. Maximum forward current vs. ambient temperature based on $T_{jmax}$ = 115 °C

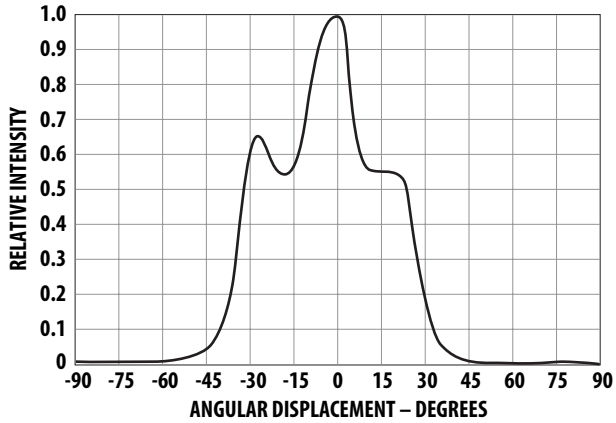



Figure 5. Radiation pattern

## Intensity Bin Limit

| | Intensity (mcd) at 20 mA | |
|---|---|---|
| **Bin** | **Min** | **Max** |
| E | 85 | 110 |
| F | 110 | 140 |
| G | 140 | 180 |
| H | 180 | 240 |
| J | 240 | 310 |
| K | 310 | 400 |
| L | 400 | 520 |
| M | 520 | 680 |
| N | 680 | 880 |
| P | 880 | 1150 |
| Q | 1150 | 1500 |
| R | 1500 | 1900 |
| S | 1900 | 2500 |
| T | 2500 | 3200 |

Tolerance for each bin limit is ±15%.

## Color Categories

| | | Lambda (nm) | |
|---|---|---|---|
| **Color** | **Cat #** | **Min.** | **Max.** |
| Blue | 1 | 460.0 | 464.0 |
| | 2 | 464.0 | 468.0 |
| | 3 | 468.0 | 472 .0 |
| | 4 | 472 .0 | 476.0 |
| | 5 | 476.0 | 480.0 |

Tolerance for each bin limit is ±0.5 nm.

## Mechanical Option Matrix

| Mechanical Option Code | Definition |
|---|---|
| 00 | Bulk Packaging, minimum increment 500 pcs/bag |

Note:
All categories are established for classification of products. Products may not be available in all categories. For further clarification/information, contact your local Avago representative.

## Precautions

### Lead Forming

- The leads of an LED lamp may be preformed or cut to length prior to insertion and soldering into PC board.
- If lead forming is required before soldering, care must be taken to avoid any excessive mechanical stress induced to LED package. Otherwise, cut the leads of LED to length after soldering process at room temperature. The solder joint formed will absorb the mechanical stress of the lead cutting from traveling to the LED chip die attach and wirebond.
- It is recommended that tooling made to precisely form and cut the leads to length rather than rely upon hand operation.

### Soldering Conditions

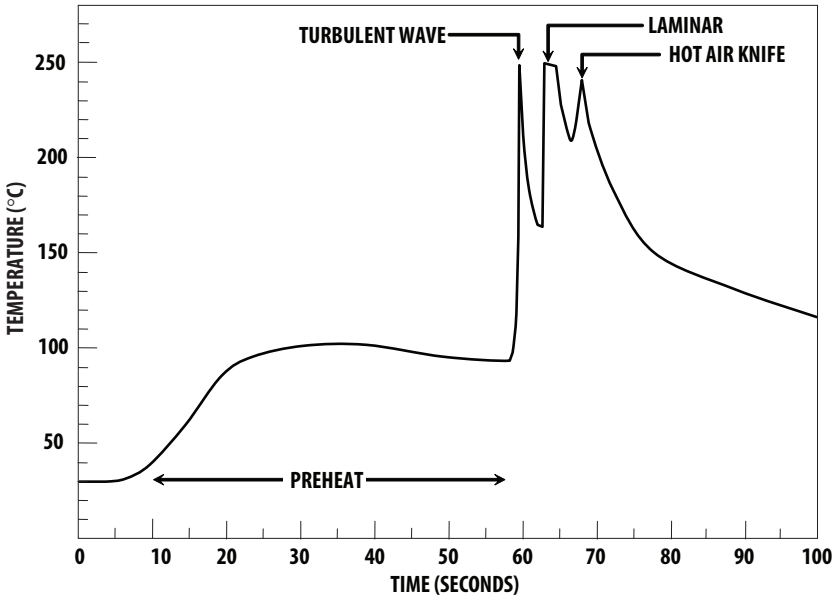
- Care must be taken during PCB assembly and soldering process to prevent damage to LED component.
- The closest LED is allowed to solder on board is 1.59 mm below the body (encapsulant epoxy) for those parts without standoff.
- Recommended soldering conditions:

| | Wave Soldering | Manual Solder Dipping |
|---|---|---|
| Pre-heat Temperature | 105 °C Max. | – |
| Pre-heat Time | 60 sec Max. | – |
| Peak Temperature | 250 °C Max. | 260 °C Max. |
| Dwell Time | 3 sec Max. | 5 sec Max. |

