

# T-13/4 (5 mm), Wide Viewing Angle, High Intensity LED Lamps

## Technical Data

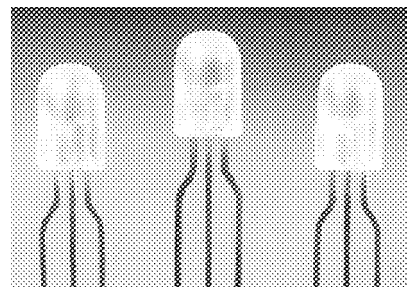
**HLMA-VH00**  
**HLMA-VL00**  
**HLMP-V100**  
**HLMP-V500**

### Features

- Outstanding LED Material Efficiency
- Extremely Wide Horizontal Viewing Angle
- High Light Output over a Wide Range of Currents
- Untinted, Non-diffused Lens
- Choice of Four Colors: 644 nm Red, 590 nm Amber, 570 nm Green, and 615 nm Orange

### Description

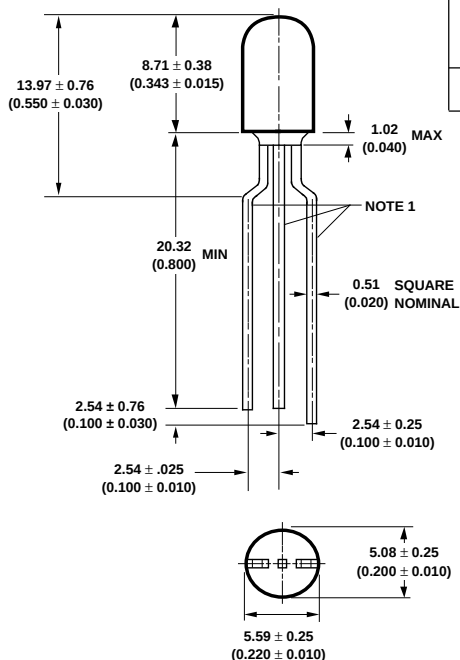
These high intensity LED lamps provide the user with an extremely wide 60° (horizontal) by 30° (vertical) oval shaped radiation pattern. Available in TS AlGaAs red, AlInGaP amber, AlInGaP orange, and GaP green colors, these untinted non-diffused T-1<sup>3</sup>/<sub>4</sub> (5 mm) LEDs are an excellent choice for outdoor applications requiring an extremely wide field of vision and high brightness.



### Applications

- Outdoor Message Boards
- Safety Lighting Equipment
- Changeable Message Signs
- Alternative to Incandescent Lamps

### Outline Drawing



### Device Selection Guide

| Amber<br>$\lambda_d = 590 \text{ nm}$ | Red-Orange<br>$\lambda_d = 615 \text{ nm}$ | Red<br>$\lambda_d = 644 \text{ nm}$ | Green<br>$\lambda_d = 570 \text{ nm}$ |
|---------------------------------------|--------------------------------------------|-------------------------------------|---------------------------------------|
| HLMA-VL00                             | HLMA-VH00                                  | HLMP-V100                           | HLMP-V500                             |

#### NOTES:

##### 1. LEAD ORIENTATION:

| DEVICE TYPE | CENTER LEAD    | OUTER LEADS |
|-------------|----------------|-------------|
| HLMP-V100   | COMMON ANODE   | CATHODE     |
| HLMP-V500   | COMMON CATHODE | ANODE       |
| HLMA-VL00   | COMMON CATHODE | ANODE       |
| HLMA-VH00   | COMMON CATHODE | ANODE       |

