

HLMP-NS31 and HLMP-NM31

T-1 (3mm) InGaN LED Lamps

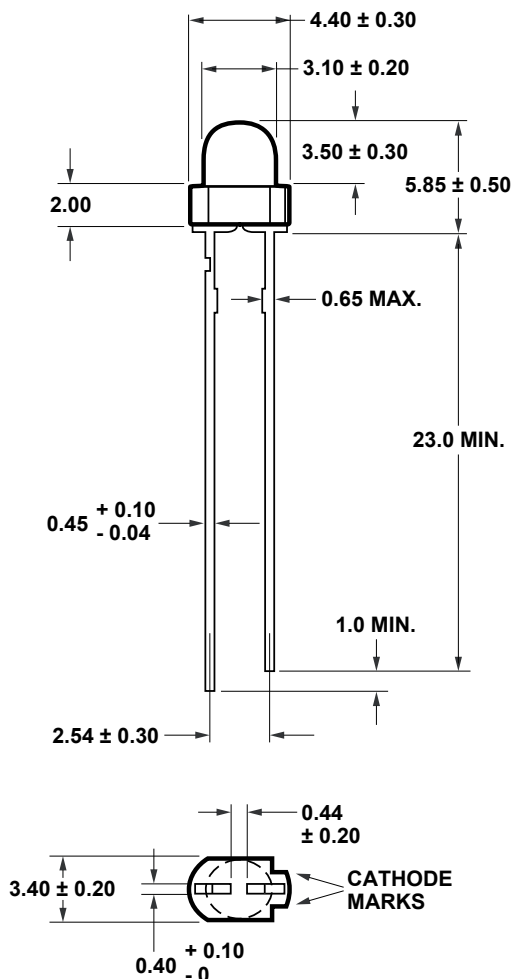


Data Sheet

Description

These InGaN lamps are designed in industry standard package with clear and non-diffused optics. These lamps are ideal for use as indicator and for general purpose lighting.

Package Dimensions



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).
2. EPOXY MENISCUS MAY EXTEND ABOUT 1 mm (0.040") DOWN THE LEADS.

Features

- General purpose LED
- Reliable and rugged
- Binned for color and intensity
- Bright InGaN dice

Applications

- Status indicator
- Small message panel
- Running and decorative lights for commercial use
- Back lighting
- Consumer audio

CAUTION: DEVICES ARE CLASS 1 ESD SENSITIVE. PLEASE OBSERVE APPROPRIATE PRECAUTIONS DURING HANDLING AND PROCESSING. REFER TO APPLICATION NOTE AN-1142 FOR ADDITIONAL DETAILS

Selection Guide

| Part Number | Color and Dominant Wavelength λ_d (nm) Typ. | Luminous Intensity, I_v (mcd) at 20 mA | | Viewing Angle, $2\theta_{1/2}$ (degree) | Tinting Type |
|-----------------|---|--|------|---|-------------------------|
| | | Min. | Typ. | | |
| HLMP-NS31-J00xx | Blue 470 | 240 | 600 | 30 | Un-tinted; non-diffused |
| HLMP-NM31-R00xx | Green 529 | 1500 | 2800 | | |

Notes:

1. The luminous intensity is measured on the mechanical axis of the lamp package
2. The tolerance for intensity limit is $\pm 15\%$
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.

Absolute Maximum Ratings, $T_A = 25^\circ\text{C}$

| Parameter | Blue /Green | Unit |
|---|-------------|------------------|
| DC Forward Current ^[1] | 30 | mA |
| Peak Forward Current | 100 | mA |
| Reverse Voltage ($I_R = 10\mu\text{A}$) | 5 | V |
| LED Junction Temperature | 115 | $^\circ\text{C}$ |
| Operating Temperature Range | -40 to +85 | $^\circ\text{C}$ |
| Storage Temperature Range | -40 to +85 | $^\circ\text{C}$ |

Notes:

