

Agilent HLMP-AD85, HLMP-AD87, HLMP-AM86, HLMP-AM87, HLMP-AB86, HLMP-AB87 5mm Mini Oval Precision Optical Performance Red, Blue and Green LEDs. 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 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 material is used in these lamps: Aluminium Indium Gallium Phosphide (AlInGaP) for red and Indium Gallium Nitride (InGaN) for blue and green. Each lamp is made with an advance optical grade epoxy offering superior high temperature and high moisture resistance in outdoor applications.

Features

- Well defined spatial radiation pattern
- High brightness material
- Available in red, green and blue color.
- Superior resistance to moisture

Benefits

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

Applications

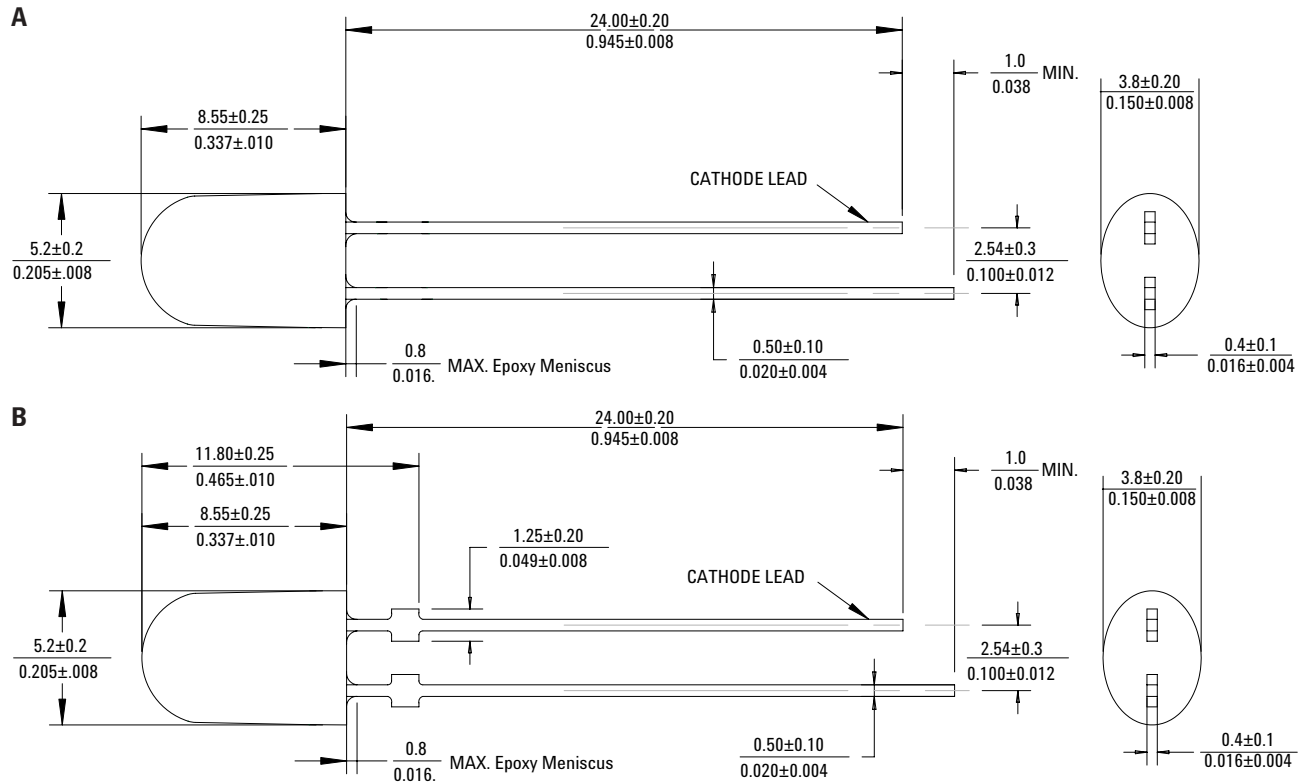
- Full color signs
- Commercial outdoor advertising

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



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Package Dimensions



NOTES:

DIMENSIONS IN MILLIMETERS (INCHES).

