

# High Intensity AlInGaP LED Lamps

## Technical Data

### SunPower Series

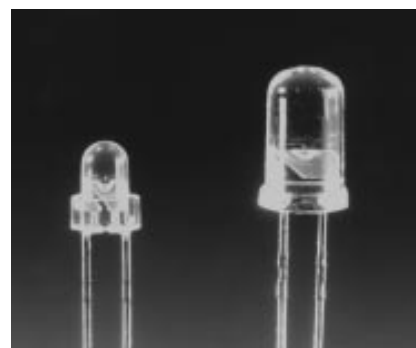
|           |           |
|-----------|-----------|
| HLMP-WLxx | HLMP-NL06 |
| HLMP-WHxx | HLMP-NH04 |
| HLMP-WGxx | HLMP-NG07 |

### Features

- T-1 (3 mm) and T-1 3/4 (5 mm) General Purpose LED Lamps
- AlInGaP SunPower Intensity
- High Light Output
- Clear and Tinted Diffused Lens Options
- Narrow and Wide Viewing Angles
- Amber, Red-Orange, and Red
- Available on Tape and Reel

### Description

This family of 3 mm and 5 mm LED lamps is specially designed for applications requiring higher levels of intensity than is achieved with a standard lamp. The 5 mm lamp is available with 15, 30, and 65 degree viewing angle options. The 3 mm lamp is available with a 60 degree viewing angle.



### Applications

- General Purpose
- Consumer Goods
- Indicator Lights

### Device Selection Guides

| T-1 3/4 (5 mm) Lamp |             | Package |      | Luminous Intensity<br>Min. mcd, If @ 20 mA | Viewing Angle<br>2θ 1/2 (Degrees) |
|---------------------|-------------|---------|------|--------------------------------------------|-----------------------------------|
| Color               | Part Number | Diff.   | Tint |                                            |                                   |
| Amber               | HLMP-WL12   |         |      | 450                                        | 15                                |
| Amber               | HLMP-WL27   |         |      | 205                                        | 30                                |
| Amber               | HLMP-WL02   | X       | X    | 35                                         | 65                                |
| Red Orange          | HLMP-WH12   |         |      | 270                                        | 15                                |
| Red Orange          | HLMP-WH27   |         |      | 155                                        | 30                                |
| Red Orange          | HLMP-WH02   | X       | X    | 35                                         | 65                                |
| Red                 | HLMP-WG12   |         |      | 270                                        | 15                                |
| Red                 | HLMP-WG27   |         |      | 155                                        | 30                                |
| Red                 | HLMP-WG02   | X       | X    | 26                                         | 65                                |

| T-1 (3 mm) Lamp |             | Package |      | Luminous Intensity<br>Min. mcd, If @ 20 mA | Viewing Angle<br>2θ 1/2 (Degrees) |
|-----------------|-------------|---------|------|--------------------------------------------|-----------------------------------|
| Color           | Part Number | Diff.   | Tint |                                            |                                   |
| Amber           | HLMP-NL06   |         |      | 96.2                                       | 60                                |
| Red Orange      | HLMP-NH04   |         |      | 90.2                                       | 60                                |
| Red             | HLMP-NG07   |         |      | 90.2                                       | 60                                |