1. Derate linearly as shown in Figure 5

Electrical/Optical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Units | Test Condition | |
|---------------------|-------------------------|------|------|------|---------------------------|-------------------------|---|
| Forward Voltage | V_F | 3.0 | 3.3 | 4.0 | V | $I_F = 20\text{ mA}$ | |
| Reverse Voltage | V_R | 5 | | | V | $I_R = 10\ \mu\text{A}$ | |
| Dominant wavelength | λ_d | NS31 | 460 | 470 | 480 | nm | $I_F = 20\text{ mA}$ |
| | | NM31 | 520 | 529 | 540 | | |
| Peak wavelength | λ_{peak} | NS31 | | 464 | | nm | Peak of wavelength of spectral distribution at $I_F = 20\text{ mA}$ |
| | | NM31 | | 519 | | | |
| Thermal Resistance | $R\theta_{J-PIN}$ | | 290 | | $^\circ\text{C}/\text{W}$ | | |

Notes:

1. The dominant wavelength λ_d is derived from the Chromaticity Diagram and represents the color of the lamp.
2. Tolerance for each color bin limit is $\pm 0.5\text{ nm}$

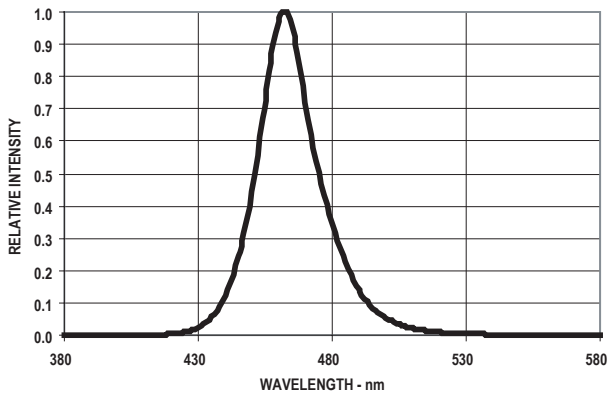


Figure 1. Relative Intensity vs wavelength for HLMP-NS31

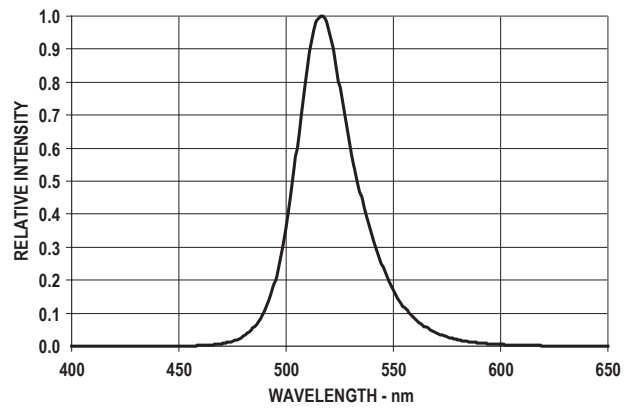


Figure 2. Relative Intensity vs wavelength for HLMP-NM31

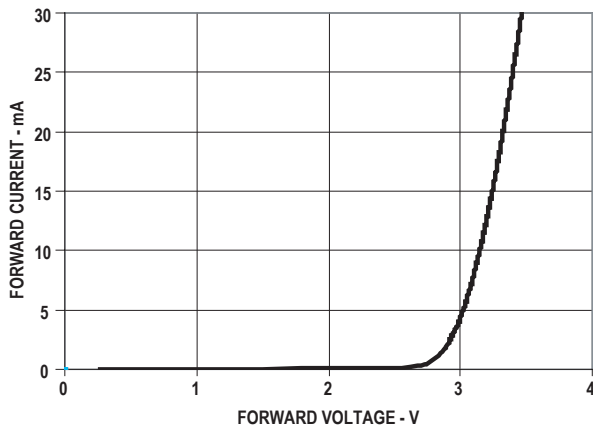


Figure 3. Forward Current vs Forward Voltage

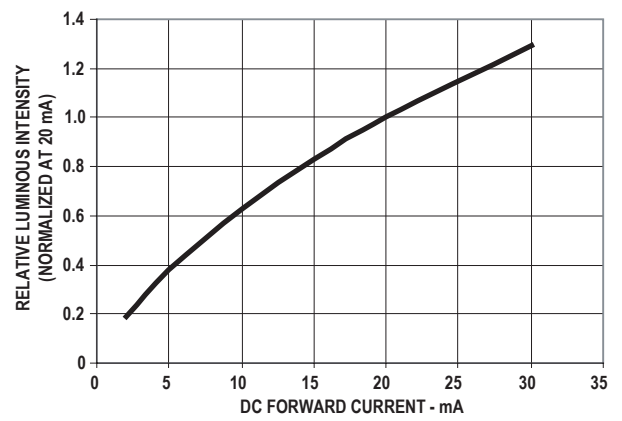