FOR BLUE AND GREEN, IF HEAT-SINKING APPLICATION IS REQUIRED, THE TERMINAL FOR HEAT SINK IS ANODE.

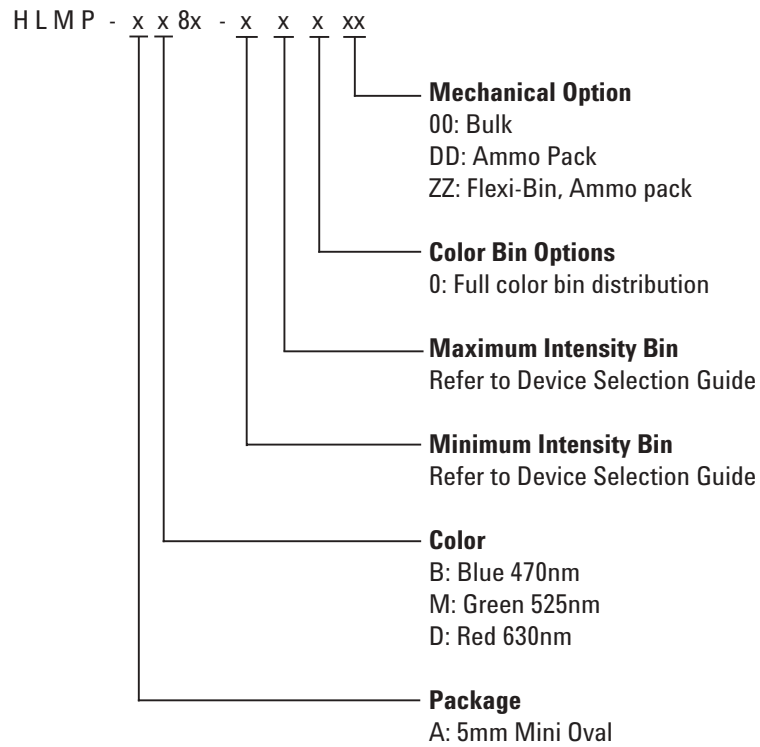
Device Selection Guide

| Part Number | Color | Typ. Dominant Wavelength λ_d (nm) | Luminous Intensity I_v (cd) at 20mA | | Lens Type | Standoffs | Package Drawing |
|-----------------|-------|---|---------------------------------------|------|------------------|-----------|-----------------|
| | | | Min. | Max. | | | |
| HLMP-AD85-RU0xx | Red | 630 | 1.50 | 4.20 | Tinted, diffused | No | A |
| HLMP-AD87-RU0xx | Red | 630 | 1.50 | 4.20 | Tinted, diffused | Yes | B |
| HLMP-AM86-TW0xx | Green | 525 | 2.50 | 7.20 | Tinted, diffused | No | A |
| HLMP-AM87-TW0xx | Green | 525 | 2.50 | 7.20 | Tinted, diffused | Yes | B |
| HLMP-AB86-MQ0xx | Blue | 470 | 0.52 | 1.50 | Tinted, diffused | No | A |
| HLMP-AB87-MQ0xx | Blue | 470 | 0.52 | 1.50 | Tinted, diffused | Yes | B |

Notes:

1. Tolerance for luminous intensity measurement is $\pm 15\%$
2. The luminous intensity is measured on the mechanical axis of the lamp package.
3. The optical axis is closely aligned with the package mechanical axis.
4. The dominant wavelength λ_d is derived from the Chromaticity Diagram and represents the color of the lamp.
5. LED light output is bright enough to cause injuries to the eyes. Precautions must be taken to prevent looking directly at the LED without proper safety equipment.