##### 2. ALL DIMENSIONS ARE IN MM (INCHES).

### Absolute Maximum Ratings at $T_A = 25^\circ\text{C}$

| Parameter                                                            | HLMA-VL00                          | HLMA-VH00           | HLMP-V100   | HLMP-V500   | Units            |
|----------------------------------------------------------------------|------------------------------------|---------------------|-------------|-------------|------------------|
| DC Forward Current <sup>[1,3]</sup>                                  | 60 <sup>[4,5]</sup>                | 60 <sup>[4,5]</sup> | 60          | 50          | mA               |
| Peak Forward Current <sup>[2,3]</sup>                                | 400                                | 400                 | 600         | 180         | mA               |
| Average Input Power <sup>[2]</sup>                                   | 120                                | 120                 | 120         | 110         | mW               |
| Reverse Voltage ( $I_R = 200\ \mu\text{A}$ )                         | 5                                  | 5                   | 5           | 5           | V                |
| Operating Temperature Range                                          | -40 to +100                        | -40 to +100         | -55 to +85  | -20 to +100 | $^\circ\text{C}$ |
| Storage Temperature Range                                            | -55 to +100                        | -55 to +100         | -55 to +100 | -55 to +100 | $^\circ\text{C}$ |
| Junction Temperature                                                 | 110                                |                     |             |             | $^\circ\text{C}$ |
| Soldering Temperature<br>[1.59 mm (0.06 in.) below<br>seating plane] | 260 $^\circ\text{C}$ for 5 seconds |                     |             |             |                  |

**Notes:**

- Derate linearly as shown in Figure 5.
- Any pulsed operation cannot exceed the Absolute Max Peak Forward Current or the Max Allowable Average Power as specified in Figure 6.
- Specified with both die powered simultaneously.
- Drive Currents between 10 mA and 30 mA are recommended for best long term performance.
- Operation at currents below 10 mA is not recommended, please contact your Hewlett-Packard sales representative.

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

| Part Number | Luminous Intensity<br>$I_V$ (mcd)<br>@ 40 mA <sup>[1]</sup> |      | Peak Wavelength<br>$\lambda_{\text{peak}}$ (nm)<br>Typ. | Color, Dominant Wavelength<br>$\lambda_d$ <sup>[2]</sup> (nm)<br>Typ. | Viewing Angle<br>$2\theta_{1/2}$<br>Degrees <sup>[3]</sup><br>Typ. | Luminous Efficacy<br>$\eta_V$<br>(lm/w) |
|-------------|-------------------------------------------------------------|------|---------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------|
|             | Min.                                                        | Typ. |                                                         |                                                                       |                                                                    |                                         |
| HLMA-VL00   | 212                                                         | 460  | 592                                                     | 590                                                                   | 60° horizontal<br>30° vertical                                     | 480                                     |
| HLMA-VH00   | 200                                                         | 460  | 621                                                     | 615                                                                   |                                                                    | 263                                     |
| HLMP-V100   | 500                                                         | 1000 | 654                                                     | 644                                                                   | 60° horizontal<br>30° vertical                                     | 85                                      |
| HLMP-V500   | 112                                                         | 270  | 568                                                     | 570                                                                   | 60° horizontal<br>30° vertical                                     | 595                                     |

**Notes:**

- The luminous intensity,  $I_V$ , is measured at the mechanical axis of the lamp package. The actual peak of the spatial radiation pattern may not be aligned with this axis.
- The dominant wavelength,  $\lambda_d$ , is derived from the CIE Chromaticity Diagram and represents the color of the device.
- $2\theta_{1/2}$  is the off-axis angle where the luminous intensity is 1/2 the on-axis intensity.

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

| Part Number | Forward Voltage<br>$V_F$ (Volts)<br>@ $I_F = 40\ \text{mA}$ |      | Reverse Breakdown<br>$V_R$ (Volts)<br>@ $I_R = 200\ \mu\text{A}$ | Capacitance<br>C (pF)<br>$V_F = 0$ ,<br>$f = 1\ \text{MHz}$ | Thermal Resistance<br>$R_{\theta J-PIN}$<br>( $^\circ\text{C}/\text{W}$ ) | Speed of Response<br>$\tau_s$ (ns)<br>Time Constant<br>$e^{-t/\tau_s}$ |
|-------------|-------------------------------------------------------------|------|------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------|
|             | Typ.                                                        | Max. |                                                                  |                                                             |                                                                           |                                                                        |
| HLMA-VL00   | 1.90                                                        | 2.4  | 5                                                                | 120                                                         | 100                                                                       | 13                                                                     |
| HLMA-VH00   | 1.90                                                        | 2.4  | 5                                                                | 120                                                         | 100                                                                       | 13                                                                     |
| HLMP-V100   | 1.85                                                        | 2.4  | 5                                                                | 50                                                          | 115                                                                       | 26                                                                     |
| HLMP-V500   | 2.20                                                        | 3.0  | 5                                                                | 20                                                          | 100                                                                       | 171                                                                    |

