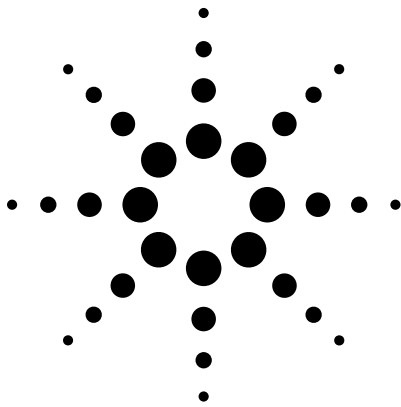


# Agilent T-1<sup>3</sup>/<sub>4</sub> (5 mm), T-1 (3 mm) Blue LED Lamps Data Sheet



## Features

- Popular T-1<sup>3</sup>/<sub>4</sub> and T-1 diameter packages
- General purpose leads
- Reliable and rugged
- Available on tape and reel
- Binned for color and intensity

## HLMP-DB25-B00xx, HLMP-KB45-A00xx

### Description

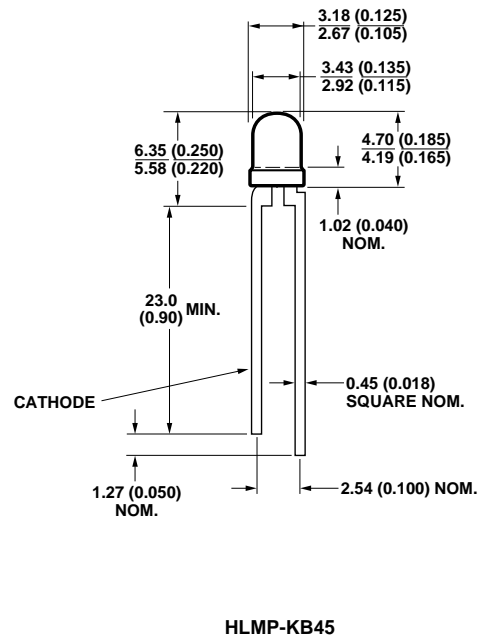
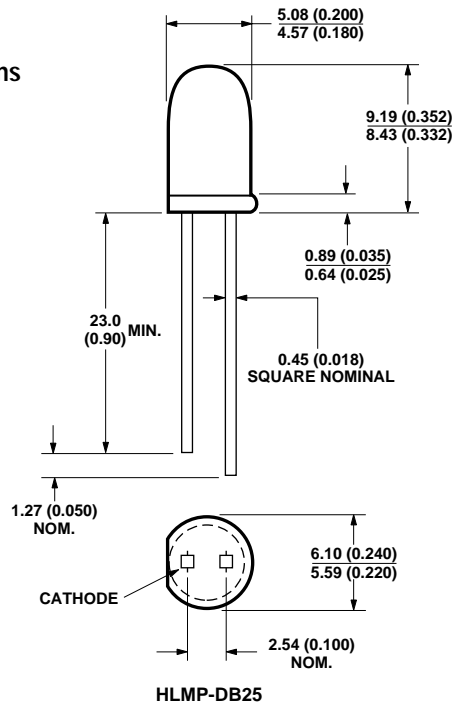
These blue LEDs are designed in industry standard T-1 and T-1<sup>3</sup>/<sub>4</sub> package with clear and non diffused optics. They are also available in tape and reel, and ammo-pack option for ease of handling and use.

These blue lamps are ideal for use as indicators and for general purpose lighting. Blue lamps offer color differentiation as blue is attractive and not widely available.

### Applications

- Status indicators
- Small message panel
- Running and decorative lights for commercial use

### Package Dimensions



- NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).  
 2. EPOXY MENISCUS MAY EXTEND ABOUT 1 mm (0.040") DOWN THE LEADS.

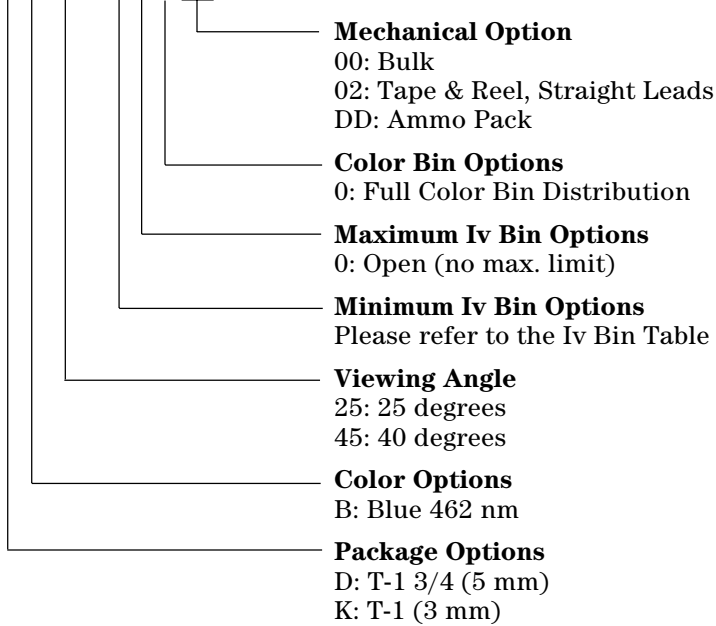
**CAUTION:** Devices are Class II ESD sensitive. Please observe appropriate precautions during handling and processing. Refer to Application Note AN-1142 for additional details.