Part Numbering System



Absolute Maximum Rating at $T_A = 25^\circ\text{C}$

| Parameters | Blue and Green | Red | Unit |
|---|--------------------|--------------------|------|
| DC forward current ^[1] | 30 | 50 | mA |
| Peak pulsed forward current | 100 ^[2] | 100 ^[3] | mA |
| Average forward current | 30 | 30 | mA |
| Power dissipation | 120 | 140 | mW |
| LED junction temperature | 110 | 130 | °C |
| Operating temperature range | -40 to +85 | -40 to +100 | °C |
| Storage temperature range | -40 to +100 | -40 to +120 | °C |
| Wave soldering temperature ^[4] | 250 for 3 seconds | | °C |

Notes:

- Derate linearly as shown in figure 3 and figure 7.
- Duty factor 10%, frequency 1KHz.
- Duty factor 30%, frequency 1KHz.
- 1.59 mm (0.06 inch) below body.

Electrical/Optical Characteristics $T_A = 25^\circ\text{C}$

| Parameters | Symbol | Value | | | Units | Test Condition |
|--------------------------------------|-----------------------|-------|------|------|---------------------------|--|
| | | Min. | Typ. | Max. | | |
| Forward voltage | V_F | | | | V | $I_F = 20 \text{ mA}$ |
| Red | | | 2.20 | 2.40 | | |
| Green | | | 3.60 | 4.00 | | |
| Blue | | | 3.50 | 4.00 | | |
| Reverse Voltage ^[1] | V_R | | | | V | |
| Red | | 5.0 | | | | $I_R = 100 \mu\text{A}$ |
| Green | | 5.0 | | | | $I_R = 10 \mu\text{A}$ |
| Blue | | 5.0 | | | | $I_R = 10 \mu\text{A}$ |
| Thermal resistance ^[2] | $R\theta_{J-PIN}$ | | 240 | | $^\circ\text{C}/\text{W}$ | |
| Dominant wavelength ^[3,4] | λ_d | | | | nm | $I_F = 20 \text{ mA}$ |
| Red | | 622 | 630 | 634 | | |
| Green | | 520 | 525 | 540 | | |
| Blue | | 460 | 470 | 480 | | |
| Peak wavelength | λ_{PEAK} | | | | nm | Peak of wavelength of spectral distribution at $I_F = 20 \text{ mA}$ |
| Red | | | 639 | | | |
| Green | | | 516 | | | |
| Blue | | | 464 | | | |
| Spectral half width | $\Delta\lambda_{1/2}$ | | | | nm | Wavelength width at spectral distribution power point at $I_F = 20 \text{ mA}$ |
| Red | | | 17 | | | |
| Green | | | 32 | | | |
| Blue | | | 23 | | | |
| Luminous Efficacy ^[5] | η_v | | | | lm/W | Emitted luminous power/Emitted radiant power |
| Red | | | 155 | | | |
| Green | | | 484 | | | |
| Blue | | | 74 | | | |

Notes:

1. The reverse voltage of blue and green is equivalent to the forward voltage of the protective chip at $I_R = 10 \mu\text{A}$.
The reverse voltage of red is equivalent to the forward voltage of the protective chip at $I_R = 100 \mu\text{A}$.
2. For AlInGaP Red, the thermal resistance applied to LED junction to cathode lead. For InGaN Blue and Green, the thermal resistance applied to LED junction to anode lead.
3. The dominant wavelength λ_d is derived from the Chromaticity Diagram and represents the color of the lamp.
4. Tolerance for each color bin limit is $\pm 0.5 \text{ nm}$
5. The radiant intensity, I_e in watts/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.

