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# T-1<sup>3</sup>/<sub>4</sub> (5 mm) Precision Optical Performance AlInGaP LED Lamps

## Technical Data

### SunPower Series

|           |           |
|-----------|-----------|
| HLMP-EL55 | HLMP-EL57 |
| HLMP-EH55 | HLMP-EH57 |
| HLMP-EG55 | HLMP-EG57 |

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### Features

- **Well Defined and Smooth Spatial Radiation Patterns**
- **Wide Viewing Angle**
- **Tinted Diffused Lamp**
- **High Luminous Output**
- **Colors:**  
590/592 nm Amber  
615/617 nm Reddish-Orange  
626/630 nm Red
- **High Operating Temperature:**  
 $T_{JLED} = +130^{\circ}C$
- **Superior Resistance to Moisture**

### Benefits

- **Viewing Angles Match Traffic Management Sign Requirements**
- **Colors Meet Automotive Specifications**
- **Superior Performance in Outdoor Environments**
- **Suitable for Autoinsertion onto PC Boards**

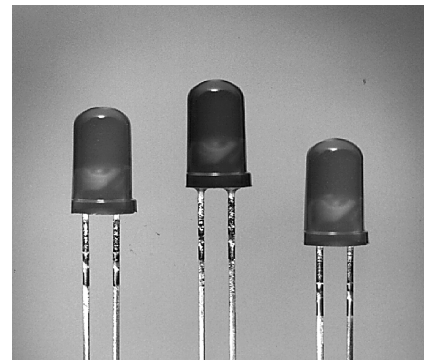
### Applications

- **Traffic Management:**  
Variable Message Signs  
Traffic Management Signs
- **Commercial Indoor/Outdoor Advertising:**  
Signs  
Marquees  
Passenger Information
- **Automotive:**  
Exterior and Interior Lights

### Description

These Precision Optical Performance AlInGaP LEDs provide superior light output for excellent readability in sunlight and are extremely reliable. AlInGaP LED technology provides extremely stable light output over long periods of time. Precision Optical Performance lamps utilize the aluminum indium gallium phosphide (AlInGaP) technology.

These LED lamps are tinted, diffused, T-1<sup>3</sup>/<sub>4</sub> packages incorporating second generation optics producing well defined radiation patterns at specific viewing cone angles.



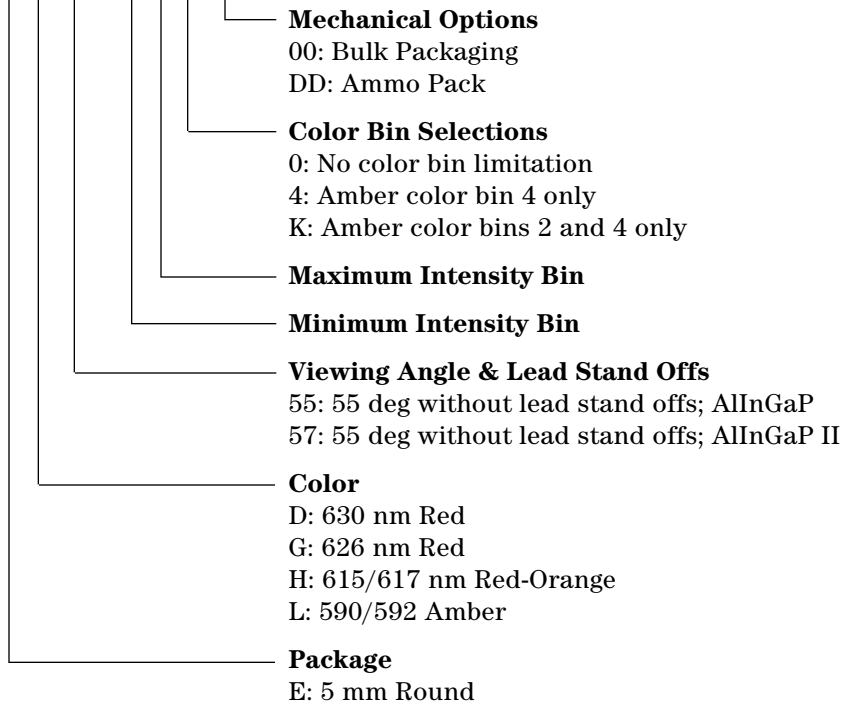
There are two families of amber, red, and red-orange lamps; AlInGaP and the higher performance AlInGaP II.

The high maximum LED junction temperature limit of +130° C enables high temperature operation in bright sunlight conditions.

