HLMP-LB11/HLMP-LM11

4 mm Precision Optical Performance InGaN Standard Oval LED Lamps

Data Sheet

Description

These Precision Optical Performance Oval LEDs are specifically designed for full color/video and passenger information signs. The oval shaped radiation pattern and high luminous intensity ensure that this device is excellent for wide field of view outdoor applications where a wide viewing angle and readability in sunlight are essential. This lamp has 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 material is used in this lamp: Indium Gallium Nitride 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.

Features

- **Well defined spatial radiation pattern**
- **High brightness material**
  - **Blue InGaN 470 nm**
  - **Green InGaN 525 nm**

Applications

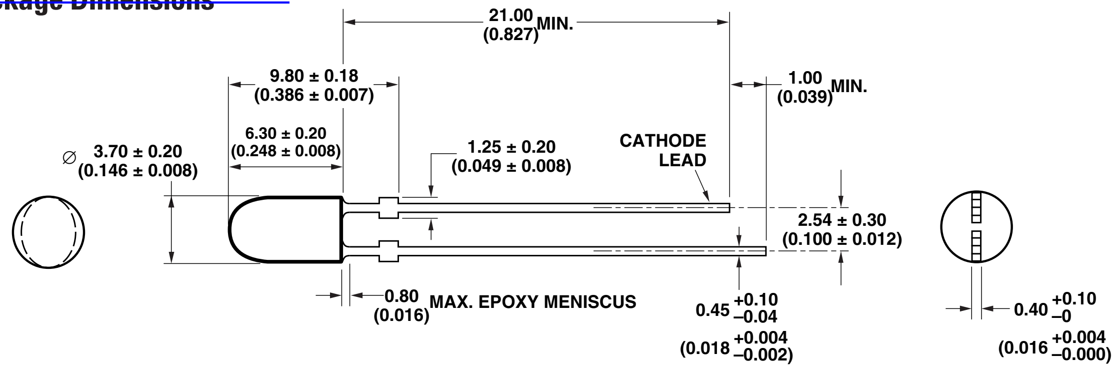
- **Full color signs**
- **Commercial outdoor advertising**

Benefits

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

CAUTION: Devises are Class I ESD sensitive. Please observe appropriate precautions during handling and processing. Refer to Application Note AN-1142 for additional details.

Package Dimensions



NOTES:
1. DIMENSIONS IN MILLIMETERS (INCHES).
2. TOLERANCE ± 0.1 mm UNLESS OTHERWISE NOTED.

Device Selection Guide

Part Number	Color and Dominant Wavelength λ_d (nm) Typ.	Luminous Intensity Iv (mcd) at 20 mA Min.	Luminous Intensity Iv (mcd) at 20 mA Max.	Tinting Type
HLMP-LB11-FJ0xx	Blue 470	110	310	Blue
HLMP-LB11-HJCxx	Blue 470	180	310	Blue
HLMP-LB11-HL0xx	Blue 470	180	520	Blue
HLMP-LB11-JKCxx	Blue 470	240	400	Blue
HLMP-LB11-KN0xx	Blue 470	310	880	Blue
HLMP-LM11-LP0xx	Green 525	400	1150	Green
HLMP-LM11-MNCxx	Green 525	520	880	Green
HLMP-LM11-NR0xx	Green 525	680	1900	Green
HLMP-LM11-PQCxx	Green 525	880	1500	Green
HLMP-LM11-QRCxx	Green 525	1150	1900	Green
HLMP-LM11-QT0xx	Green 525	1150	3200	Green

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 Chromaticity Diagram and represents the color of the lamp.
4. Tolerance for intensity limit is ±15%.

Part Numbering System

HLMP-X X 11 – X X X XX

Mechanical Options
00: Bulk Packaging
DD: Ammo Pack
ZZ: Flexi-bin, Ammo Pack

Color Bin Selections
0: No color bin limitation

Maximum Intensity Bin
0: No Iv bin limitation

Minimum Intensity Bin
Refer to Device Selection Guide

Color
B: 470 nm Blue
M: 525 nm Green

Package
L: 4 mm Standard Oval

Absolute Maximum Ratings at $T_A = 25°C$

Parameter	Value
DC Forward Current[1]	30 mA
Peak Pulsed Forward Current[2]	100 mA
Power Dissipation	130 mW
Reverse Voltage	5 V (I_R = 10 µA)
LED Junction Temperature	130°C
Operating Temperature Range	–40°C to +80°C
Storage Temperature Range	–40°C to +100°C

Notes:
1. Derate linearly as shown in Figure 3.
2. Duty Factor 10%, Frequency 1 kHz.

