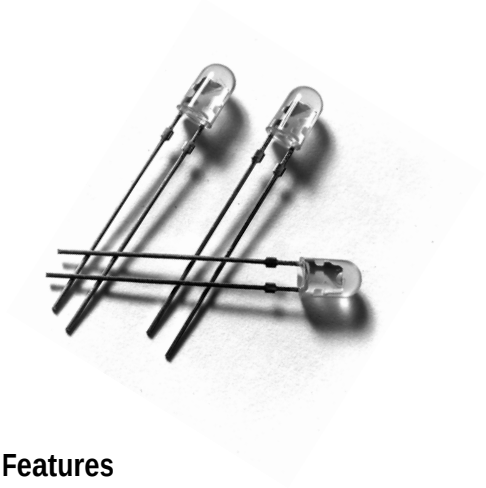
HLMP-SL11

4 mm Oval Precision
Optical Performance Best Value
AlInGaP and InGaN Lamps

Data Sheet

HLMP-SL11, HLMP-RL11, HLMP-SD11, HLMP-RD11, HLMP-RB11, HLMP-RM11



Description

These Precision Optical Performance Oval LEDs are specifically designed for Full Color/Video and Passenger Information signs. The Oval shaped radiation pattern (60˚ x 120˚) and high luminous intensity ensure that these devices are excellent for wide field of view outdoor applications where a wide viewing angle and readability in sunlight are essential. These lamps have very smooth, matched radiation patterns ensuring consistent color mixing in full color applications, message uniformity across the viewing angle of the sign.

High efficiency LED materials are used in these lamps: Higher performance of Aluminum Indium Gallium Phosphide (AlInGaP II) for Red and Amber color and Indium Gallium Nitride (InGaN) for Blue and Green. Each lamp is made with an advanced optical grade epoxy offering superior high temperature and high moisture resistance in outdoor applications. The package epoxy contains both UV-A and UV-B inhibitors to reduce the effects of long term exposure to direct sunlight.

Designers can select parallel or perpendicular orientation. Both lamps are available in tinted version.

Features

- **Well-defined spatial radiation pattern**
- **Viewing angles:**
  - **Major axis 120˚**
  - **Minor axis 60˚**
- **High luminous output**
- **AlInGaP II (brightest) intensity level**
- **Colors:**
  - **472 nm blue**
  - **526 nm green**
  - **630 nm red**
  - **592 nm amber**
- **Superior resistance to moisture**
- **UV resistant epoxy**

Benefits

- **Viewing angle designed for wide field of view applicaion**
- **Superior performance in outdoor environments**

Applications

- **Full color signs**

CAUTION: *The Blue and Green LEDs are Class 1 ESD sensitive. Please observe appropriate precautions during handling and processing. Refer to Avago Application Note AN-1142 for additional details.*

