

# HLMP-EL55

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



## Data Sheet

### SunPower Series

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

### 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>3/4</sup> 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.

### 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<sub>JLED</sub> = +130°C
- Superior resistance to moisture

### Benefits

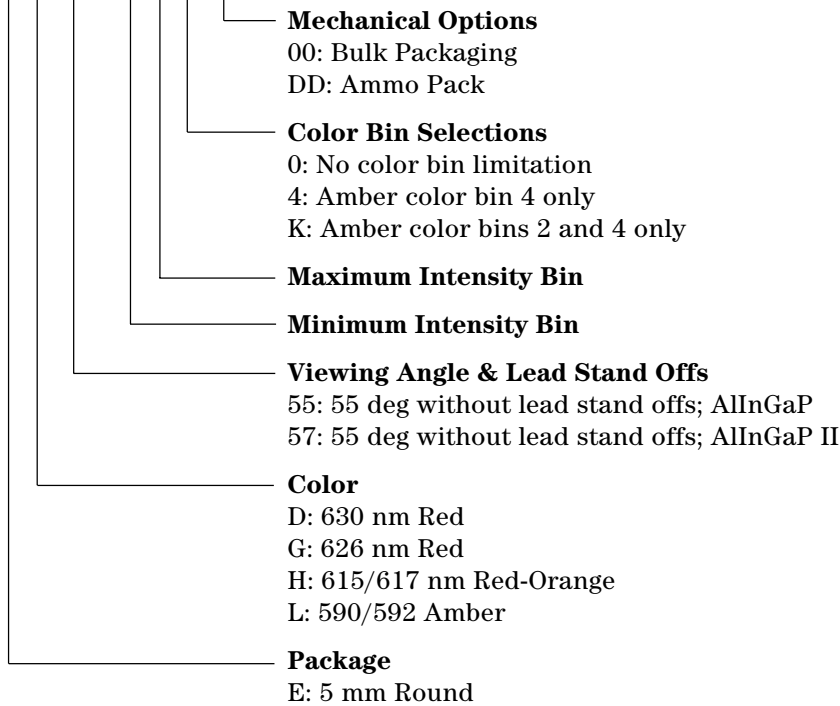
- Viewing angles match traffic management sign requirements
- Colors meet automotive specifications
- Superior performance in outdoor environments
- Suitable for autoinsertion onto PC boards

### Applications

- Traffic management:
  - Variable message signs
  - Traffic management signs
- Commercial indoor/outdoor advertising:
  - Signs
  - Marquees
  - Passenger information
- Automotive:
  - Exterior and interior lights

## Part Numbering System

HLMP - x x xx - x x x xx



### Device Selection Guide (AllnGaP)

Typical Viewing Angle 2θ <sup>1/2</sup> (Deg.) <sup>[4]</sup>	Color and Dominant Wavelength (nm), Typ. <sup>[3]</sup>	Lamps Without Standoffs on Leads (Outline Drawing A)	Luminous Intensity I <sub>v</sub> (mcd) <sup>[1,2]</sup> @ 20 mA	
			Min.	Max.
55°	Amber 590	HLMP-EL55-GHKxx	140	240
		HLMP-EL55-GK0xx	140	400
	Red-Orange 615	HLMP-EH55-GK0xx	140	400
	Red 626	HLMP-EG55-GK0xx	140	400
		HLMP-EG55-HJ0DD	180	310

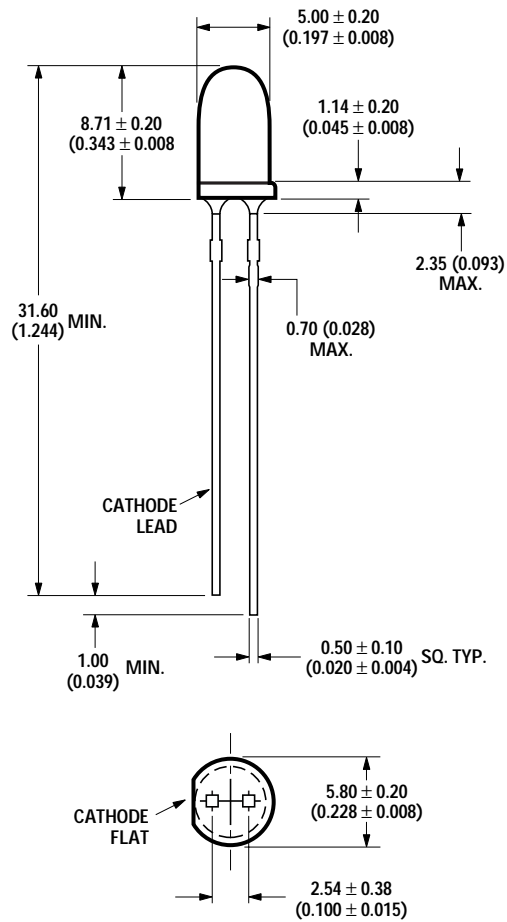
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			Min.	Max.
55°	Amber 592	HLMP-EL57-LP0xx	400	1150
	Red-Orange 617	HLMP-EH57-LP0xx	400	1150
	Red 630	HLMP-ED57-LP0xx	400	1150
		HLMP-ED57-LPTxx	400	1150