These lamps are available in two package options to give the designer flexibility with device mounting.

## Part Numbering System

HLMP - x x xx - x x x xx



## Device Selection Guide (AlInGaP)

| Typical Viewing Angle<br>2θ <sup>1/2</sup><br>(Deg.) <sup>[4]</sup> | Color and Dominant Wavelength<br>(nm), Typ. <sup>[3]</sup> | Lamps Without Standoffs<br>on Leads<br>(Outline Drawing A) | Luminous Intensity I <sub>v</sub> (mcd) <sup>[1,2]</sup><br>@20 mA |      |
|---|--|--|--|------|
|   |  |  | Min.   | Max. |
| 55°   | Amber 590  | HLMP-EL55-GK000  | 140  | 400  |
|   | Red-Orange 615   | HLMP-EH55-GK000  | 140  | 400  |
|   | Red 626  | HLMP-EG55-GK000  | 140  | 400  |

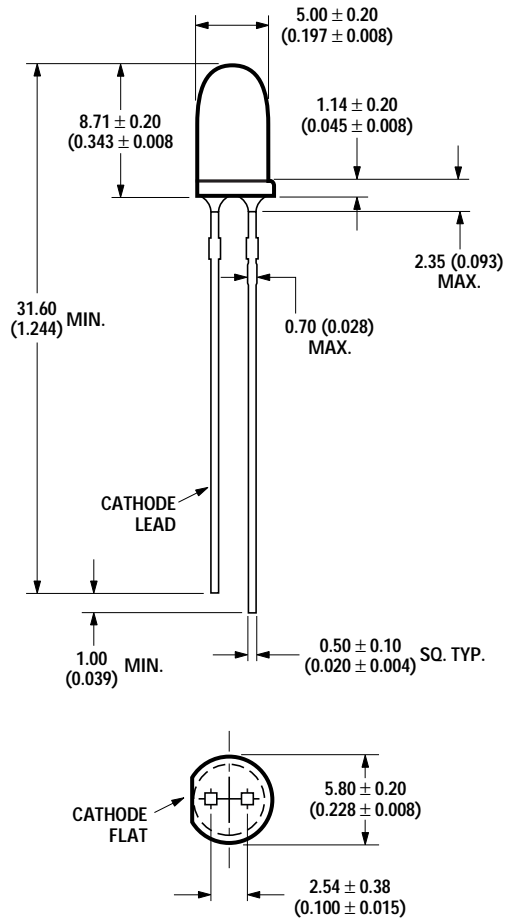
## Device Selection Guide (AlInGaP II)

| Typical Viewing Angle<br>2θ <sup>1/2</sup><br>(Deg.) <sup>[4]</sup> | Color and Dominant Wavelength<br>(nm), Typ. <sup>[3]</sup> | Lamps Without Standoffs<br>on Leads<br>(Outline Drawing A) | Luminous Intensity I <sub>v</sub> (mcd) <sup>[1,2]</sup><br>@20 mA |      |
|---|--|--|--|------|
|   |  |  | Min.   | Max. |
| 55°   | Amber 592  | HLMP-EL57-LP000  | 400  | 1150 |
|   | Red-Orange 617   | HLMP-EH57-LP000  | 400  | 1150 |
|   | Red 630  | HLMP-ED57-LP000  | 400  | 1150 |

### 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, λ<sub>d</sub>, is derived from the CIE Chromaticity Diagram and represents the color of the lamp.
4. θ<sub>1/2</sub> is the off-axis angle where the luminous intensity is one half the on-axis intensity.

## Package Dimensions



### NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).
2. LEADS ARE MILD STEEL, SOLDER DIPPED.
3. TAPERS SHOWN AT TOP OF LEADS (BOTTOM OF LAMP PACKAGE) INDICATE AN EPOXY MENISCUS THAT MAY EXTEND ABOUT 1 mm (0.040 in.) DOWN THE LEADS.
4. RECOMMENDED PC BOARD HOLE DIAMETERS:  
LAMP PACKAGE WITHOUT STAND-OFFS: FLUSH MOUNTING AT BASE OF  
LAMP PACKAGE =  $1.143/1.067$  ( $0.044/0.042$ ).