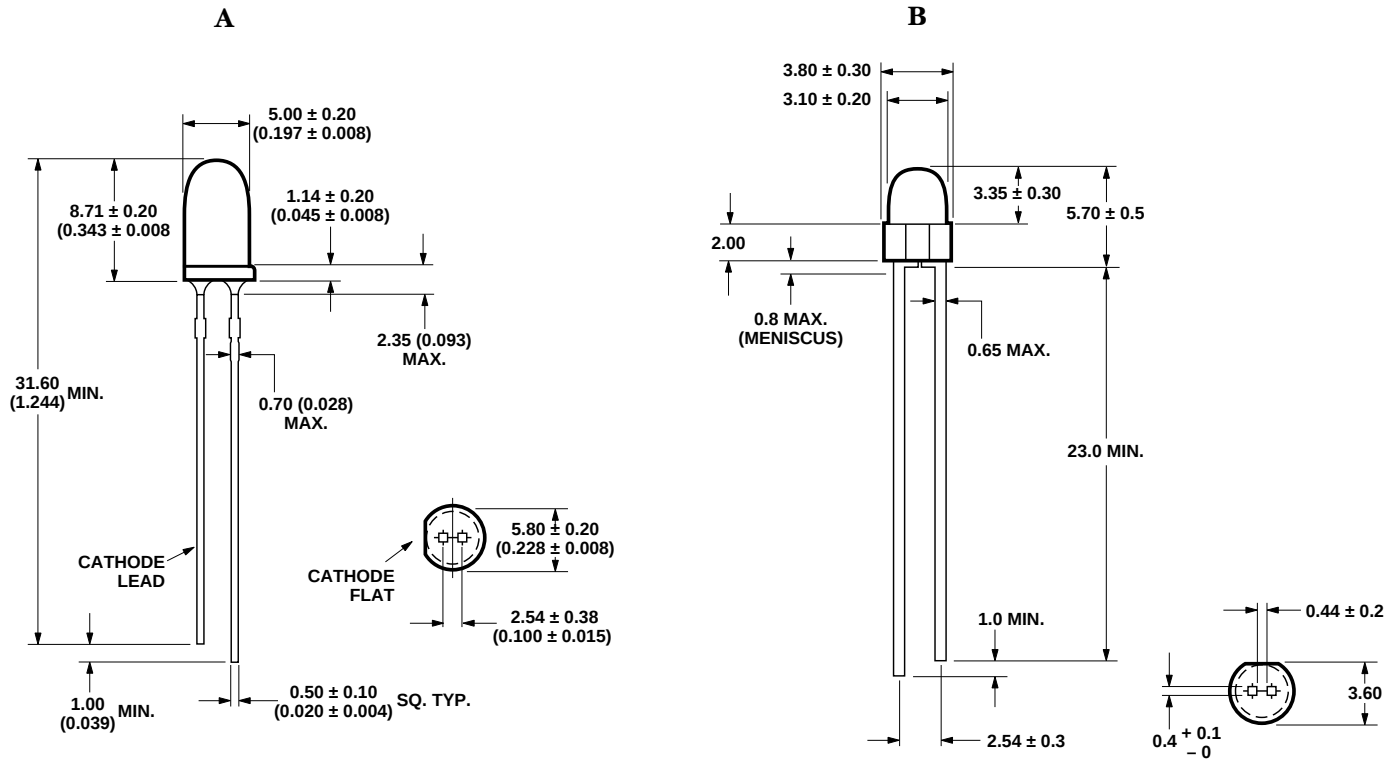
## Technical Data

| Typical Viewing Angle, $2\theta_{1/2}$ (Deg.) <sup>[2]</sup> | Amber ( $\lambda_d = 590 \text{ nm}$ ) <sup>[1]</sup> |                                                                   | Red-Orange ( $\lambda_d = 615 \text{ nm}$ ) <sup>[1]</sup> |                                                                   | Red ( $\lambda_d = 626 \text{ nm}$ ) <sup>[1]</sup> |                                                                   | Epoxy                          | Package Drawing/ Nominal Diameter |
|--------------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------------|--------------------------------|-----------------------------------|
|                                                              | Part No. HLMP-                                        | Minimum Luminous Intensity $I_v$ (mcd) <sup>[3,4]</sup> , @ 20 mA | Part No. HLMP-                                             | Minimum Luminous Intensity $I_v$ (mcd) <sup>[3,4]</sup> , @ 20 mA | Part No. HLMP-                                      | Minimum Luminous Intensity $I_v$ (mcd) <sup>[3,4]</sup> , @ 20 mA |                                |                                   |
| 15                                                           | WL12                                                  | 450                                                               | WH12                                                       | 270                                                               | WG12                                                | 270                                                               | clear                          | A/5 mm                            |
| 30                                                           | WL27                                                  | 205                                                               | WH27                                                       | 155                                                               | WG27                                                | 155                                                               | clear                          | A/5 mm                            |
| 65                                                           | WL02                                                  | 35                                                                | WH02                                                       | 35                                                                | WG02                                                | 26                                                                | tinted diffused <sup>[5]</sup> | A/5 mm                            |
| 60                                                           | NL06                                                  | 96.2                                                              | NH04                                                       | 90.2                                                              | NG07                                                | 90.2                                                              | clear                          | B/3 mm                            |