#### 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

#### Notes:

1. Derate linearly as shown in Figure 4.
2. 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).
3. Please contact your Avago 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	$V_F$				V	$I_F = 20 \text{ mA}$
Amber ( $\lambda_d = 590 \text{ nm}$ )			2.02	2.4		
Amber ( $\lambda_d = 592 \text{ nm}$ )			2.15	2.4		
Red-Orange ( $\lambda_d = 615 \text{ nm}$ )			1.94	2.4		
Red-Orange ( $\lambda_d = 617 \text{ nm}$ )			2.08	2.4		
Red ( $\lambda_d = 626 \text{ nm}$ )			1.90	2.4		
Red ( $\lambda_d = 630 \text{ nm}$ )			2.00	2.4		
Reverse Voltage	$V_R$	5	20		V	$I_R = 100 \mu\text{A}$
Peak Wavelength	$\lambda_{\text{PEAK}}$				nm	Peak of Wavelength of Spectral Distribution at $I_F = 20 \text{ mA}$
Amber ( $\lambda_d = 590 \text{ nm}$ )			592			
Amber ( $\lambda_d = 592 \text{ nm}$ )			594			
Red-Orange ( $\lambda_d = 615 \text{ nm}$ )			621			
Red-Orange ( $\lambda_d = 617 \text{ nm}$ )			623			
Red ( $\lambda_d = 626 \text{ nm}$ )			635			
Red ( $\lambda_d = 630 \text{ nm}$ )			639			
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		$^\circ\text{C}/\text{W}$	LED Junction-to-Cathode Lead
Luminous Efficacy <sup>[1]</sup>	$\eta_v$				$\text{lm}/\text{W}$	Emitted Luminous Power/Emitted Radiant Power
Amber ( $\lambda_d = 590 \text{ nm}$ )			480			
Amber ( $\lambda_d = 592 \text{ nm}$ )			500			
Red-Orange ( $\lambda_d = 615 \text{ nm}$ )			260			
Red-Orange ( $\lambda_d = 617 \text{ nm}$ )			235			
Red ( $\lambda_d = 626 \text{ nm}$ )			150			
Red ( $\lambda_d = 630 \text{ nm}$ )			155			

#### 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.

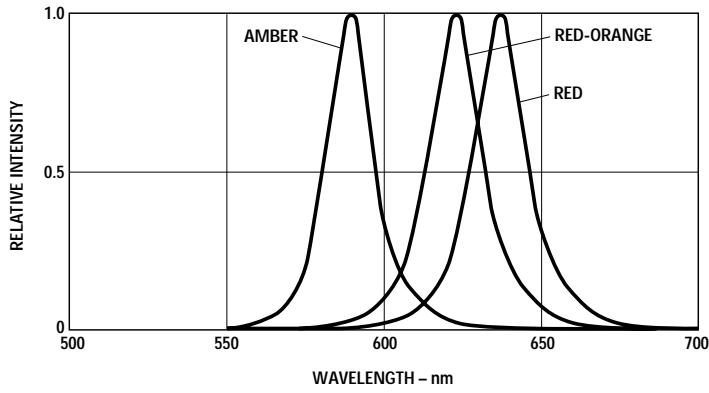


Figure 1. Relative intensity vs. peak wavelength.