- Wave soldering parameter must be set and maintained according to recommended temperature and dwell time in the solder wave. Customer is advised to periodically check on the soldering profile to ensure the soldering profile used is always conforming to recommended soldering condition.
- If necessary, use fixture to hold the LED component in proper orientation with respect to the PCB during soldering process.
- Proper handling is imperative to avoid excessive thermal stresses to LED components when heated. Therefore, the soldered PCB must be allowed to cool to room temperature, 25 °C, before handling.
- Special attention must be given to board fabrication, solder masking, surface plating and lead holes size and component orientation to assure solderability.
- Recommended PC board plated through hole sizes for LED component leads:

| | LED Component Lead Size | Diagonal | Plated Through-Hole Diameter |
|---|---|---|---|
| Lead size (typ.) | 0.45 × 0.45 mm (0.018 × 0.018 in.) | 0.636 mm (0.025 in) | 0.98 to 1.08 mm (0.039 to 0.043 in) |
| Dambar shear-off area (max.) | 0.65 mm (0.026 in) | 0.919 mm (0.036 in) | |
| Lead size (typ.) | 0.50 × 0.50 mm (0.020 × 0.020 in.) | 0.707 mm (0.028 in) | 1.05 to 1.15 mm (0.041 to 0.045 in) |
| Dambar shear-off area (max.) | 0.70 mm (0.028 in) | 0.99 mm (0.039 in) | |

Note:
Refer to application note AN1027 for more information on soldering LED components.




**Recommended solder:**
**Sn63 (Leaded solder alloy)**
**SAC305 (Lead-free solder alloy)**

**Flux: Rosin flux**

**Solder bath temperature:**
**245 °C ± 5 °C (maximum peak temperature = 250 °C)**

**Dwell time: 1.5 sec – 3.0 sec (maximum = 3 sec)**

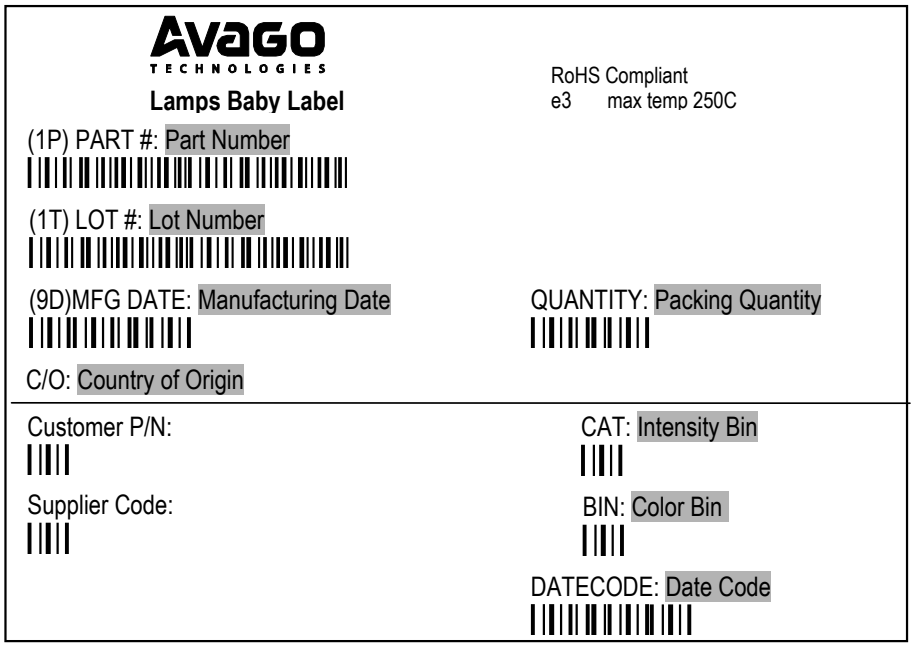
**Note: Allow for board to be sufficiently cooled to room temperature before you exert mechanical force.**

**Figure 5. Recommended wave soldering profile**

## Packing Label

### (i) Avago Mother Label: (Available on packaging box of ammo pack and shipping box)


### (ii) Avago Baby Label (Only available on bulk packaging)

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