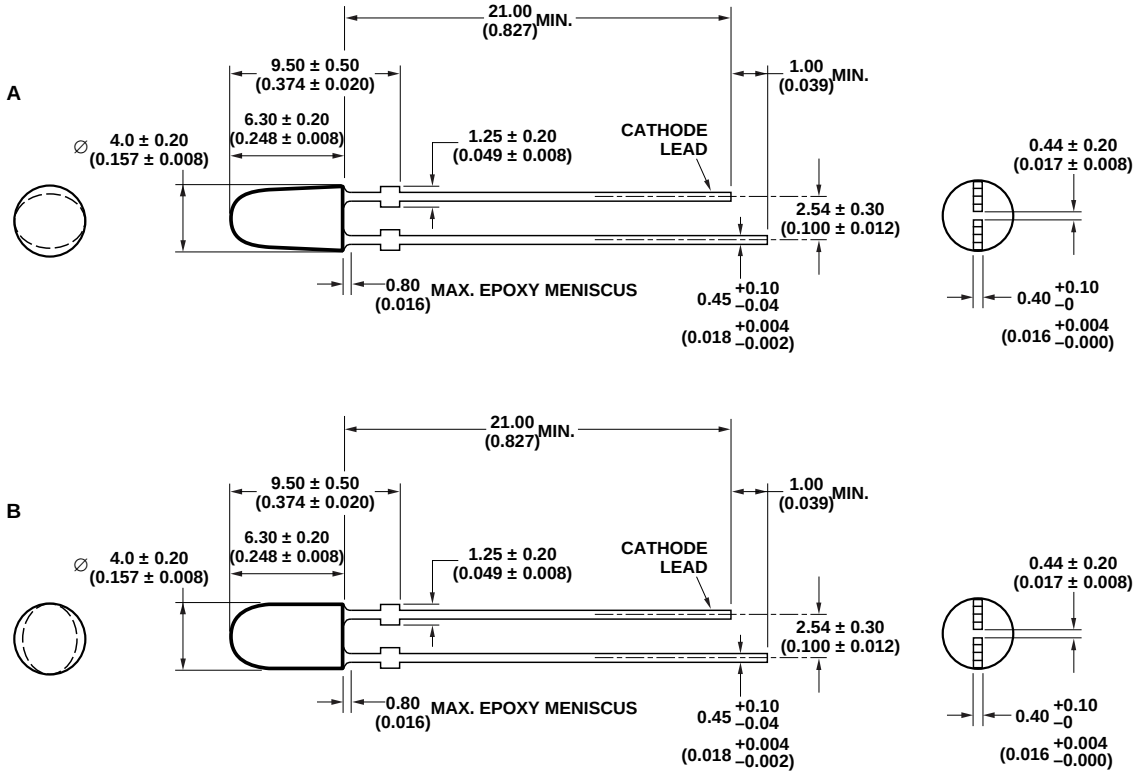
Selection Guide for AlInGaP II

Part Number	Color and Dominant Wavelength λ_d (nm) Typ.	Luminous Intensity, I_v (mcd) Min.	Leads with Stand-Offs	Leadframe Orientation	Package Drawing
HLMP-SL11-H0000	Amber 592	180	Yes	Perpendicular	A
HLMP-RL11-H0000	Amber 592	180	Yes	Parallel	B
HLMP-SD11-J0000	Red 630	240	Yes	Perpendicular	A
HLMP-RD11-J0000	Red 630	240	Yes	Parallel	B

Selection Guide for InGaN

Part Number	Color and Dominant Wavelength λ_d (nm) Typ.	Luminous Intensity, I_v (mcd) Min.	Leads with Stand-Offs	Leadframe Orientation	Package Drawing
HLMP-RB11-D0000	Blue 472	65	Yes	Parallel	B
HLMP-RB11-H0000	Blue 472	180	Yes	Parallel	B
HLMP-RM11-H0000	Green 526	180	Yes	Parallel	B
HLMP-RM11-M0000	Green 526	520	Yes	Parallel	B

Package Dimensions



DIMENSIONS ARE IN MILLIMETERS (INCHES).

Absolute Maximum Ratings at $T_A = 25^\circ C$

Parameter	Blue and Green	Red and Amber
DC Forward Current[1]	30 mA	50 mA
Peak Pulsed Forward Current	100 mA	100 mA
Average Forward Current	30 mA	30 mA
Reverse Voltage (I_R = 100 μA)	5 V	5 V
Power Dissipation	120 mW	120 mW
LED Junction Temperature	100°C	110°C
Operating Temperature Range	–40°C to +80°C	–40°C to +100°C
Storage Temperature Range	–40°C to +100°C	–40°C to +120°C
Wave Soldering Temperature	250°C for 3 sec.	250°C for 3 sec.

Note:
1. Derate linearly as shown in Figure 6 and 7.

Electrical / Optical Characteristics at $T_A = 25^\circ C$

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Typical Viewing Angle						
Major	$2\theta_{1/2}$		120		deg	
Minor			60			
Forward Voltage	V_F					I_F = 20 mA
Amber (λ_d = 592 nm)			2.15	2.5	V	
Red (λ_d = 630 nm)			2.00	2.5		
Blue (λ_d = 472 nm)			3.5	4.0		
Green (λ_d = 526 nm)			3.5	4.0		
Reverse Voltage						
Amber, Red	V_R	5	20		V	I_R = 100 μA
Blue, Green		5	—			I_R = 10 μA
Peak Wavelength						Peak of Wavelength
Amber (λ_d = 592 nm)	λ_{peak}		594		nm	of Spectral Distribution
Red (λ_d = 630 nm)			639			at I_F = 20 mA
Blue (λ_d = 472 nm)			470			
Green (λ_d = 526 nm)			524			
Spectral Halfwidth						Wavelength Width
Amber (λ_d = 592 nm)	$\Delta\lambda_{1/2}$		17		nm	at Spectral Distribution
Red (λ_d = 630 nm)			17			1/2 Power Point at
Blue (λ_d = 472 nm)			35			I_F = 20 mA
Green (λ_d = 526 nm)			47			
Capacitance						V_F = 0, F = 1 MHz
Amber, Red	C		40		pF	
Blue, Green			43			
Luminous Efficacy						Emitted Luminous
Amber (λ_d = 592 nm)	η_v		500		lm/W	Power / Emitted Radiant
Red (λ_d = 630 nm)			155			Power at I_F = 20 mA
Blue (λ_d = 472 nm)			75			
Green (λ_d = 526 nm)			520			
Thermal Resistance	$R\theta_{J\text{-}PIN}$		240		°C/W	LED Junction-to-Cathode Lead