### Notes:

1. Dominant Wavelength,  $\lambda_d$ , is derived from the CIE Chromaticity Diagram, and represents the color of the lamp.
2.  $\theta_{1/2}$  is the off-axis angle where the luminous intensity is one half the on-axis intensity.
3. The luminous intensity is measured on the mechanical axis of the lamp package.
4. The optical axis is closely aligned with the package mechanical axis.
5. Tinting of amber lamps is yellow, red-orange lamps are tinted a reddish orange, and red lamps are tinted red.

## Package Dimensions



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

| Parameter                                    | 5 mm                     | 3 mm                     |
|----------------------------------------------|--------------------------|--------------------------|
| DC Forward Current                           | 50 mA <sup>[1,3,4]</sup> | 30 mA <sup>[2,3,4]</sup> |
| Peak Pulsed Forward Current <sup>[3,4]</sup> | 70 mA                    | 50 mA                    |
| Average Forward Current                      | 30 mA                    | 30 mA                    |
| Reverse Voltage (I <sub>R</sub> = 100 μA)    | 5 V                      | 5 V                      |
| LED Junction Temperature                     | 130°C                    | 110°C                    |
| Operating Temperature                        | -40°C to +100°C          | -40°C to +80°C           |
| Storage Temperature                          | -40°C to +120°C          | -40°C to +85°C           |
| Dip/Drag Solder Temperature                  | 260°C for 5 seconds      |                          |
| Wave Solder Temperature                      | 245°C for 3 seconds      |                          |
| [1.59 mm (0.060 in.) below seating plane]    |                          |                          |

#### Notes:

1. Derate linearly as shown in Figure 4.
2. Derate linearly as shown in Figure 5.
3. For long term performance with minimal light output degradation, drive currents between 10 and 30 mA are recommended.
4. Please contact your Agilent 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>Red-Orange ( $\lambda_d = 615\ \text{nm}$ )<br>Red ( $\lambda_d = 626\ \text{nm}$ ) | $V_F$                    |      | 2.02<br>1.94<br>1.90 | 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<br>Red-Orange<br>Red                                                                                                    | $\lambda_{\text{PEAK}}$  |      | 592<br>621<br>635    |      | 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>[5]</sup><br>Amber<br>Red-Orange<br>Red                                                                                   | $\eta_v$                 |      | 500<br>235<br>155    |      | lm/W  | Emitted Luminous Power/Emitted Radiant Power                                         |

#### Note:

1. 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.

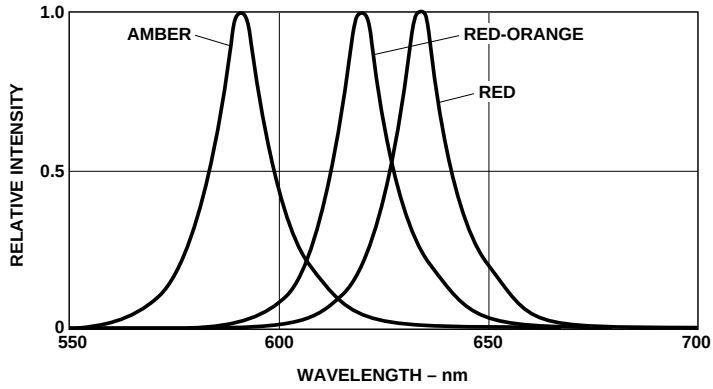


Figure 1. Relative Intensity vs. Peak Wavelength.

