HEWLETT PACKARD

T-1¾ (5 mm) Precision Optical Performance AlInGaP LED Lamps

Technical Data

HP SunPower Series
HLMP-ELxx
HLMP-EJxx
HLMP-EHxx
HLMP-EGxx

Features

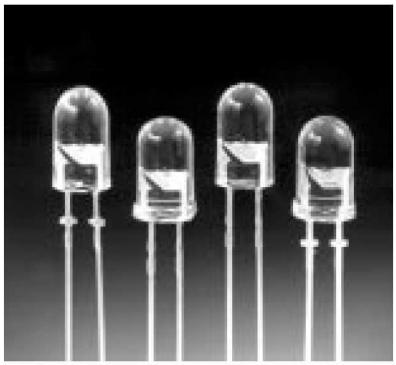
- **Well Defined Spatial Radiation Patterns**
- **Viewing Angles: 6°, 15°, 23°, 30°**
- **High Luminous Output**
- **Colors:**
  590 nm Amber
  605 nm Orange
  615 nm Reddish-Orange
  626 nm Red
- **High Operating Temperature:**
  $T_{J\,LED}$ = +130°C
- **Superior Resistance to Moisture**
- **Package Options:**
  With or Without Lead Stand-Offs

Benefits

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

Applications

- **Traffic Management:**
  Traffic Signals
  Pedestrian Signals
  Work Zone Warning Lights
  Variable Message Signs
- **Commercial Outdoor Advertising:**
  Signs
  Marquees
- **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 untinted, nondiffused, T-1¾ packages incorporating second generation optics producing well defined spatial radiation patterns at specific viewing cone angles.

These lamps are made with an advanced optical grade epoxy, offering superior high temperature and high moisture resistance performance in outdoor signal and sign applications. The high maximum LED junction temperature limit of +130°C enables high temperature operation in bright sunlight conditions. The package epoxy contains both uv-a and uv-b inhibitors to reduce the effects of long term exposure to direct sunlight.

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

The HLMP-Exxx Series replace the HLMP-Dxxx and HLMP-Uxxx series products. A cross reference is found on page 10 of this data sheet.

Device Selection Guide (Continued)

Typical Viewing Angle $2\theta_{1/2}$ (Deg.)[4]	Color and Dominant Wavelength (nm), Typ.[3]	Lamps Without Standoffs on Leads (Outline Drawing A)	Lamps With Standoffs on Leads (Outline Drawing B)	Luminous Intensity Iv (mcd) [1,2] @ 20 mA	
				Min.	Max.
6°[5]	Orange 605	**HLMP-EJ08-TW000**	HLMP-EJ10-TW000	2170	8300
		HLMP-EJ08-UX000	HLMP-EJ10-UX000	2750	10700
		HLMP-EJ08-VY000	HLMP-EJ10-VY000	3600	13800
		HLMP-EJ08-WZ000	HLMP-EJ10-WZ000	4700	18400
	Red-Orange 615	**HLMP-EH08-SV000**	HLMP-EH10-SV000	1650	6300
		HLMP-EH08-TW000	HLMP-EH10-TW000	2170	8300
		HLMP-EH08-UX000	HLMP-EH10-UX000	2750	10700
		HLMP-EH08-VY000	HLMP-EH10-VY000	3600	13800
	Red 626	**HLMP-EG08-SV000**	HLMP-EG10-SV000	1650	6300
		HLMP-EG08-TW000	HLMP-EG10-TW000	2170	8300
		HLMP-EG08-UW000		2750	8300
		HLMP-EG08-UX000	HLMP-EG10-UX000	2750	10700
		HLMP-EG08-VW000		3600	8300
		HLMP-EG08-VX000		3600	10700
		HLMP-EG08-VY000	HLMP-EG10-VY000	3600	13800
15°	Amber 590	**HLMP-EL15-PS000**	HLMP-EL17-PS000	765	2900
		HLMP-EL15-QR000		1000	2200
		HLMP-EL15-QRK00*		1000	2200
		HLMP-EL15-QS000		1000	2900
		HLMP-EL15-QS400**		1000	2900
		HLMP-EL15-QSK00*		1000	2900
		HLMP-EL15-QT000	HLMP-EL17-QT000	1000	3700
		HLMP-EL15-QTK00*		1000	3700
		HLMP-EL15-RU000	HLMP-EL17-RU000	1300	4800
		HLMP-EL15-SV000	HLMP-EL17-SV000	1650	6300
	Orange 605	**HLMP-EJ15-PS000**	HLMP-EJ17-PS000	765	2900
		HLMP-EJ15-QT000	HLMP-EJ17-QT000	1000	3700
		HLMP-EJ15-RU000	HLMP-EJ17-RU000	1300	4800
		HLMP-EJ15-SV000	HLMP-EJ17-SV000	1650	6300