Notes:
1. $2\theta_{1/2}$ is the off-axis angle where the luminous intensity is 1/2 the on-axis intensity.
2. 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.
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. The dominant wavelength λ_d is derived from the CIE Chromaticity Diagram and represents the color of the lamp.

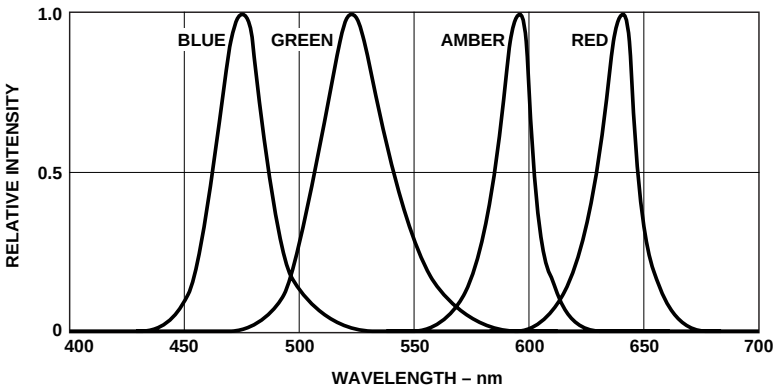


Figure 1. Relative intensity vs. wavelength.

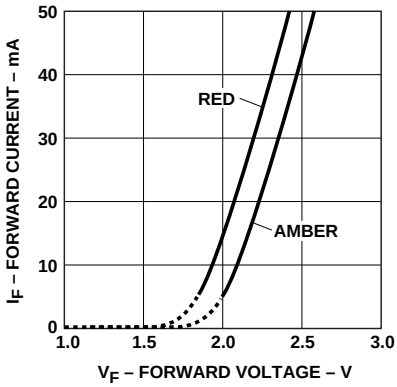


Figure 2. Amber, red forward current vs. forward voltage.

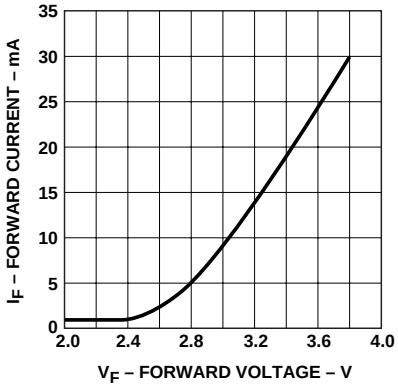


Figure 3. Blue, green forward current vs. forward voltage.

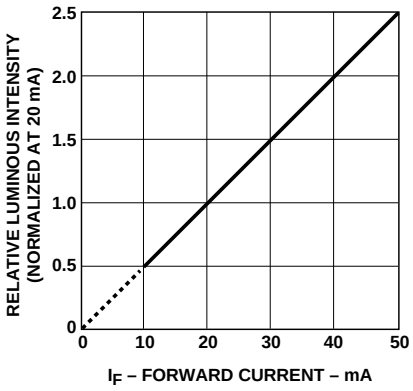


Figure 4. Amber, red relative luminous intensity vs. forward current.

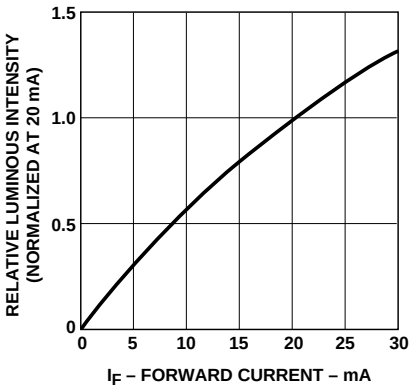


Figure 5. Blue, green relative luminous intensity vs. forward current.

