

# Agilent HLMP-HB55/HLMP-HM55/ HLMP-HB54/HLMP-HM54 5 mm Precision Optical Performance InGaN 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. These lamps are available in two package options (standoff and without standoff) to give designer flexibility with device mounting.

## Features

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

## Applications

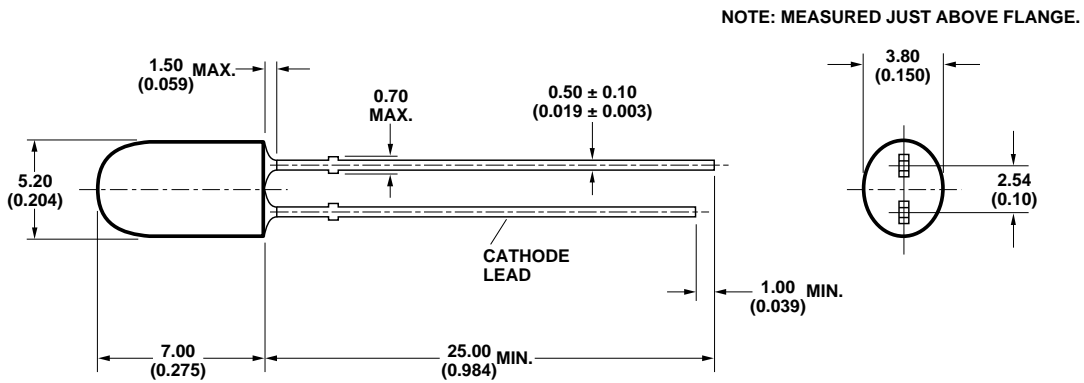
- Full color signs
- Commercial outdoor advertising

## Benefits

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

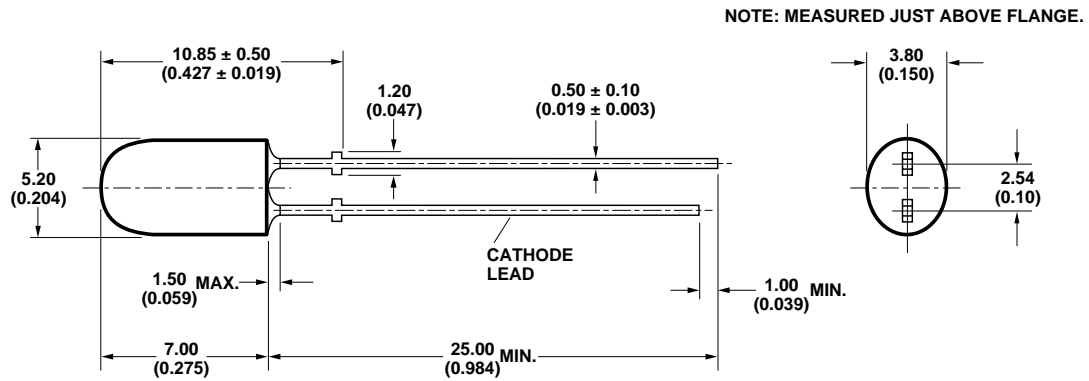


Package Dimensions  
 Package Drawing A



- NOTES:  
 1. DIMENSIONS IN MILLIMETERS (INCHES).  
 2. TOLERANCE ± 0.25 mm UNLESS OTHERWISE NOTED.

Package Drawing B



- NOTES:  
 1. DIMENSIONS IN MILLIMETERS (INCHES).  
 2. TOLERANCE ± 0.25 mm UNLESS OTHERWISE NOTED.

## Device Selection Guide

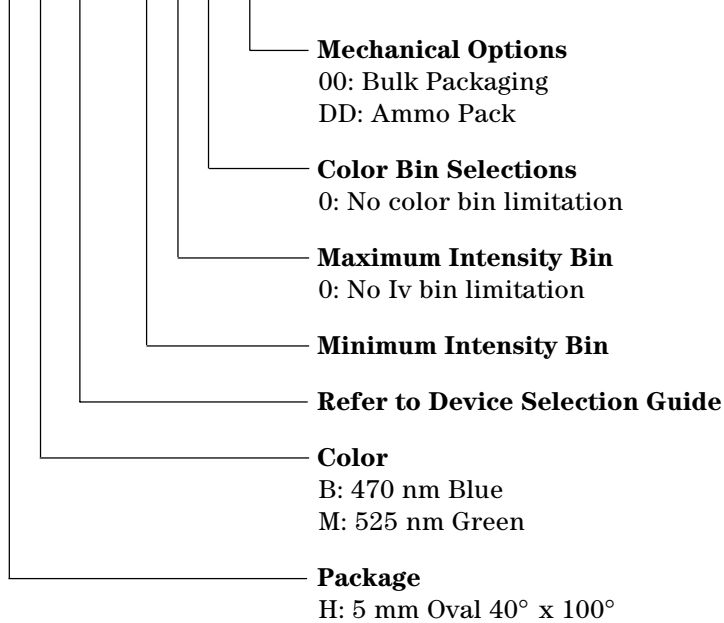
Part Number	Color and Dominant Wavelength $\lambda_d$ (nm) Typ.	Luminous Intensity $I_v$ (mcd) at 20 mA Min.	Luminous Intensity $I_v$ (mcd) at 20 mA Max.	Leads with Standoff	Package Drawing	Tinting Type
HLMP-HB54-FJ0xx	Blue 470	110	310	No	A	Blue
HLMP-HB55-HJCxx	Blue 470	180	310	Yes	B	Blue
HLMP-HB55-JKCxx	Blue 470	240	400	Yes	B	Blue
HLMP-HM54-MQ0xx	Green 525	520	1500	No	A	Green
HLMP-HM55-MQ0xx	Green 525	520	1500	Yes	B	Green
HLMP-HM55-NPCxx	Green 525	680	1150	Yes	B	Green
HLMP-HM55-PQCxx	Green 525	880	1500	Yes	B	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,  $\lambda_d$ , is derived from the Chromaticity Diagram and represents the color of the lamp.