Electrical / Optical Characteristics Table
$T_A = 25°C$

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage						
Blue (λ_d = 470 nm)	V_F		3.8	4.0	V	I_F = 20 mA
Green (λ_d = 525 nm)			3.8	4.0		
Reverse Voltage	V_R	5			V	I_R = 10 µA
Capacitance						
Blue (λ_d = 470 nm)	C		43		pF	V_F = 0, f = 1 MHz
Green (λ_d = 525 nm)			43			
Thermal Resistance	$R\theta_{J\text{-}PIN}$		240		°C/W	LED Junction-to-Cathode Lead
Peak Wavelength						
Blue (λ_d = 470 nm)	λ_P		467		nm	Peak of Wavelength of Spectral
Green (λ_d = 525 nm)			520			Distribution at I_F = 20 mA
Spectral Halfwidth						
Blue (λ_d = 470 nm)	$\Delta\lambda_{1/2}$		24		nm	Wavelength Width at Spectral
Green (λ_d = 525 nm)			35			Distribution Power Point at I_F = 20 mA
Luminous Efficacy						
Blue (λ_d = 470 nm)	η_v		75		lm/W	Emitted luminous power/Emitted
Green (λ_d = 525 nm)			520			radiant power

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, Ie in watts per steradian, may be found from the equation $I_e = I_v/\eta_v$ where Iv is the luminous intensity in candelas and η_v is the luminous efficacy in lumens/watt.

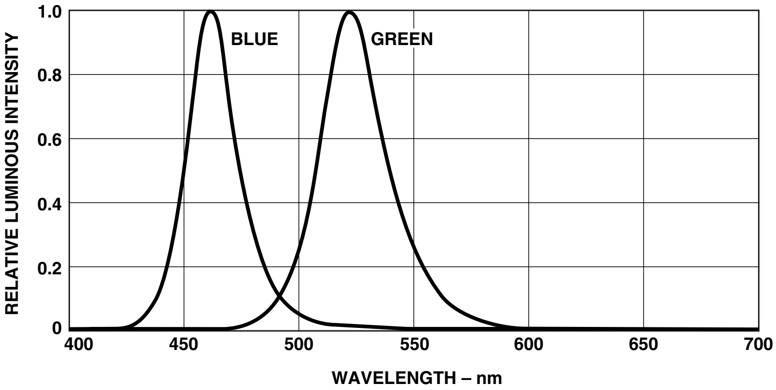


Figure 1. Relative intensity vs. wavelength.

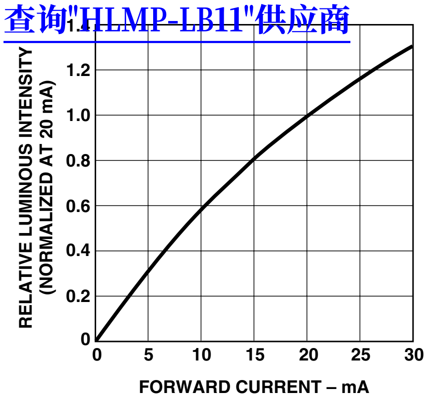


Figure 2. Relative luminous intensity vs. forward current.

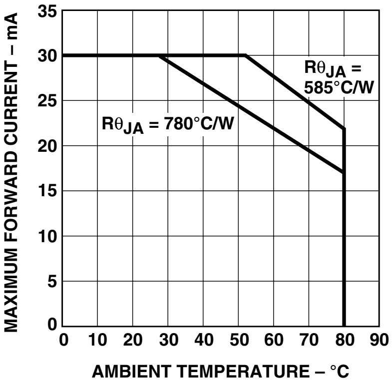


Figure 3. Forward current vs. ambient temperature.

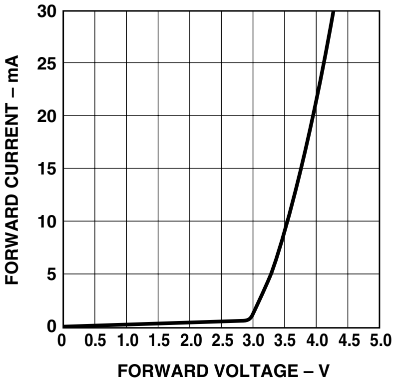


Figure 4. Forward current vs. forward voltage.