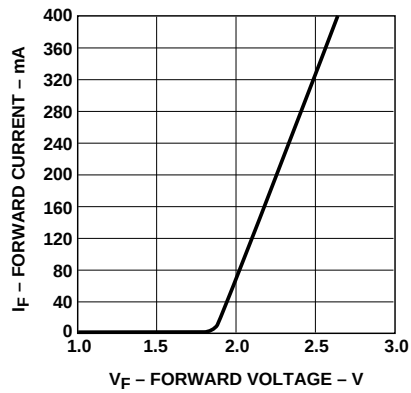


Figure 2a. Forward Current vs. Forward Voltage, HLMA-VL00/VH00.

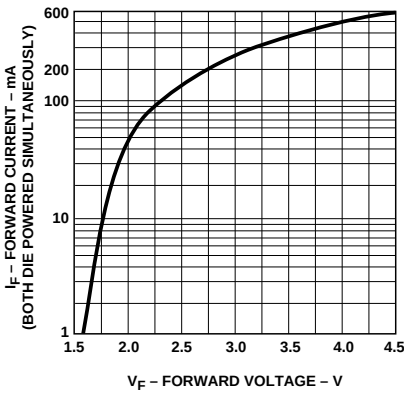


Figure 2b. Forward Current vs. Forward Voltage, HLMP-V100.

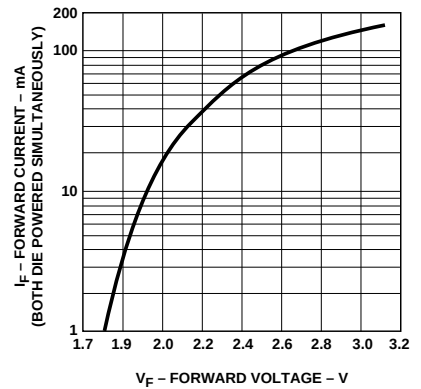


Figure 2c. Forward Current vs. Forward Voltage, HLMP-V500.

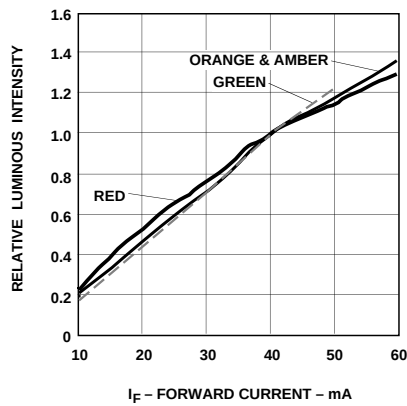


Figure 3. Relative Luminous Intensity vs. Forward Current.

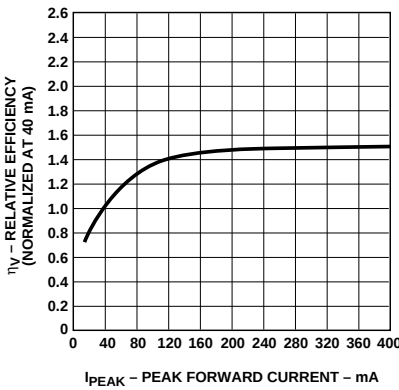


Figure 4a. Relative Efficiency vs. Peak Forward Current, HLMA-VL00/VH00.