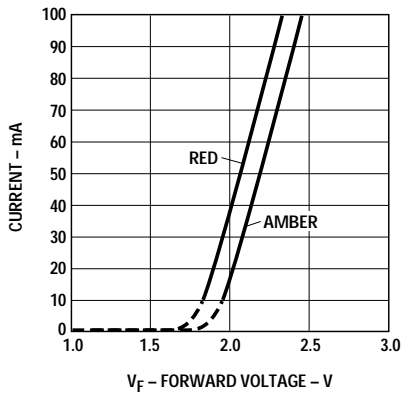


Figure 2. Forward current vs. forward voltage.

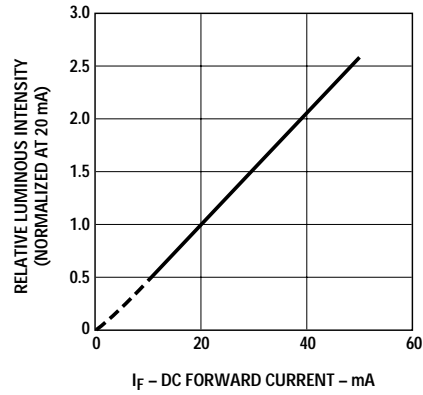


Figure 3. Relative luminous intensity vs. forward current.

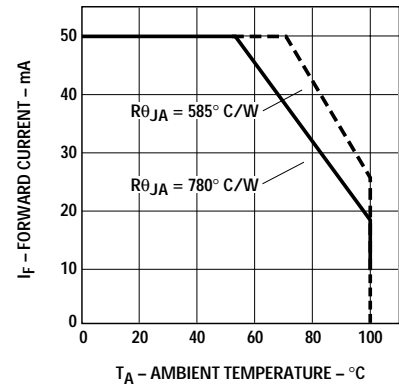


Figure 4. Maximum forward current vs. ambient temperature. Derating based on  $T_{JMAX} = 130^{\circ}C$ .

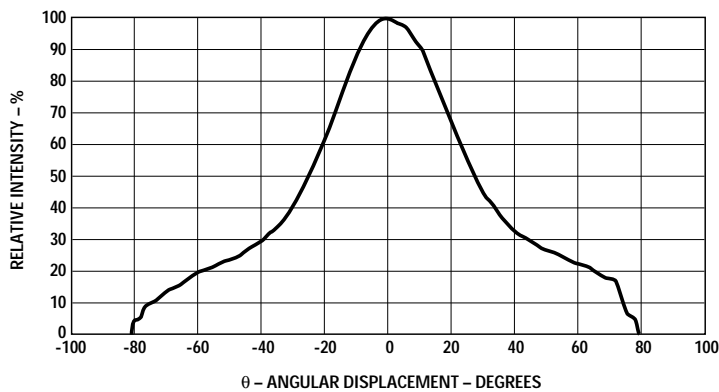


Figure 5. Representative spatial radiation pattern for 55° viewing angle lamps.

**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.

**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 (0.018 x 0.018 inch)	0.646 mm (0.025 inch)	0.976 to 1.078 mm (0.038 to 0.042 inch)
0.508 x 0.508 mm (0.020 x 0.020 inch)	0.718 mm (0.028 inch)	1.049 to 1.150 mm (0.041 to 0.045 inch)

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

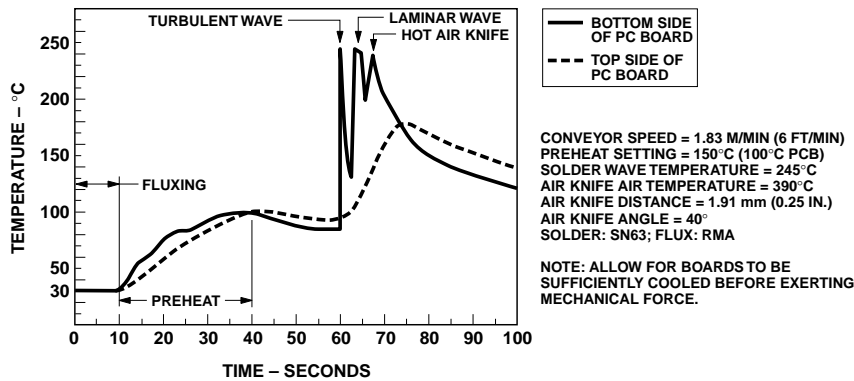


Figure 6. Recommended wave soldering profile.

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