AlInGaP Red 630nm

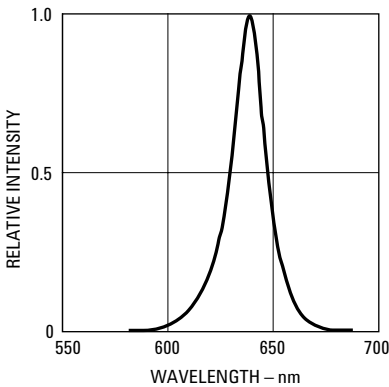


Figure 1. Relative intensity vs. wavelength

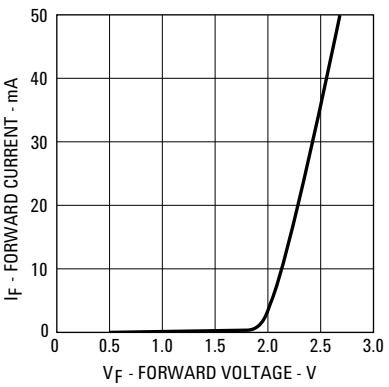


Figure 2. Forward current vs. forward voltage

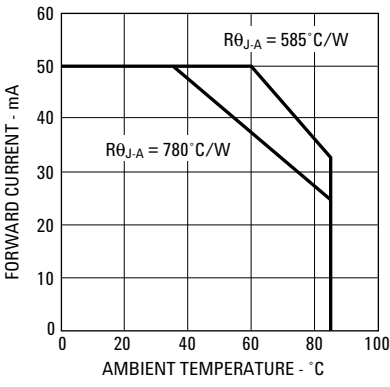


Figure 3. Forward current vs. ambient temperature

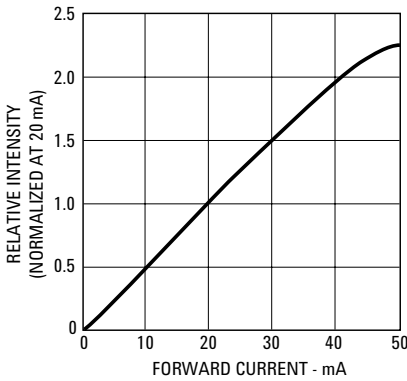


Figure 4. Relative luminous intensity vs. forward current

InGaN Blue and Green

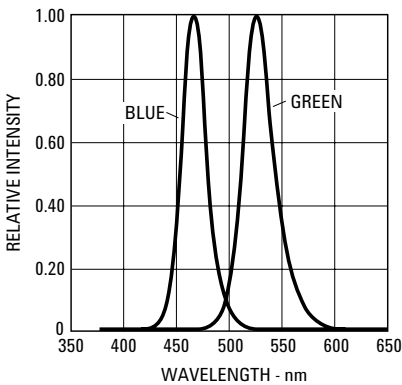


Figure 5. Relative Intensity vs. Wavelength

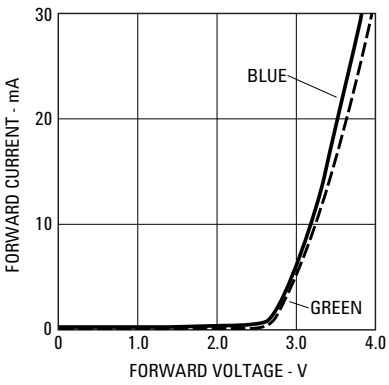


Figure 6. Forward current vs. forward voltage.

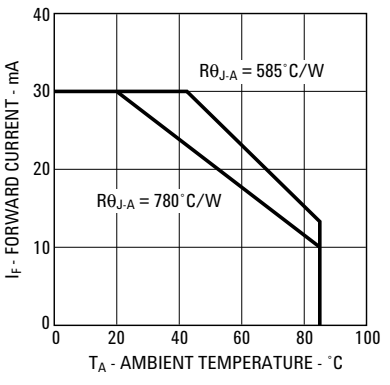


Figure 7. Forward Current vs. Ambient Temperature.