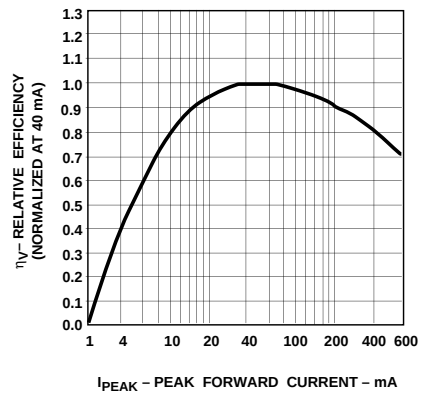


Figure 4b. Relative Efficiency vs. Peak Forward Current, HLMP-V100.

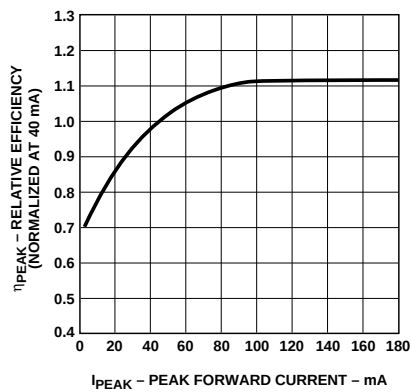


Figure 4c. Relative Efficiency vs. Peak Forward Current, HLMP-V500.

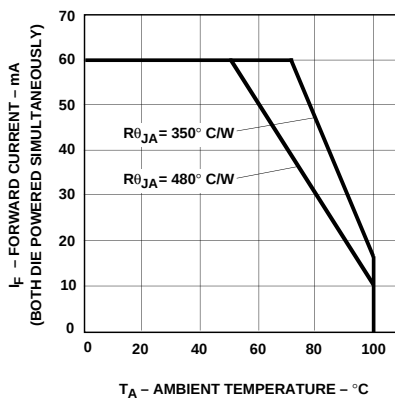


Figure 5a. Maximum Forward DC Current vs. Ambient Temperature, HLMA-VL00/VH00.

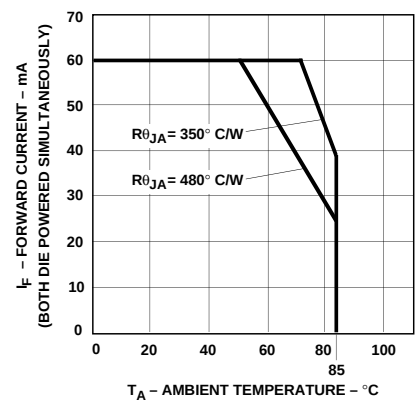
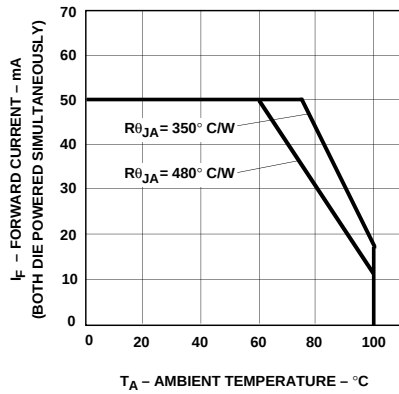
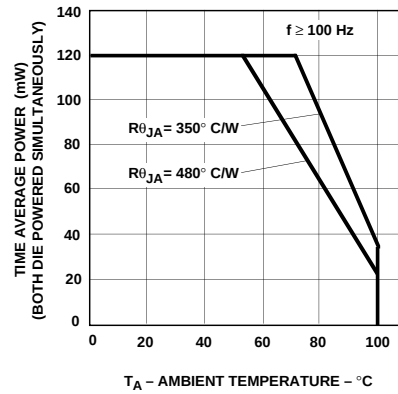


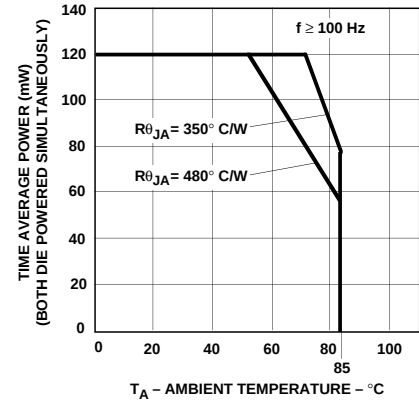
Figure 5b. Maximum Forward DC Current vs. Ambient Temperature, HLMP-V100.