Figure 4. Relative Intensity vs Forward Current

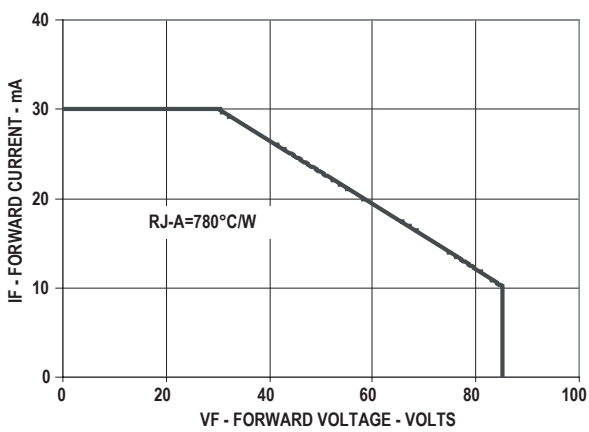


Figure 5. Maximum Forward current vs Ambient temperature based on $T_J=110^{\circ}\text{C}$

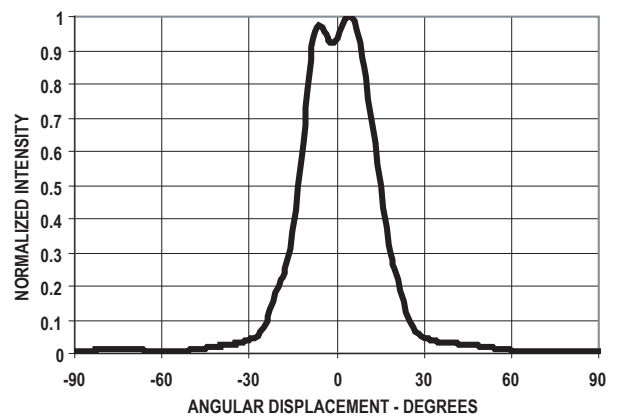


Figure 6. Radiation pattern

Intensity Bin Limit Table

| Bin | Intensity (mcd) at 20 mA | |
|-----|--------------------------|------|
| | Min | Max |
| J | 240 | 310 |
| 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 |

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

Blue Color Bin Limit Table

| Bin | Intensity (mcd) at 20 mA | |
|-----|--------------------------|-----|
| | Min | Max |
| 1 | 460 | 464 |
| 2 | 464 | 468 |
| 3 | 468 | 472 |
| 4 | 472 | 476 |
| 5 | 476 | 480 |

Tolerance for each bin limit is $\pm 0.5\text{nm}$

Green Color Bin Limit Table

| Bin | Dominant Wavelength (nm) at 20 mA | |
|-----|-----------------------------------|-----|
| | Min | Max |
| 1 | 520 | 524 |
| 2 | 524 | 528 |
| 3 | 528 | 532 |
| 4 | 532 | 536 |
| 5 | 536 | 540 |

Tolerance for each bin limit is $\pm 0.5\text{nm}$

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 attached and wirebond.
- It is recommended that tooling made to precisely form and cut the leads to length rather than rely upon hand operation.