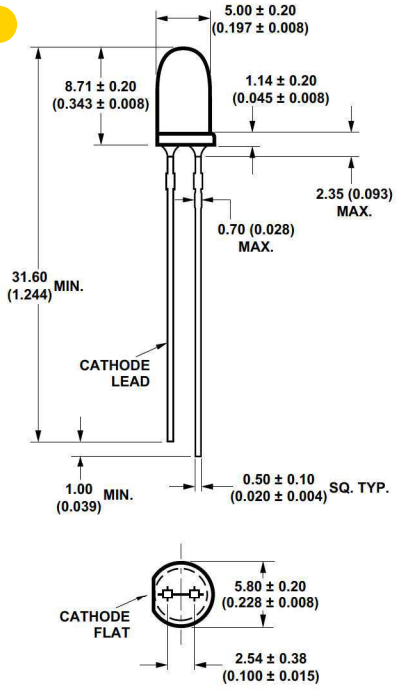
Notes:

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_d, is derived from the CIE Chromaticity Diagram and represents the color of the lamp.
4. $\theta_{1/2}$ is the off-axis angle where the luminous intensity is one half the on-axis intensity.
5. The intensity of narrow viewing angle lamps is measured at the intensity peak.

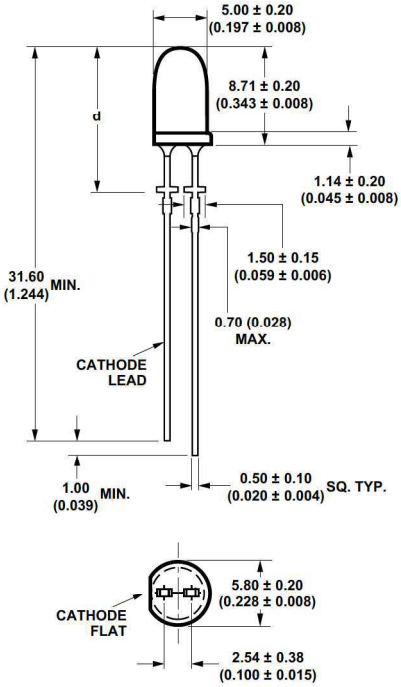
Part numbers in **bold** are recommended for new designs.
*HLMP-xLxx-xxK00 are selected to amber color bins 2 and 4 only.
**HLMP-xLxx-xx400 are selected to amber color bin 4 only.

Package Dimensions

A



B



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 A WITHOUT STAND-OFFS: FLUSH MOUNTING AT BASE OF LAMP PACKAGE = 1.143/1.067 (0.044/0.042).
   - LAMP PACKAGE B WITH STAND-OFFS: MOUNTING AT LEAD STAND-OFFS = 0.965/0.889 (0.038/0.035).
5. FOR DOME HEIGHTS ABOVE LEAD STAND-OFF SEATING PLANE, d, LAMP PACKAGE B, SEE TABLE.

PART NO.	d
HLMP-XX10	12.37 ± 0.25 (0.487 ± 0.010)
HLMP-XX17	12.42 ± 0.25 (0.489 ± 0.010)
HLMP-XX26	12.52 ± 0.25 (0.493 ± 0.010)
HLMP-XX32	11.96 ± 0.25 (0.471 ± 0.010)

Absolute Maximum Ratings at T_A = 25°C

DC Forward Current[1,2,3] ..... 50 mA
Peak Pulsed Forward Current[2,3] ..... 70 mA
Average Forward Current[3] ..... 30 mA
Reverse Voltage (I_R = 100 µA) ..... 5 V
LED Junction Temperature ..... 130°C
Operating Temperature ..... -40°C to +100°C
Storage Temperature ..... -40°C to +120°C
Dip/Drag Soldering Temperature ..... 260°C for 6 seconds
Through-the-Wave Preheat Temperature ..... 145°C
Through-the-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. For long term performance with minimal light output degradation, drive currents between 10 mA and 30 mA are recommended.
3. Please contact your Hewlett-Packard sales representative about operating currents below 10 mA.

Electrical/Optical Characteristics at T_A = 25°C

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage Amber (λ_d = 590 nm) Orange (λ_d = 605 nm) Red-Orange (λ_d = 615 nm) Red (λ_d = 626 nm)	V_F		 2.02 1.98 1.94 1.90	2.4	V	I_F = 20 mA
Reverse Voltage	V_R	5	20		V	I_F = 100 µA
Peak Wavelength: Amber (λ_d = 590 nm) Orange (λ_d = 605 nm) Red-Orange (λ_d = 615 nm) Red (λ_d = 626 nm)	λ_{PEAK}		 592 609 621 635		nm	Peak of Wavelength of Spectral Distribution at I_F = 20 mA
Spectral Halfwidth	$\Delta\lambda_{1/2}$		17		nm	Wavelength Width at Spectral Distribution 1/2 Power Point at I_F = 20 mA
Speed of Response	τ_s		20		ns	Exponential Time Constant, e^{-t/τ_s}
Capacitance	C		40		pF	V_F = 0, f = 1 MHz
Thermal Resistance	$R\theta_{J\text{-}PIN}$		240		°C/W	LED Junction-to-Cathode Lead
Luminous Efficacy[1] Amber (λ_d = 590 nm) Orange (λ_d = 605 nm) Red-Orange (λ_d = 615 nm) Red (λ_d = 626 nm)	η_v		 480 370 260 150		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 η_v is the luminous efficacy in lumens/watt.