## Selection Guide

| Part Number     | Package | Viewing Angle | Luminous Intensity I <sub>v</sub> (mcd) |      |
|-----------------|---------|---------------|---|------|
|                 |         |               | Min.                                    | Max. |
| HLMP-KB45-A00xx | T-1     | 40            | 30                                      | –    |
| HLMP-DB25-B00xx | T-1 3/4 | 25            | 40                                      | –    |

## Part Numbering System

**HLMP - x x xx - x x x xx**



## Absolute Maximum Ratings at T<sub>A</sub> = 25°C

| Parameter  | Blue        | Units |
|--|-------------|-------|
| Peak Forward Current                                     | 70          | mA    |
| DC Current <sup>[1]</sup>                                | 30          | mA    |
| Reverse Voltage (I <sub>R</sub> = 100 μA)                | 5           | V     |
| Transient Forward Current <sup>[2]</sup> (10 μsec Pulse) | 350         | mA    |
| LED Junction Temperature                                 | 115         | °C    |
| Operating Temperature                                    | –20 to +80  | °C    |
| Storage Temperature                                      | –30 to +100 | °C    |

### Notes:

- Derate linearly from 50 °C as shown in Figure 6.
- The transient peak current is the maximum non-recurring peak current that can be applied to the device without damaging the LED die and wirebond. It is not recommended that this device be operated at peak currents above the Absolute Maximum Peak Forward Current.

### Optical Characteristics at $T_A = 25^\circ\text{C}$

| Part Number     | Luminous Intensity<br>$I_V$ (mcd) @ $I_F = 20\text{ mA}$ |      | Color, Dominant<br>Wavelength<br>$\lambda_d^{[1]}$ (nm)<br>Typ. | Peak Wavelength<br>$\lambda_{PEAK}$ (nm)<br>Typ. | Viewing Angle<br>$2\theta_{1/2}^{[2]}$ Degrees<br>Typ. |
|-----------------|--|------|---|--|--|
|                 | Min.   | Typ. |   |  |  |
| HLMP-DB25-B00xx | 40   | 100  | 462   | 426  | 25   |
| HLMP-KB45-A00xx | 30   | 45   | 462   | 426  | 40   |

#### Notes:

1. The dominant wavelength,  $\lambda_d$ , is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
2.  $\theta_{1/2}$  is the off-axis angle at which the luminous intensity is half of the axial luminous intensity.

### Electrical Characteristics at $T_A = 25^\circ\text{C}$

| Part Number     | Forward Voltage<br>$V_F$ (Volts)<br>@ $I_F = 20\text{ mA}$ |      | Reverse Breakdown<br>$V_R$ (Volts)<br>@ $I_R = 100\ \mu\text{A}$ |      | Speed<br>Response<br>$t_s$ (ns)<br>Typ. | Capacitance<br>$C$ (pF), $V_F = 0$ ,<br>$f = 1\text{ MHz}$<br>Typ. | Thermal Resistance<br>$R\theta_{J-PIN}$ ( $^\circ\text{C}/\text{W}$ )<br>Junction to<br>Cathode Lead<br>Typ. |
|-----------------|--|------|--|------|---|--|--|
|                 | Typ.   | Max. | Min.   | Typ. |   |  |  |
| HLMP-DB25-B00xx | 4.0  | 5.0  | 5.0  | 30   | 500                                     | 97   | 260  |
| HLMP-KB45-A00xx | 4.0  | 5.0  | 5.0  | 30   | 500                                     | 97   | 290  |

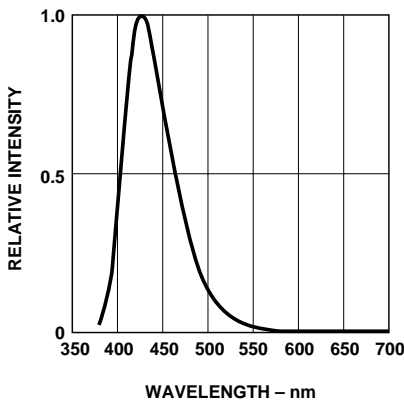


Figure 1. Relative intensity vs. wavelength.