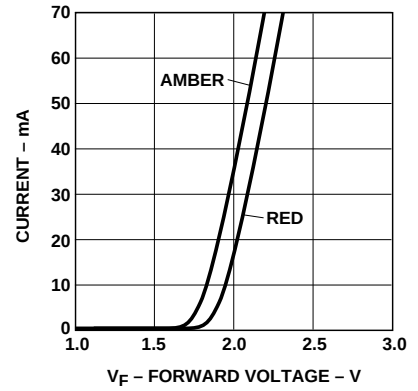


Figure 2. Forward Current vs. Forward Voltage.

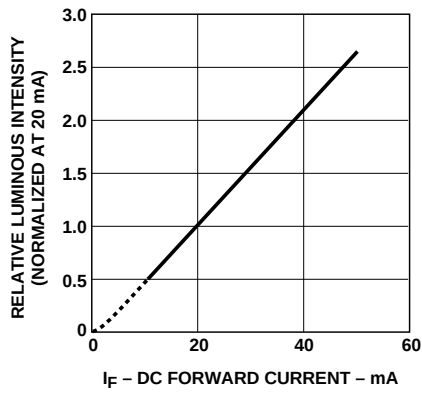


Figure 3. Relative Luminous Intensity vs. Forward Current.

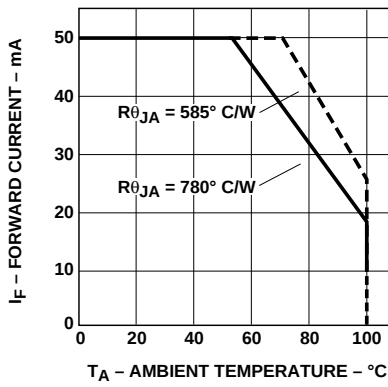


Figure 4. Maximum Forward Current vs. Ambient Temperature for 5 mm Lamps. Derating Based on  $T_{JMAX} = 130^\circ\text{C}$ .

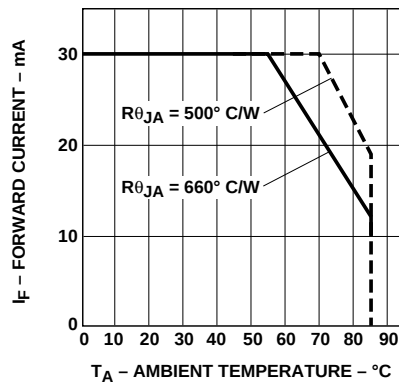
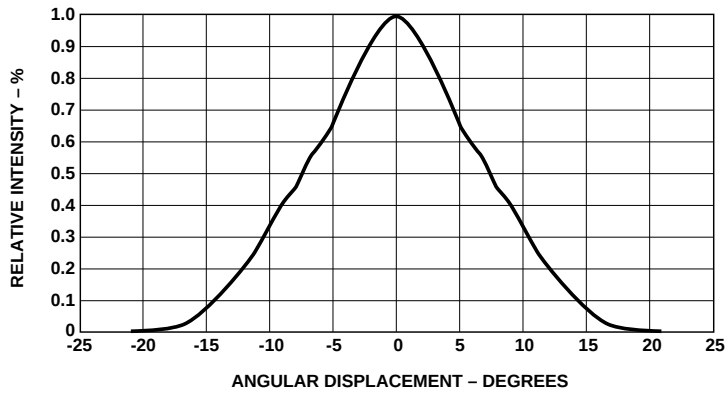
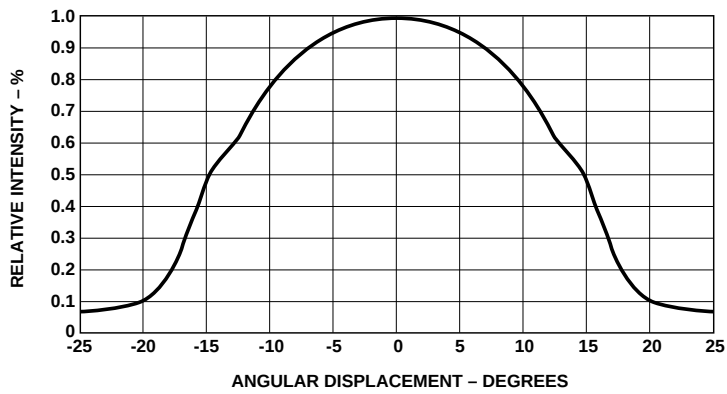