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

|  |                      |
|--|----------------------|
| DC Forward Current <sup>[1,2,3]</sup> .....        | 50 mA                |
| Peak Pulsed Forward Current <sup>[2,3]</sup> ..... | 100 mA               |
| Average Forward Current <sup>[3]</sup> .....       | 30 mA                |
| Reverse Voltage ( $I_R = 100 \mu\text{A}$ ) .....  | 5 V                  |
| LED Junction Temperature .....                     | 130° C               |
| Operating Temperature .....                        | -40° C to +100° C    |
| Storage Temperature .....                          | -40° C to +120° C    |
| Through-the-Wave Solder Temperature .....          | 250° C for 3 seconds |
| [1.59 mm (0.060 in.) below body]                   |                      |

### Notes:

- Derate linearly as shown in Figure 4.
- For long term performance with minimal light output degradation, drive currents between 10 mA and 30 mA are recommended. For more information on recommended drive conditions, please refer to Application Brief I-024 (5966-3087E).
- Please contact your Agilent Technologies sales representative about operating currents below 10 mA.

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

| Parameter  | Symbol                   | Min. | Typ.   | Max.                                   | Units | Test Conditions  |
|--|--------------------------|------|--|--|-------|--|
| Forward Voltage<br>Amber ( $\lambda_d = 590 \text{ nm}$ )<br>Amber ( $\lambda_d = 592 \text{ nm}$ )<br>Red-Orange ( $\lambda_d = 615 \text{ nm}$ )<br>Red-Orange ( $\lambda_d = 617 \text{ nm}$ )<br>Red ( $\lambda_d = 626 \text{ nm}$ )<br>Red ( $\lambda_d = 630 \text{ nm}$ )                  | $V_F$                    |      | 2.02<br>2.15<br>1.94<br>2.08<br>1.90<br>2.00 | 2.4<br>2.4<br>2.4<br>2.4<br>2.4<br>2.4 | V     | $I_F = 20 \text{ mA}$  |
| Reverse Voltage  | $V_R$                    | 5    | 20   |  | V     | $I_R = 100 \mu\text{A}$  |
| Peak Wavelength<br>Amber ( $\lambda_d = 590 \text{ nm}$ )<br>Amber ( $\lambda_d = 592 \text{ nm}$ )<br>Red-Orange ( $\lambda_d = 615 \text{ nm}$ )<br>Red-Orange ( $\lambda_d = 617 \text{ nm}$ )<br>Red ( $\lambda_d = 626 \text{ nm}$ )<br>Red ( $\lambda_d = 630 \text{ nm}$ )                  | $\lambda_{\text{PEAK}}$  |      | 592<br>594<br>621<br>623<br>635<br>639       |  | nm    | Peak of Wavelength of Spectral Distribution at $I_F = 20 \text{ mA}$               |
| Spectral Halfwidth   | $\Delta\lambda_{1/2}$    |      | 17   |  | nm    | Wavelength Width at Spectral Distribution 1/2 Power Point at $I_F = 20 \text{ mA}$ |
| Speed of Response  | $\tau_s$                 |      | 20   |  | ns    | Exponential Time Constant, $e^{-t/\tau_s}$   |
| Capacitance  | C                        |      | 40   |  | pF    | $V_F = 0, f = 1 \text{ MHz}$   |
| Thermal Resistance   | $R\theta_{\text{J-PIN}}$ |      | 240  |  | °C/W  | LED Junction-to-Cathode Lead   |
| Luminous Efficacy <sup>[1]</sup><br>Amber ( $\lambda_d = 590 \text{ nm}$ )<br>Amber ( $\lambda_d = 592 \text{ nm}$ )<br>Red-Orange ( $\lambda_d = 615 \text{ nm}$ )<br>Red-Orange ( $\lambda_d = 617 \text{ nm}$ )<br>Red ( $\lambda_d = 626 \text{ nm}$ )<br>Red ( $\lambda_d = 630 \text{ nm}$ ) | $\eta_v$                 |      | 480<br>500<br>260<br>235<br>150<br>155       |  | lm/W  | Emitted Luminous Power/Emitted Radiant Power                                       |

### Note:

- The radiant intensity,  $I_e$ , in watts per steradian, may be found from the equation  $I_e = I_v/\eta_v$ , where  $I_v$  is the luminous intensity in candelas and  $\eta_v$  is the luminous efficacy in lumens/watt.