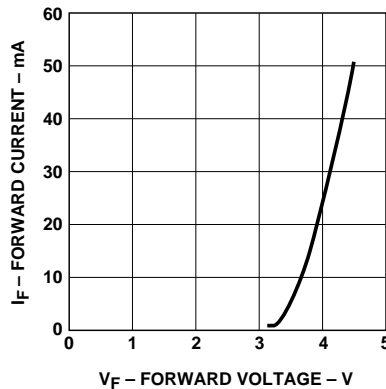


Figure 2. Forward current vs. forward voltage.

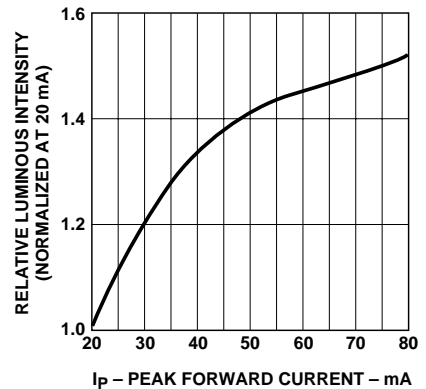


Figure 3. Relative intensity vs. peak forward current (300  $\mu\text{s}$  pulse width, 10 ms period).

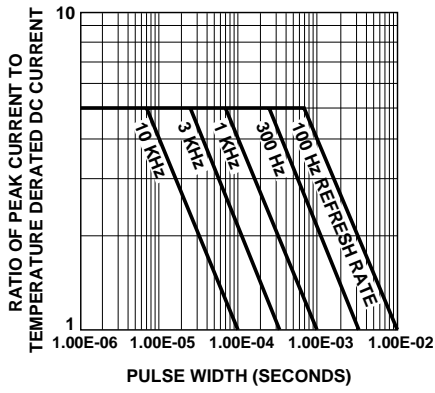


Figure 4. Forward current vs. forward voltage.

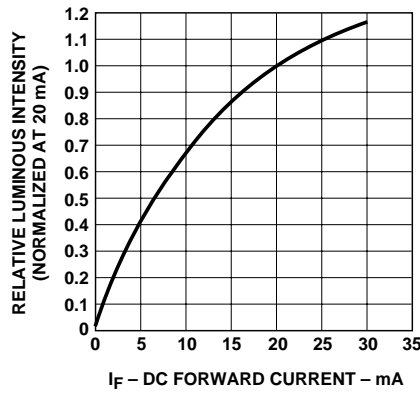


Figure 5. Relative luminous intensity vs. forward current.

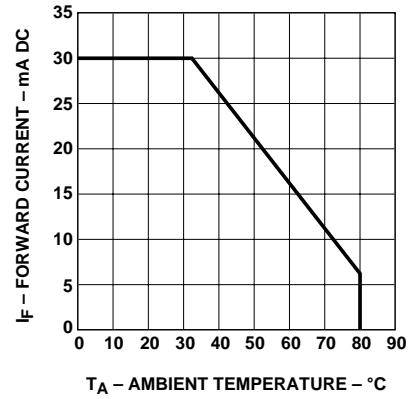


Figure 6. Maximum DC forward current vs. ambient temperature. Derating based on  $T_J$  max. = 115 °C.

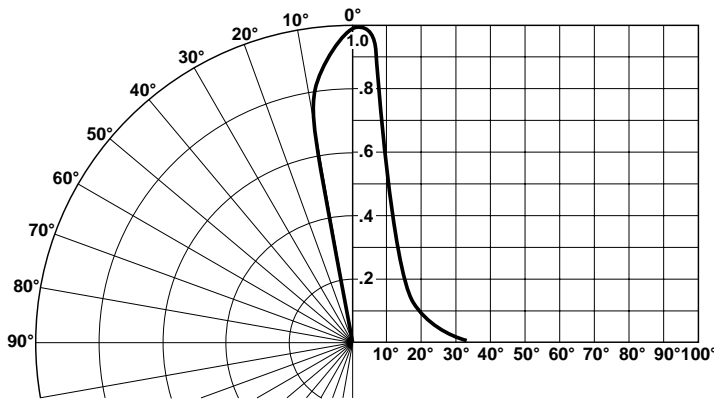


Figure 7. Relative luminous intensity vs. angular displacement for HLMP-DB25.

