HEWLETT PACKARD

Precision Optical Performance AlInGaP II LED Lamps

Technical Data

HP SunPower Series
HLMP-DLXX
HLMP-DHXX
HLMP-DDXX

Features

- **Well Defined Spatial Radiation Patterns**
- **Viewing Angles: 15°, 23°, 30°**
- **High Luminous Output**
- **Colors:**
  592 nm Amber
  617 nm Reddish-Orange
  630 nm Red
- **High Operating Temperature:**
  T_{jLED} = +130°C
- **Superior Resistance to Moisture**

Benefits

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

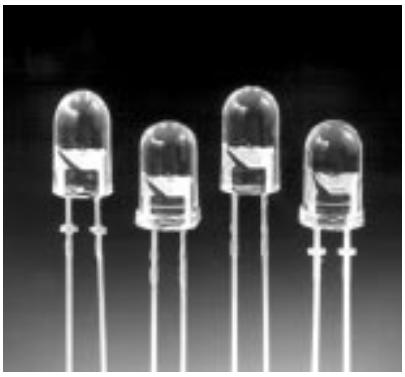
Applications

- **Traffic Management:**
  Traffic Signals
  Work Zone Warning Lights
  Variable Message Signs
- **Commercial Outdoor Advertising:**
  Signs
  Marquees
- **Automotive:**
  Exterior and Interior Lights

Description

Precision Optical Performance AlInGaP II (aluminum indium gallium phosphide) LEDs offer superior light output for excellent readability in sunlight and dependable performance. The AlInGaP II technology provides extremely stable light output over long periods of time.

These LED lamps are untinted, nondiffused, T-1¾ packages incorporating second generation optics which produce well defined 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 maximum LED junction temperature limit of +130°C enables high temperature operation in bright sunlight conditions. The epoxy contains both uv-a and uv-b inhibitors to reduce the effects of long term exposure to direct sunlight.

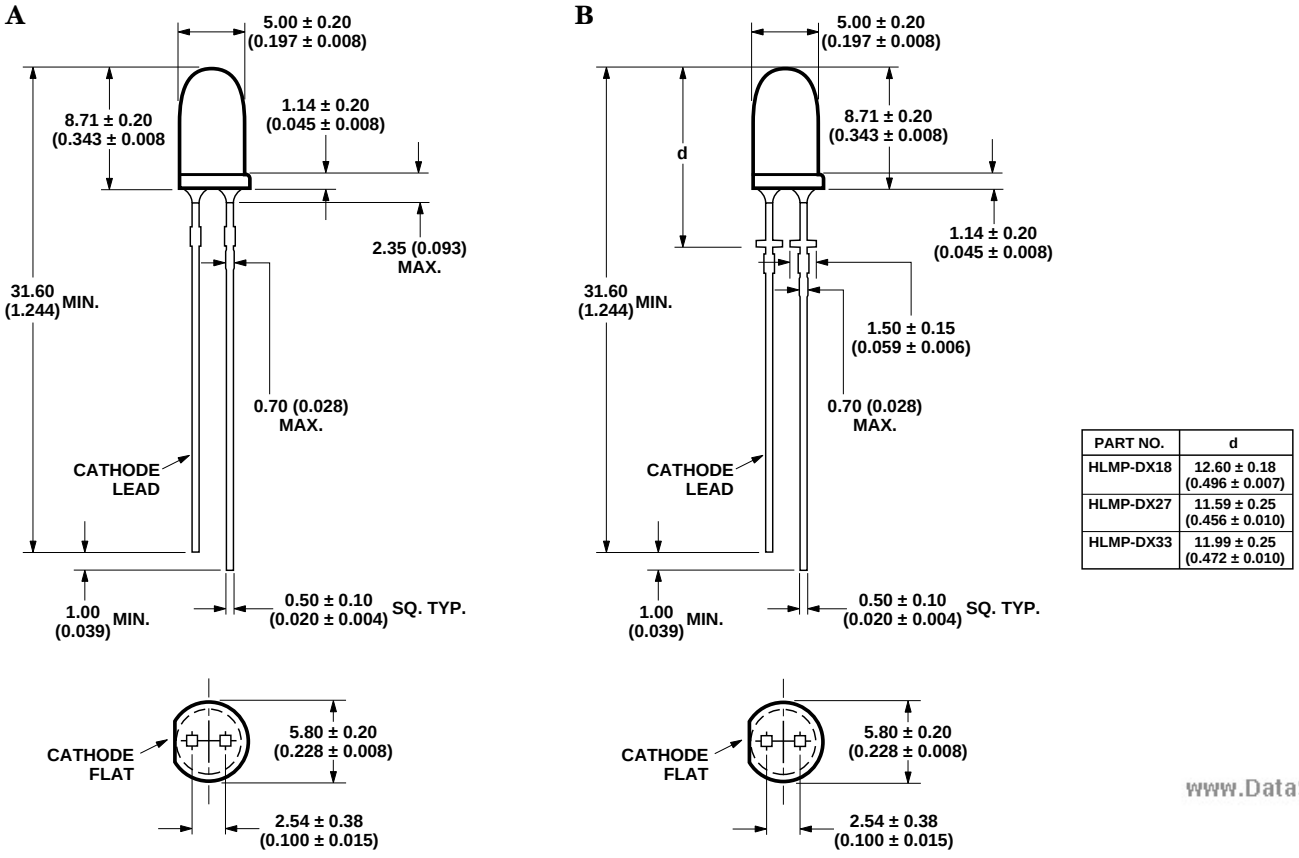
T-1 3/4 (5 mm) Precision Optical Performance AlInGaP II LED Lamps