## Part Numbering System

HLMP-X X XX - X X X XX



### Absolute Maximum Ratings at T<sub>A</sub> = 25°C

Parameter	Value
DC Forward Current <sup>[1]</sup>	30 mA
Peak Pulsed Forward Current <sup>[2]</sup>	100 mA
Power Dissipation	130 mW
Reverse Voltage	5 V (I <sub>R</sub> = 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 1kHz

### Electrical /Optical Characteristics Table

T<sub>A</sub> = 25°C

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage						
Blue (λ <sub>d</sub> = 470 nm)	V <sub>F</sub>		3.8	4.0	V	I <sub>F</sub> = 20 mA
Green (λ <sub>d</sub> = 525 nm)			3.8	4.0		
Reverse Voltage	V <sub>R</sub>	5				I <sub>R</sub> = 10 μA
Capacitance						
Blue (λ <sub>d</sub> = 470 nm)	C		40		pF	V <sub>F</sub> = 0, f = 1 MHz
Green (λ <sub>d</sub> = 525 nm)						
Thermal Resistance	R <sub>θJ-PIN</sub>		240		°C/W	LED Junction-to-Cathode Lead
Viewing Angle						
Major Axis	2θ <sub>1/2</sub>		100		deg	
Minor Axis			40			
Peak Wavelength						
Blue (λ <sub>d</sub> = 470 nm)	λ <sub>P</sub>		467		nm	Peak of Wavelength of Spectral Distribution at I <sub>F</sub> = 20 mA
Green (λ <sub>d</sub> = 525 nm)			520			
Spectral Halfwidth						
Blue (λ <sub>d</sub> = 470 nm)	Δλ <sub>1/2</sub>		24		nm	Wavelength Width at Spectral Distribution Power Point at I <sub>F</sub> = 20 mA
Green (λ <sub>d</sub> = 525 nm)			35			
Luminous Efficacy						
Blue (λ <sub>d</sub> = 470 nm)	η <sub>v</sub>		75		lm/W	Emitted luminous power/Emitted radiant power
Green (λ <sub>d</sub> = 525 nm)			520			

**Notes:**

1. 2θ<sub>1/2</sub> is the off-axis angle where the luminous intensity is 1/2 the on axis intensity.
2. The radiant intensity, I<sub>e</sub> in watts per steradian, may be found from the equation I<sub>e</sub> = I<sub>v</sub>/η<sub>v</sub> where I<sub>v</sub> is the luminous intensity in candelas and η<sub>v</sub> is the luminous efficacy in lumens/watt.

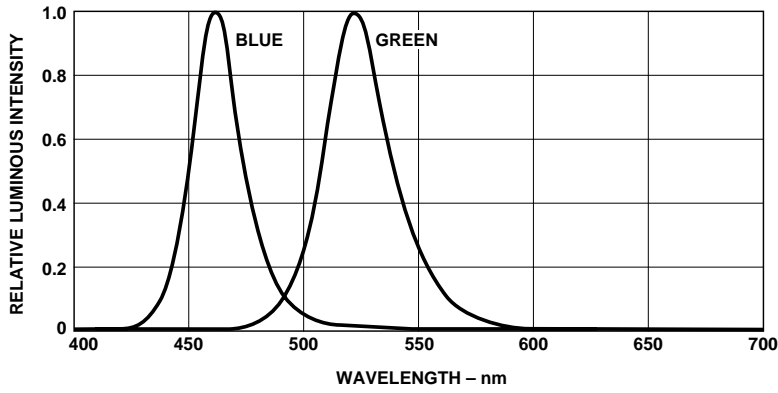


Figure 1. Relative intensity vs. wavelength.

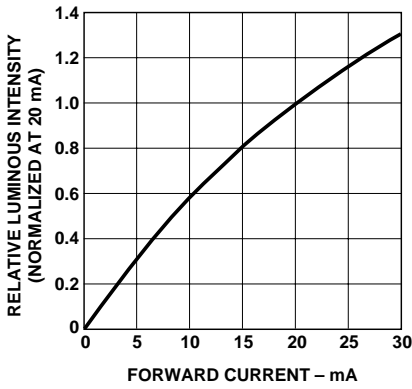


Figure 2. Relative luminous intensity vs. forward current.