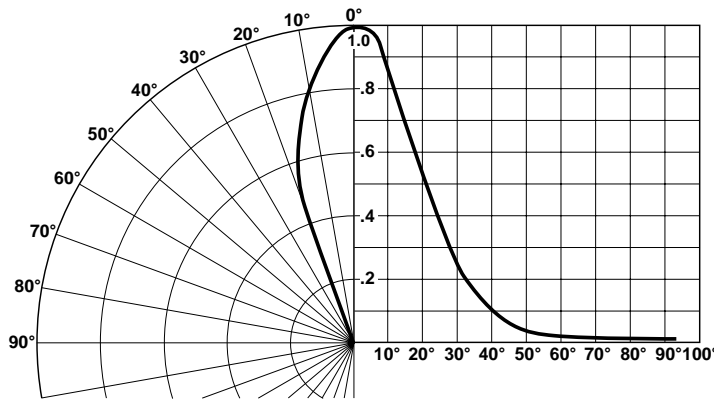


Figure 8. Relative luminous intensity vs. angular displacement for HLMP-KB45.

### Soldering/Cleaning

Cleaning agents from the ketone family (acetone, methyl ethyl ketone, etc.) and from the chlorinated hydrocarbon family (methylene chloride, trichloroethylene, carbon tetrachloride, etc.) are not recommended for cleaning LED parts. All of these various solvents attack or dissolve the encapsulating epoxies used to form the package of plastic LED parts.

For information on soldering LEDs, please refer to Application Note 1027.

### Intensity Bin Limits

| Bin | Intensity Range (mcd) |       |
|-----|-----------------------|-------|
|     | Min.                  | Max.  |
| A   | 30.0                  | 40.0  |
| B   | 40.0                  | 50.0  |
| C   | 50.0                  | 65.0  |
| D   | 65.0                  | 85.0  |
| E   | 85.0                  | 110.0 |
| F   | 110.0                 | 140.0 |
| G   | 140.0                 | 180.0 |
| H   | 180.0                 | 240.0 |
| J   | 240.0                 | 310.0 |
| K   | 310.0                 | 400.0 |
| L   | 400.0                 | 520.0 |
| M   | 520.0                 | 680.0 |
| N   | 680.0                 | 880.0 |

### Color Bin Limits (nm at 20 mA)

| Blue<br>Bin ID | nm @ 20 mA |       |
|----------------|------------|-------|
|                | Min.       | Max.  |
| 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 will be  $\pm 0.5$  nm.

### Mechanical Option Matrix

| Mechanical<br>Option Code | Definition  |
|---------------------------|---|
| 00                        | Bulk Packaging, minimum increment 500 pcs/bag               |
| 02                        | Tape & Reel, straight leads, minimum increment 1300 pcs/bag |
| DD                        | Ammo Pack, straight leads with minimum increment            |

**Note:**

All categories are established for classification of products. Products may not be available in all categories. Please contact your local Agilent representative for further clarification/information.

**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        | 30 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               |
|--|--------------------------|--|
| 0.457 x 0.457 mm<br>(0.018 x 0.018 inch) | 0.646 mm<br>(0.025 inch) | 0.976 to 1.078 mm<br>(0.038 to 0.042 inch) |
| 0.508 x 0.508 mm<br>(0.020 x 0.020 inch) | 0.718 mm<br>(0.028 inch) | 1.049 to 1.150 mm<br>(0.041 to 0.045 inch) |

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

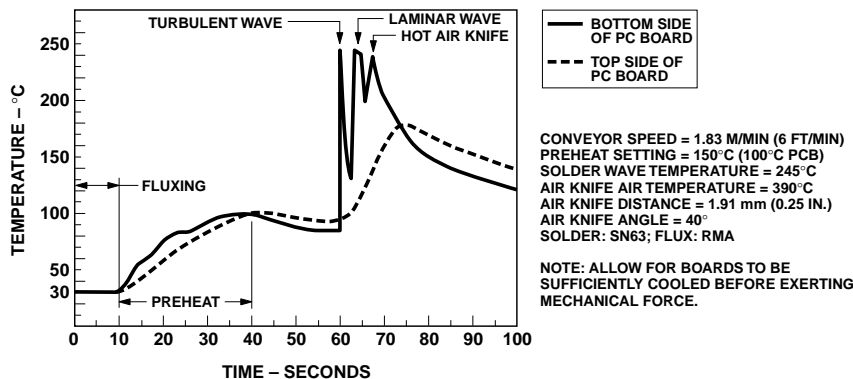


Figure 9. Recommended wave soldering profile.

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