Technical Data

	Amber (λ_d = 592 nm)[1]		Red-Orange (λ_d = 617 nm)[1]		Red (λ_d = 630 nm)[1]			
Typical Viewing Angle, $2\theta_{1/2}$ (Deg.)[2]	Part No. HLMP-	Minimum Luminous Intensity I_v (mcd)[3,4], @ 20 mA	Part No. HLMP-	Minimum Luminous Intensity I_v (mcd)[3,4], @ 20 mA	Part No. HLMP-	Minimum Luminous Intensity I_v (mcd)[3,4], @ 20 mA	Stand-offs	Package Drawing
15	DL16	2750	DH16	2170	DD16	2170	N	A
15	DL18	2750	DH18	2170	DD18	2170	Y	B
23	DL25	1650	DH25	1000	DD25	1000	N	A
23	DL27	1650	DH27	1000	DD27	1000	Y	B
30	DL31	1000	DH31	765	DD31	765	N	A
30	DL33	1000	DH33	765	DD33	765	Y	B

Notes:
1. Dominant Wavelength, λ_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.

Package Dimensions



PART NO.	d
HLMP-DX18	12.60 ± 0.18 (0.496 ± 0.007)
HLMP-DX27	11.59 ± 0.25 (0.456 ± 0.010)
HLMP-DX33	11.99 ± 0.25 (0.472 ± 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 ..... 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 Solder 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 = 592 nm) Red-Orange (λ_d = 617 nm) Red (λ_d = 630 nm)	V_F		 2.15 2.08 2.00	2.4	V	I_F = 20 mA
Reverse Voltage	V_R	5	20		V	I_R = 100 μA
Peak Wavelength Amber Red-Orange Red	λ_{PEAK}		 594 623 639		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 Red-Orange Red	η_v		 500 235 155		lm/W	Emitted Luminous Power/Emitted Radiant Power at I_f = 20 mA

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.

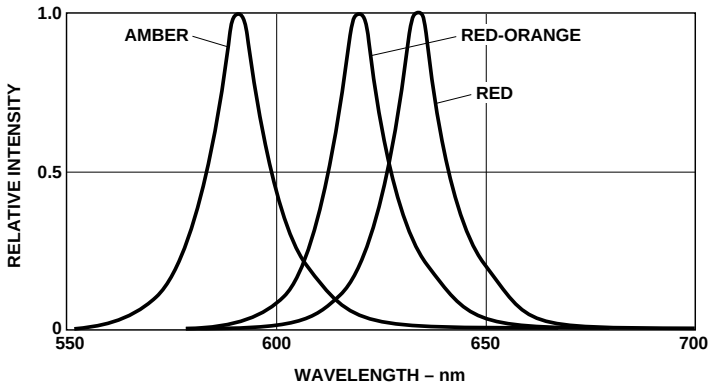


Figure 1. Relative Intensity vs. Peak Wavelength.

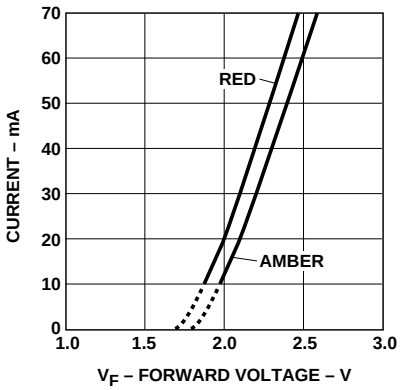


Figure 2. Forward Current vs. Forward Voltage.

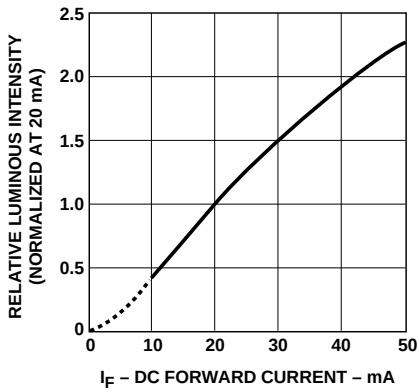


Figure 3. Relative Luminous Intensity vs. Forward Current.