Soldering Condition:

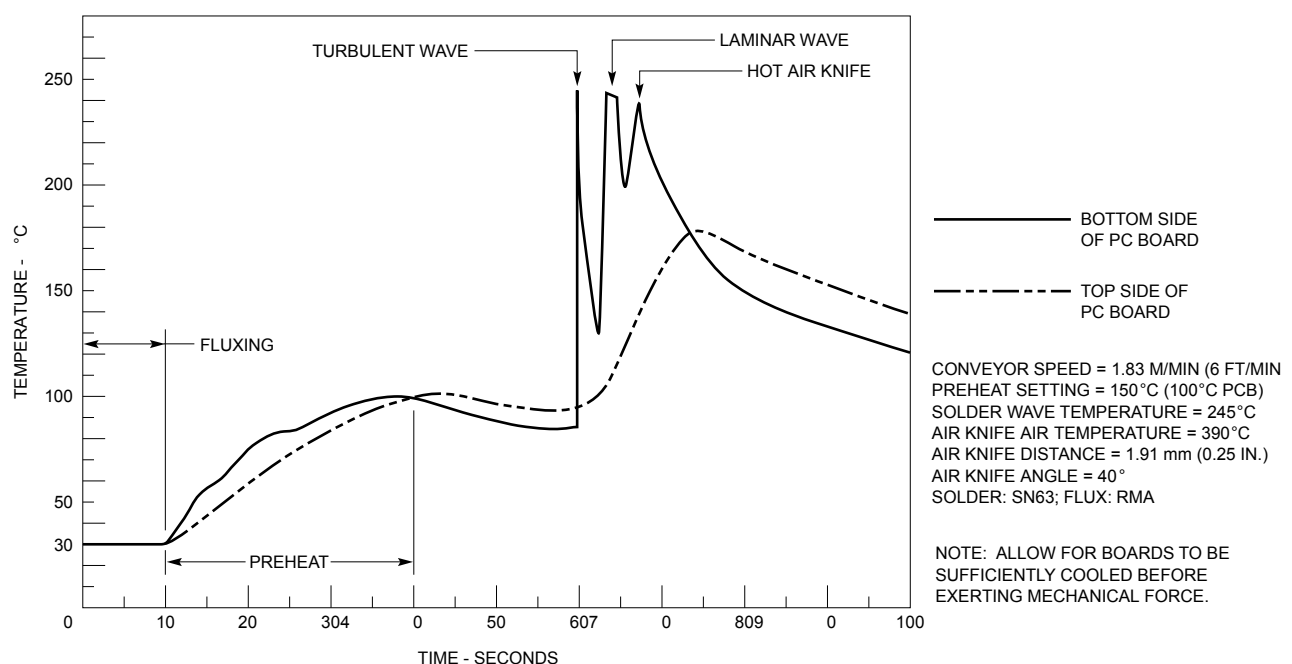
- Care must be taken during PCB assembly and soldering process to prevent damage to LED component.
- The closest LED is allowed to solder on board is 1.59mm below the body (encapsulant epoxy) for those parts without standoffs.
- Recommended soldering condition:

| | 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 maintain 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 size for LED component leads:

| LED component lead size | Diagonal | Plated through hole diameter |
|----------------------------------|---|-----------------------------------|
| 0.457 x 0.457 mm (0.025 inch) | (0.018 x 0.018 inch) 0.976 to 1.078 mm | 0.646 mm (0.038 to 0.042 inch) |
| 0.508 x 0.508 mm (0.028 inch) | (0.020 x 0.020 inch) 1.049 to 1.150 mm | 0.718 mm (0.041 to 0.045 inch) |

Note: Refer to application note AN1027 for more information on soldering LED components.



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