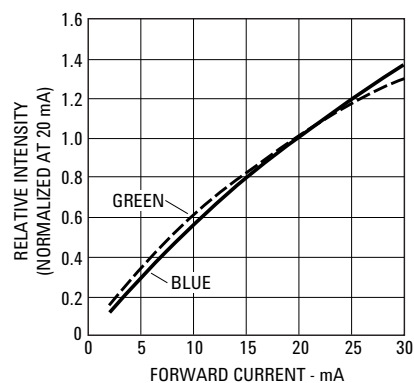


Figure 8. Relative intensity vs. forward current

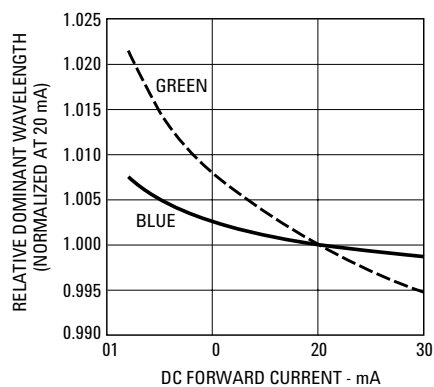


Figure 9. Relative dominant wavelength vs. DC forward current

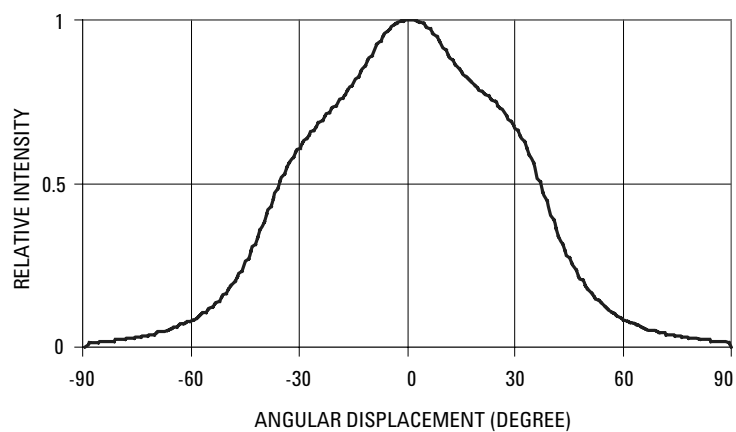


Figure 10. Spatial radiation pattern for RGB – major axis

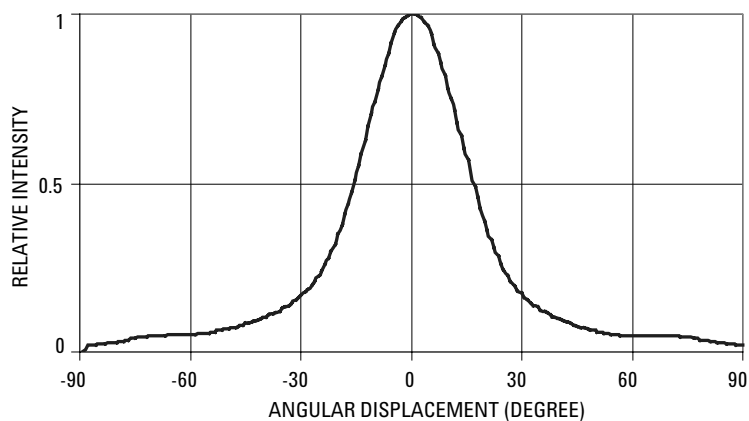


Figure 11. Spatial radiation pattern for RGB – minor axis

Intensity Bin Limit Table

| Bin | Intensity (mcd) at 20 mA | |
|------------|---------------------------------|------------|
| | Min | Max |
| K | 310 | 400 |
| L | 400 | 520 |
| M | 520 | 680 |
| N | 680 | 880 |
| P | 880 | 1150 |
| Q | 1150 | 1500 |
| R | 1500 | 1900 |
| S | 1900 | 2500 |
| T | 2500 | 3200 |
| U | 3200 | 4200 |
| V | 4200 | 5500 |
| W | 5500 | 7200 |

Tolerance for each bin limit is $\pm 15\%$

Blue Color Bin Table

| Bin | Min Dom | Max Dom | Xmin | Ymin | Xmax | Ymax |
|------------|----------------|----------------|-------------|-------------|-------------|-------------|
| 1 | 460.0 | 464.0 | 0.1440 | 0.0297 | 0.1766 | 0.0966 |
| | | | 0.1818 | 0.0904 | 0.1374 | 0.0374 |
| 2 | 464.0 | 468.0 | 0.1374 | 0.0374 | 0.1699 | 0.1062 |
| | | | 0.1766 | 0.0966 | 0.1291 | 0.0495 |
| 3 | 468.0 | 472.0 | 0.1291 | 0.0495 | 0.1616 | 0.1209 |
| | | | 0.1699 | 0.1062 | 0.1187 | 0.0671 |
| 4 | 472.0 | 476.0 | 0.1187 | 0.0671 | 0.1517 | 0.1423 |
| | | | 0.1616 | 0.1209 | 0.1063 | 0.0945 |
| 5 | 476.0 | 480.0 | 0.1063 | 0.0945 | 0.1397 | 0.1728 |
| | | | 0.1517 | 0.1423 | 0.0913 | 0.1327 |