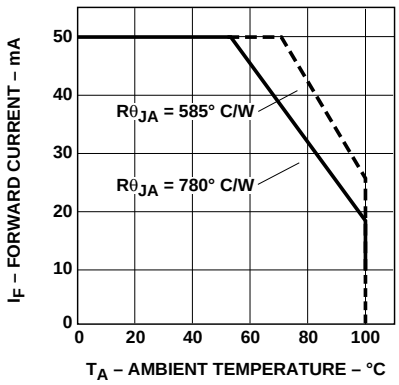


Figure 4. Maximum Forward Current vs. Ambient Temperature. Derating Based on T_{JMAX} = 130°C.

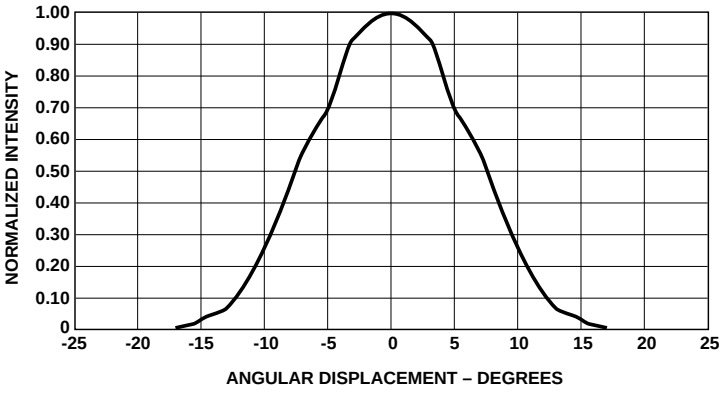


Figure 5. Representative Spatial Radiation Pattern for 15 °Viewing Angle Lamps.

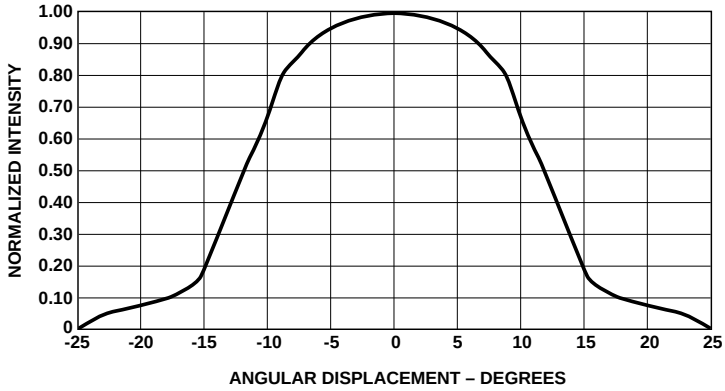


Figure 6. Representative Spatial Radiation Pattern for 24° Viewing Angle Lamps.

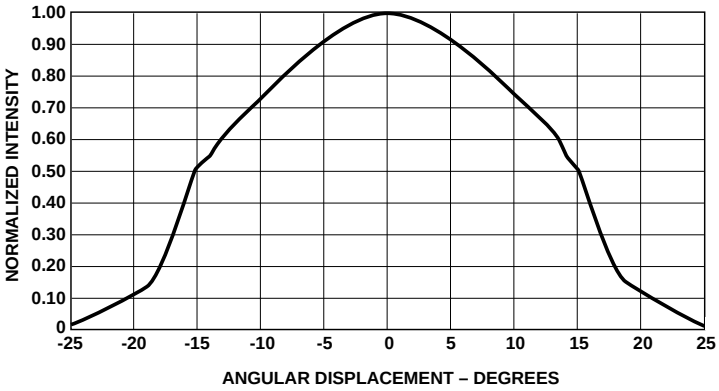


Figure 7. Representative Spatial Radiation Pattern for 30° Viewing Angle Lamps.

Intensity Bin Limits (mcd at 20 mA)

Bin Name	Min.	Max.
PP	880	1150
QQ	1150	1500
RR	1500	1900
SS	1900	2500
TT	2500	3200
UU	3200	4200
VV	4200	5500
WW	5500	7200
XX	7200	9300

Tolerance for each bin limit is ± 15%.

HLMP-xLxx 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 ± 0.5 nm.

Note:

1. Bin categories are established for classification of products. Products may not be available in all bin categories. Please contact your Hewlett-Packard representative for information on currently available bins.

HEWLETT® PACKARD

www.hp.com/go/led_lamps

For technical assistance or the location of your nearest Hewlett-Packard sales office, distributor or representative call:

Americas/Canada: 1-800-235-0312 or 408-654-8675

Far East/Australasia: Call your local HP sales office.

Japan: (81 3) 3335-8152

Europe: Call your local HP sales office.

Data subject to change.

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