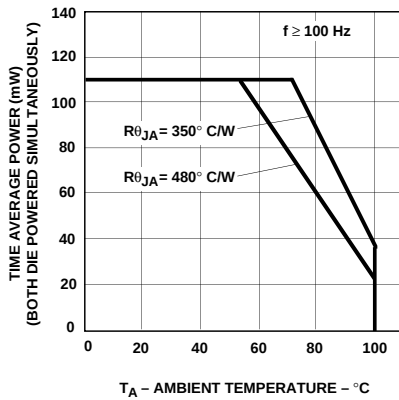
**Figure 5c. Maximum Forward DC Current vs. Ambient Temperature, HLMP-V500.**



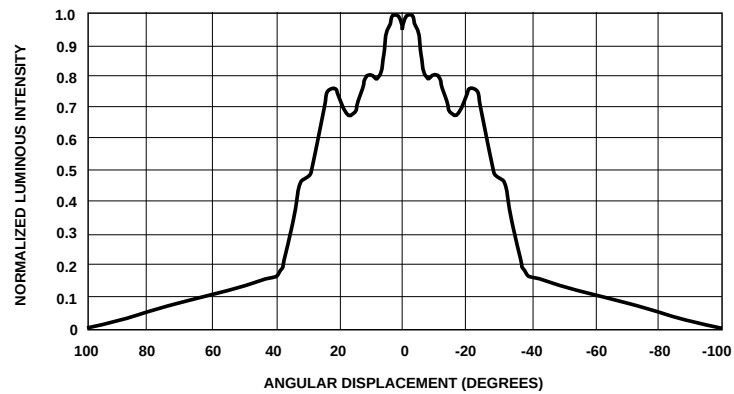
**Figure 6a. Maximum Allowable Average Power vs. Ambient Temperature, HLMA-VL00/VH00.**



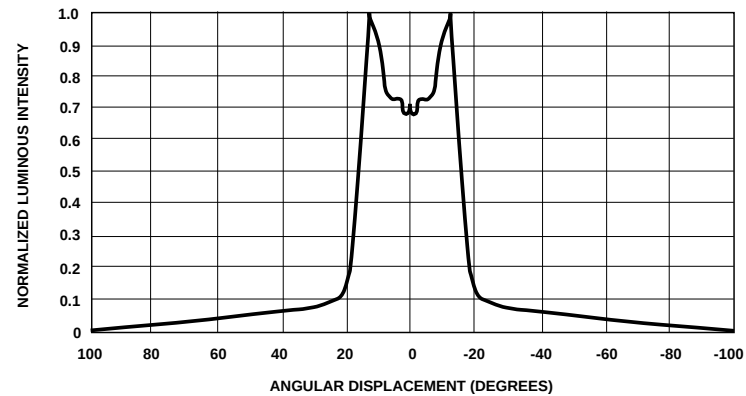
**Figure 6b. Maximum Allowable Average Power vs. Ambient Temperature, HLMP-V100.**



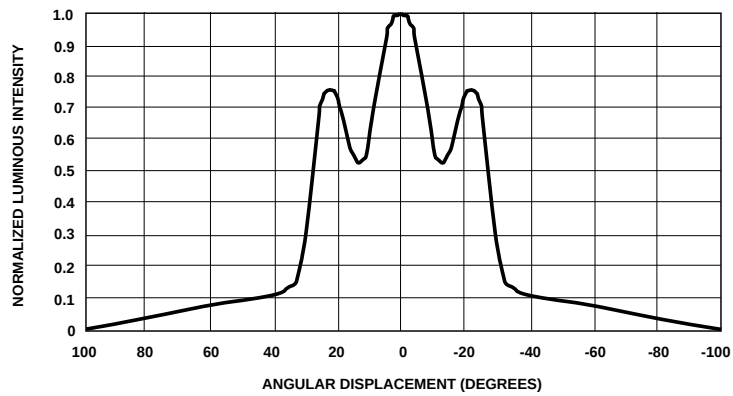
**Figure 6c. Maximum Allowable Average Power vs. Ambient Temperature, HLMP-V500.**