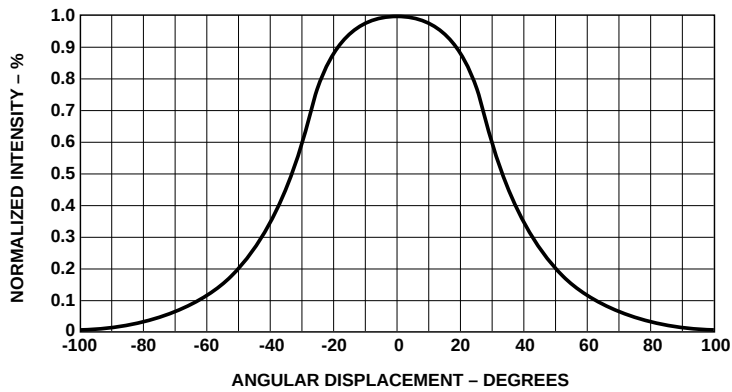
Figure 5. Maximum Forward Current vs. Ambient Temperature for 3 mm Lamps. Derating Based on  $T_{JMAX} = 110^\circ\text{C}$ .



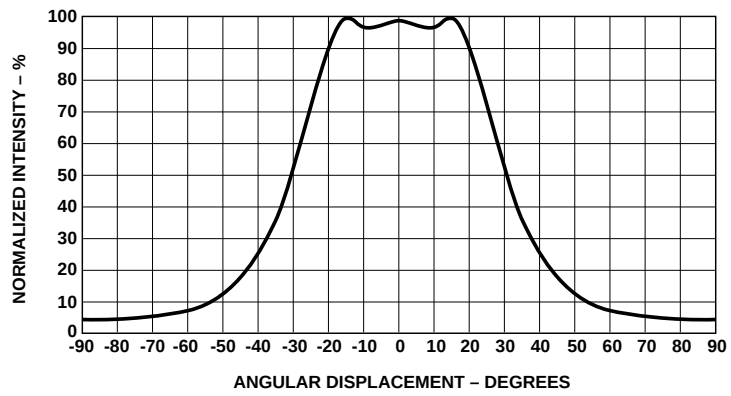
**Figure 6. Representative Spatial Radiation Pattern for 15° Viewing Angle T-1 3/4 (5 mm) Lamps (HLMP-WX12).**



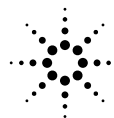
**Figure 7. Representative Spatial Radiation Pattern for 30° Viewing Angle T-1 3/4 (5 mm) Lamps (HLMP-WX27).**



**Figure 8. Representative Spatial Radiation Pattern for 65° Viewing Angle Tinted/Diffused T-1 3/4 (5 mm) Lamps (HLMP-WX02).**



**Figure 9. Representative Spatial Radiation Pattern for 60° Viewing Angle T-1 (3 mm) Lamps (HLMP-NL06/NH04/NG07).**



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