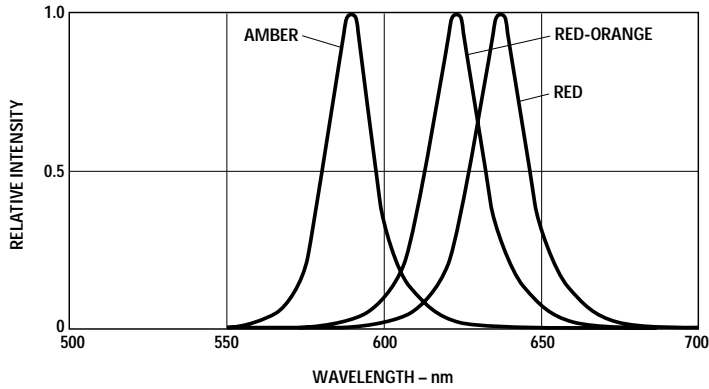


Figure 1. Relative Intensity vs. Peak Wavelength.

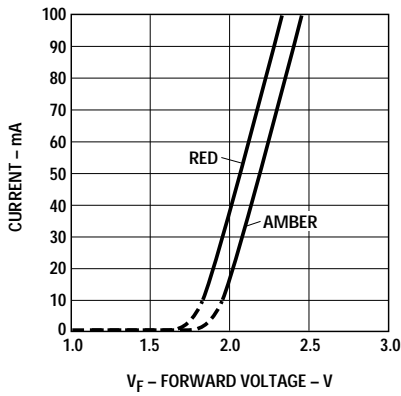


Figure 2. Forward Current vs. Forward Voltage.

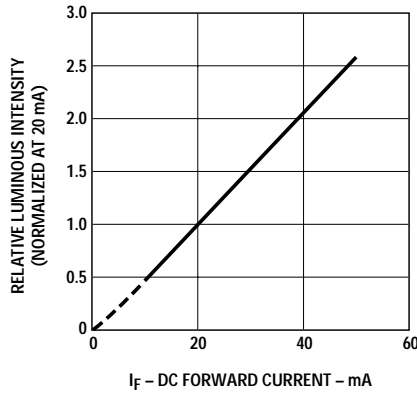


Figure 3. Relative Luminous Intensity vs. Forward Current.

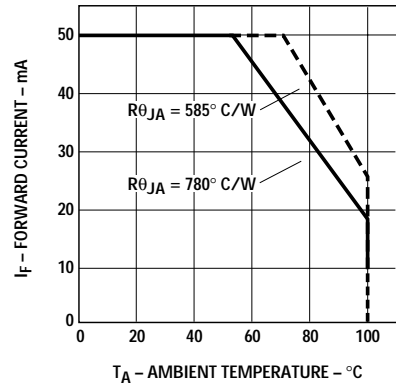


Figure 4. Maximum Forward Current vs. Ambient Temperature. Derating Based on  $T_{JMAX} = 130^{\circ}C$ .

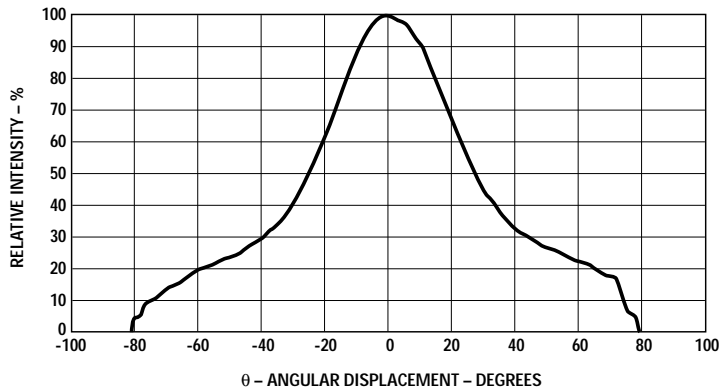


Figure 5. Representative Spatial Radiation Pattern for 55° Viewing Angle Lamps.

**Intensity Bin Limits  
(mcd at 20 mA)**

| Bin Name | Min. | Max. |
|----------|------|------|
| G        | 140  | 180  |
| H        | 180  | 240  |
| J        | 240  | 310  |
| K        | 310  | 400  |
| L        | 400  | 520  |
| M        | 520  | 680  |
| N        | 680  | 880  |
| P        | 880  | 1150 |

Tolerance for each bin limit is  $\pm 15\%$ .

**Amber Color Bin Limits  
(nm at 20 mA)**

| Bin Name | Min.  | Max.  |
|----------|-------|-------|
| 1        | 584.5 | 587.0 |
| 2        | 587.0 | 589.5 |
| 4        | 589.5 | 592.0 |
| 6        | 592.0 | 594.5 |

Tolerance for each bin limit is  $\pm 0.5$  nm.

**Note:**

1. Bin categories are established for classification of products. Products may not be available in all bin categories.

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Data subject to change.

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Obsoletes 5988-1855E

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