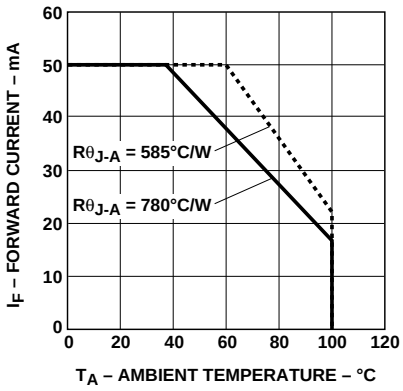


Figure 6. Amber, red maximum forward current vs. ambient temperature.

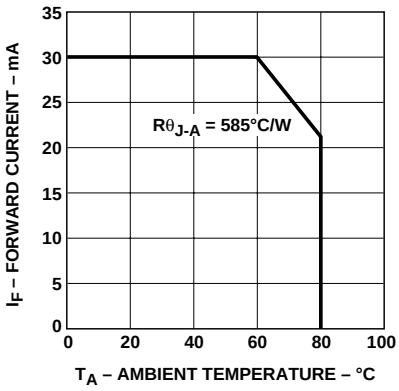


Figure 7. Blue, green maximum forward current vs. ambient temperature.

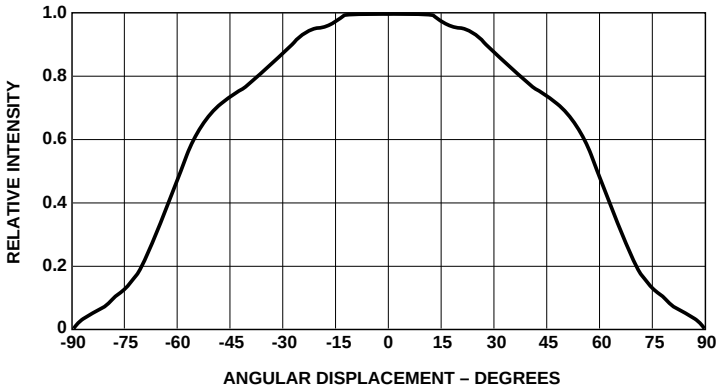


Figure 8a. Representative spatial radiation pattern for major axis.

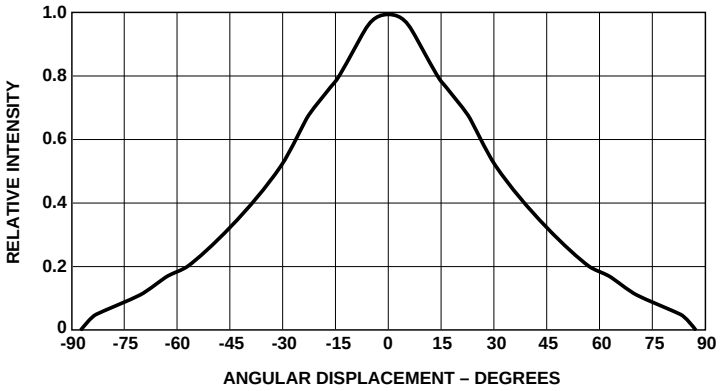


Figure 8b. Representative spatial radiation pattern for minor axis.

Intensity Bin Limits (mcd at 20 mA)

Bin Name	Min.	Max.	Bin Name	Min.	Max.
D	65	85	J	240	310
E	85	110	K	310	400
F	110	140	L	400	520
G	140	180	M	520	680
H	180	240			

Tolerance for each bin limit is ± 15%.

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

Color Bin Limits (nm at 20 mA)

Blue

	Color Range (nm)	
Bin ID	Min.	Max.
1	460.0	464.0
2	464.0	468.0
3	468.0	472.0
4	472.0	476.0
5	476.0	480.0

Tolerance for each bin limit is ± 2 nm.

Green

	Color Range (nm)	
Bin ID	Min.	Max.
1	520.0	524.0
2	524.0	528.0
3	528.0	532.0
4	532.0	536.0
5	536.0	540.0

Tolerance for each bin limit is ± 0.5 nm.

Amber

	Color Range (nm)	
Bin ID	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. All bin categories are established for classification of products. Products may not be available in all bin categories. Please contact your Avago representatives for further information.

For product information and a complete list of distributors, please go to our website: **www.avagotech.com**

5988-7311EN July 3, 2006

AVAGO TECHNOLOGIES