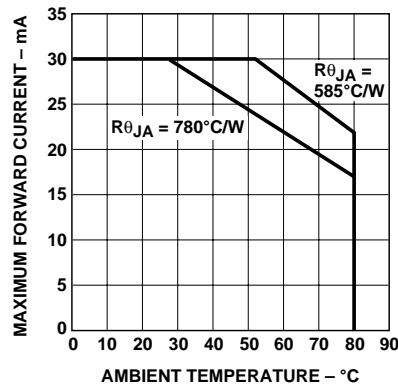


Figure 3. Forward current vs. ambient temperature.

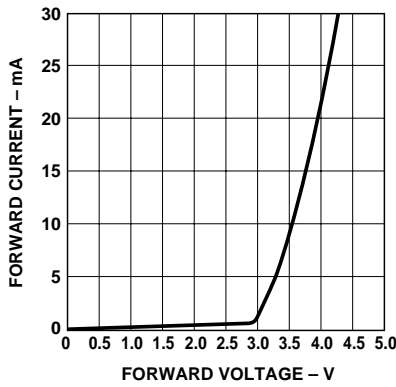


Figure 4. Forward current vs. forward voltage.

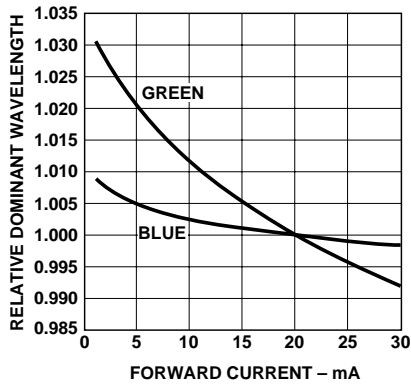


Figure 5. Relative dominant wavelength vs. forward current.

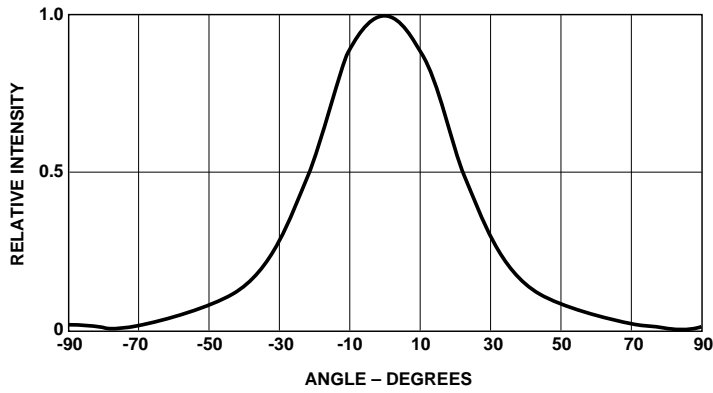


Figure 6. Spatial radiation pattern – minor axis.

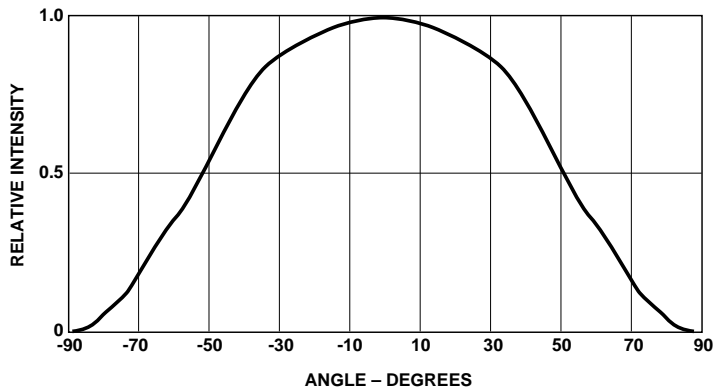


Figure 7. Spatial radiation pattern – major axis.

**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 will be  $\pm 15\%$  of these limits.

**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  $\pm 0.5$  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  $\pm 0.5$  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.

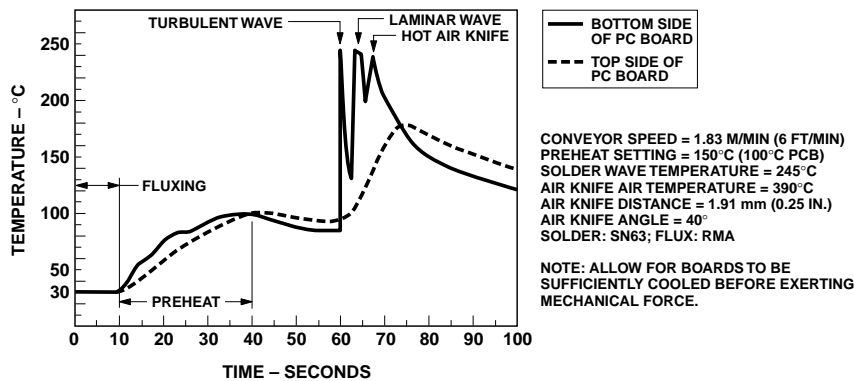


Figure 8. Recommended wave soldering profile.

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