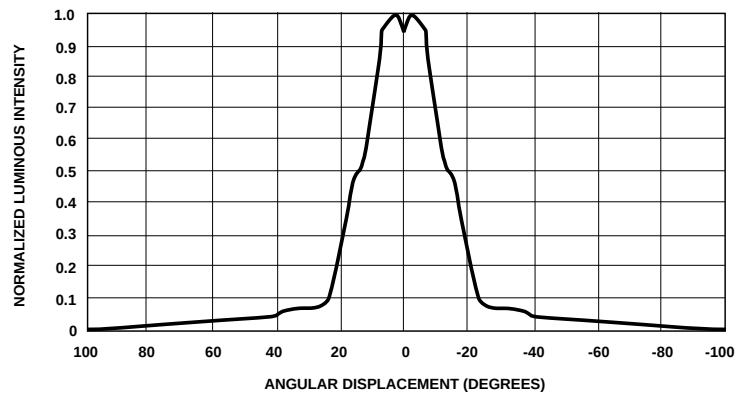
**Figure 7a. Relative Intensity vs. Angle, HLMA-VL00/VH00 Horizontal Axis.**



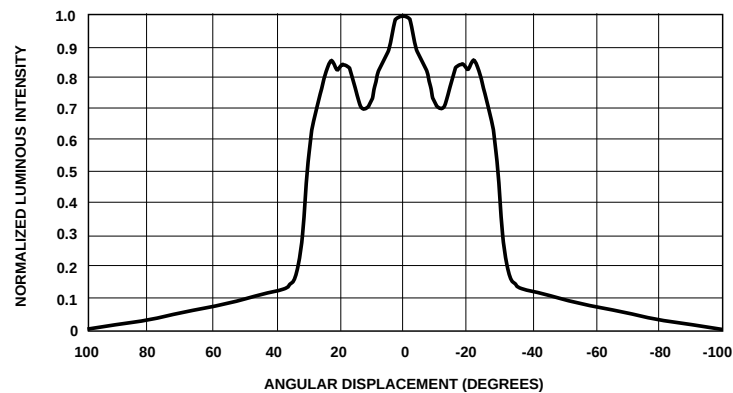
**Figure 7b. Relative Intensity vs. Angle, HLMA-VL00/VH00 Vertical Axis.**



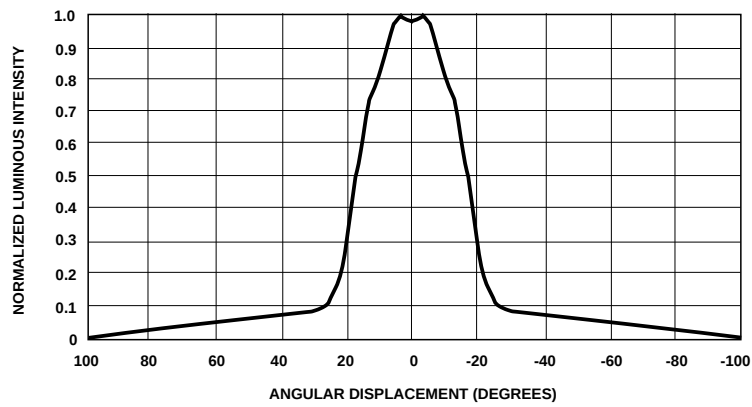
**Figure 8a. Relative Intensity vs. Angle, HLMP-V100 Horizontal Axis.**



**Figure 8b. Relative Intensity vs. Angle, HLMP-V100 Vertical Axis.**



**Figure 9a. Relative Intensity vs. Angle, HLMP-V500 Horizontal Axis.**



**Figure 9b. Relative Intensity vs. Angle, HLMP-V500 Vertical Axis.**

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