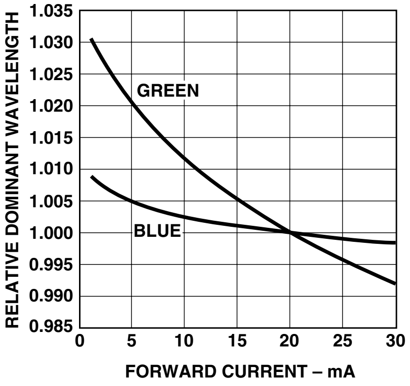


Figure 5. Relative dominant wavelength vs. forward current.

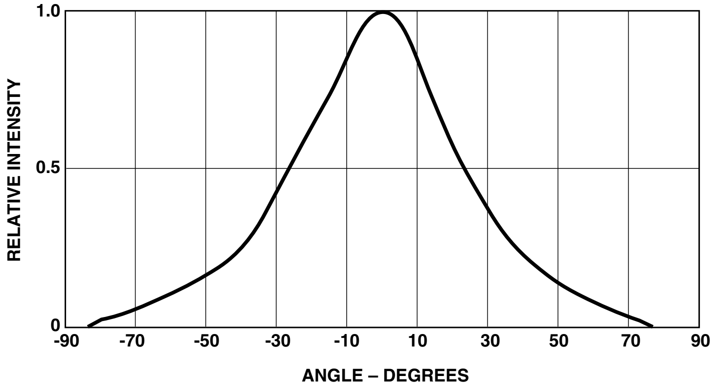


Figure 6. Spatial radiation pattern – minor axis.

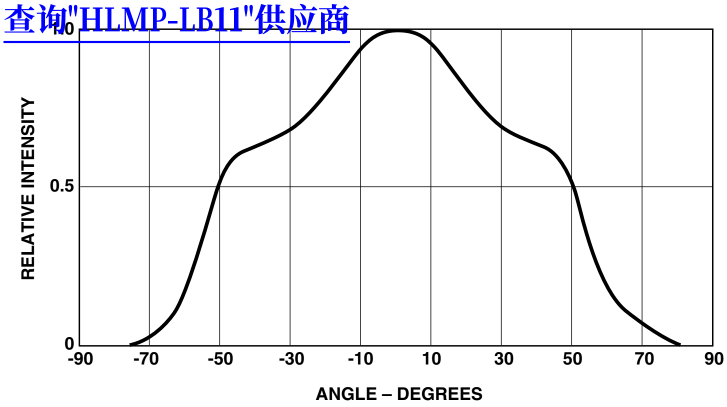


Figure 7. Spatial radiation pattern – major axis.

Intensity Bin Limits (mcd @ 20 mA)

Bin Name	Min.	Max.
F	110	140
G	140	180
H	180	240
J	240	310
K	310	400
L	400	520
M	520	680
N	680	880
P	880	1150
Q	1150	1500
R	1500	1900

Tolerance for each intensity bin limit is ±15%.

Color Bin Limits (nm at 20 mA)

Blue	Color Range (nm)	
Bin	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 ± 0.5 nm.

Green	Color Range (nm)	
Bin	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.

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.

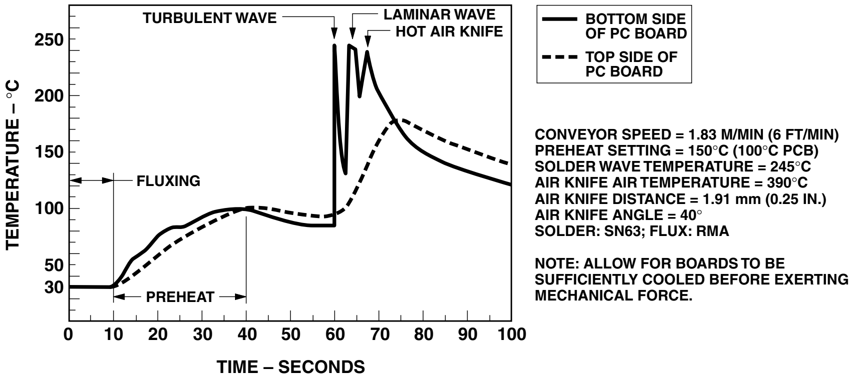


Figure 8. Recommended wave soldering profile.

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