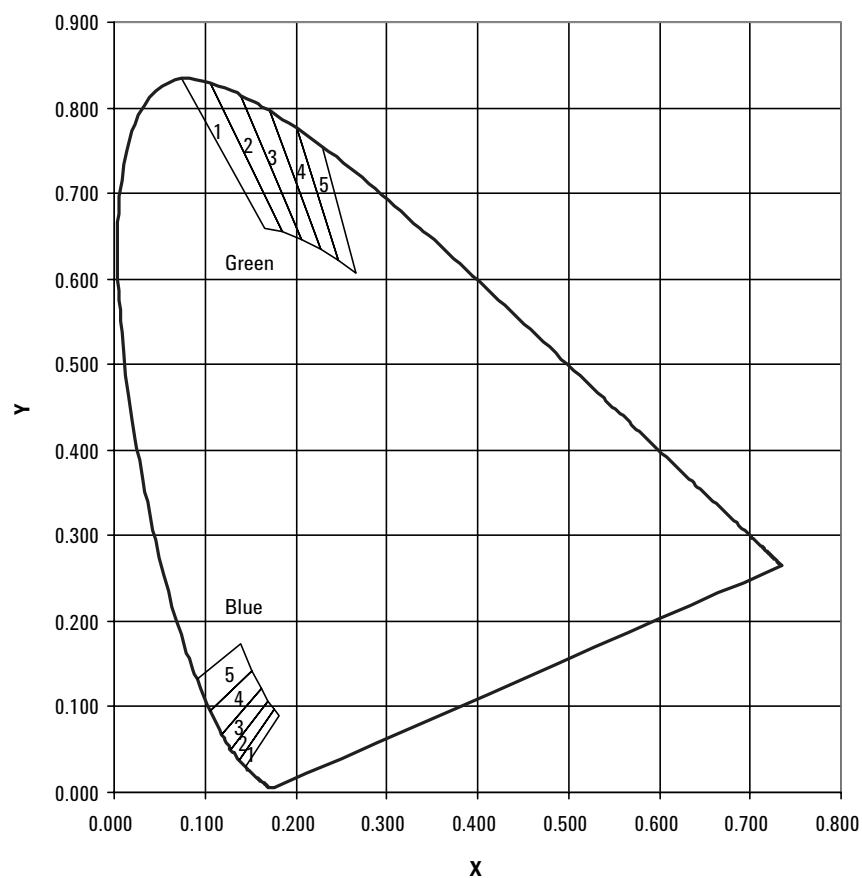
Tolerance for each bin limit is ± 0.5 nm

Green Color Bin Table

| Bin | Min Dom | Max Dom | Xmin | Ymin | Xmax | Ymax |
|------------|----------------|----------------|-------------|-------------|-------------|-------------|
| 1 | 520.0 | 524.0 | 0.0743 | 0.8338 | 0.1856 | 0.6556 |
| | | | 0.1650 | 0.6586 | 0.1060 | 0.8292 |
| 2 | 524.0 | 528.0 | 0.1060 | 0.8292 | 0.2068 | 0.6463 |
| | | | 0.1856 | 0.6556 | 0.1387 | 0.8148 |
| 3 | 528.0 | 532.0 | 0.1387 | 0.8148 | 0.2273 | 0.6344 |
| | | | 0.2068 | 0.6463 | 0.1702 | 0.7965 |
| 4 | 532.0 | 536.0 | 0.1702 | 0.7965 | 0.2469 | 0.6213 |
| | | | 0.2273 | 0.6344 | 0.2003 | 0.7764 |
| 5 | 536.0 | 540.0 | 0.2003 | 0.7764 | 0.2659 | 0.6070 |
| | | | 0.2469 | 0.6213 | 0.2296 | 0.7543 |

Tolerance for each bin limit is ± 0.5 nm

CIE 1931 - Chromaticity Diagram



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