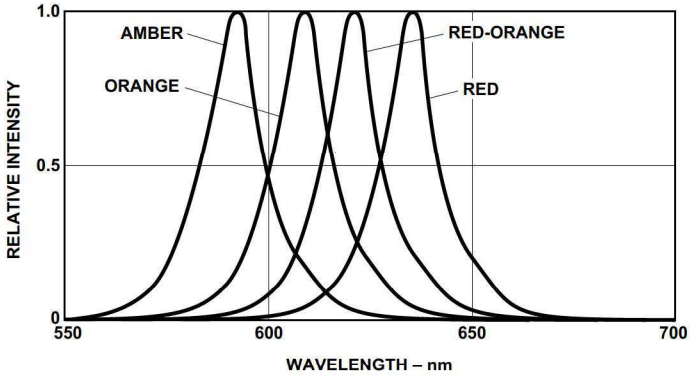


Figure 1. Relative Intensity vs. Peak Wavelength.

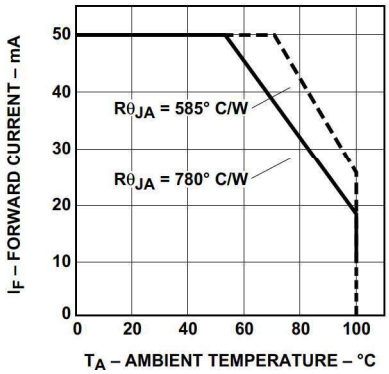


Figure 4. Maximum Forward Current vs. Ambient Temperature. Derating Based on T_{JMAX} = 130°C.

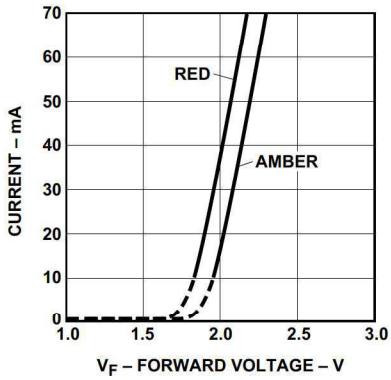


Figure 2. Forward Current vs. Forward Voltage.

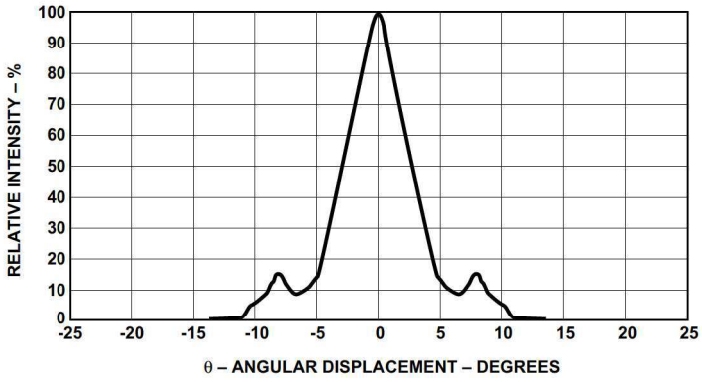


Figure 5. Representative Spatial Radiation Pattern for 6 ° Viewing Angle Lamps.

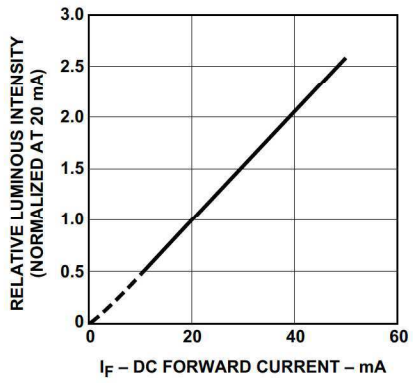


Figure 3. Relative Luminous Intensity vs. Forward Current.

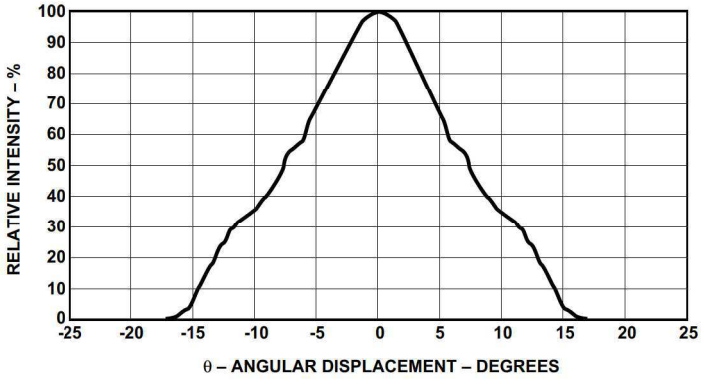


Figure 6. Representative Spatial Radiation Pattern for 15° Viewing Angle Lamps.