

T-1³/₄ (5 mm) Diffused LED Lamps

Technical Data

HLMP-3300 Series
HLMP-3400 Series
HLMP-3500 Series
HLMP-3762
HLMP-3862
HLMP-3962
HLMP-D400 Series
HLMP-D600

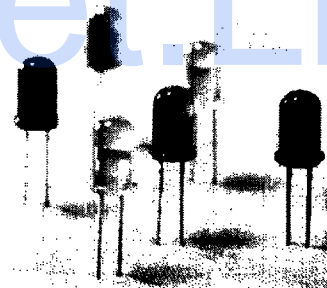
Features

- **High Intensity**
- **Choice of 4 Bright Colors**
High Efficiency Red
Orange
Yellow
High Performance Green
- **Popular T-1³/₄ Diameter Package**
- **Selected Minimum Intensities**
- **Wide Viewing Angle**
- **General Purpose Leads**

- **Reliable and Rugged**
- **Available on Tape and Reel**

Description

This family of T-1³/₄ tinted, diffused LED lamps is widely used in general purpose indicator applications. Diffusants, tints, and optical design are balanced to yield superior light output and wide viewing angles. Several intensity choices are available in each color for increased design flexibility.



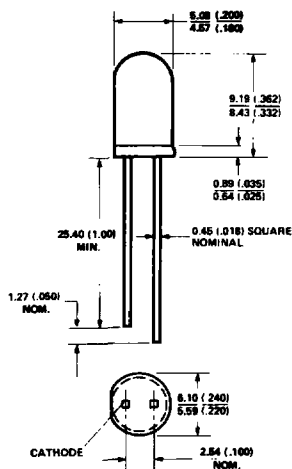
Selection Guide

| Part Number HLMP- | Application | Minimum Intensity (mcd) at 10 mA | Color (Material) |
|----------------------|-----------------|-------------------------------------|------------------------------------|
| 3300 | General Purpose | 2.1 | High Efficiency Red (GaAsP on GaP) |
| 3301 | High Ambient | 5.4 | |
| 3762 | Premium Lamp | 8.6 | |
| D400 | General Purpose | 2.1 | Orange (GaAsP on GaP) |
| D401 | High Ambient | 5.4 | |
| 3400 | General Purpose | 2.2 | Yellow (GaAsP on GaP) |
| 3401 | High Ambient | 5.7 | |
| 3862 | Premium Lamp | 9.2 | |
| 3502 | General Purpose | 1.6 | Green (GaP) 565 nm |
| 3507 | High Ambient | 4.2 | |
| 3962 | Premium Lamp | 10.6 | |
| D600 ⁽¹⁾ | General Purpose | 1.0 | Emerald Green (GaP) 558 nm |

Note:

1. Please refer to Application Note 1061 for information comparing standard green and emerald green light output degradation.

Package Dimensions



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

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

| Symbol | Parameter | Device HLMP- | Min. | Typ. | Max. | Units | Test Conditions |
|------------------|---|---|------|---------------------------------|------|-------|-------------------------------------|
| I_V | Luminous Intensity | High Efficiency Red | | | | mcd | $I_F = 10 \text{ mA}$ |
| | | 3300 | 2.1 | 3.5 | | | |
| | | 3301 | 5.4 | 7.0 | | | |
| | | 3762 | 8.6 | 12.0 | | | |
| | | Orange | | | | | |
| | | D400 | 2.1 | 3.5 | | | |
| D401 | 5.4 | 7.0 | | | | | |
| Yellow | 3400 | 2.2 | 4.0 | | | | |
| | | 3401 | 5.7 | 8.0 | | | |
| | | 3862 | 9.2 | 12.0 | | | |
| Green | 3502 | 1.6 | 2.4 | | | | |
| | | 3507 | 4.2 | 5.2 | | | |
| | | 3962 | 10.6 | 14.0 | | | |
| Emerald Green | D600 | 1.0 | 3.0 | | | | |
| | | | | | | | |
| $2\theta^{1/2}$ | Included Angle Between Half Luminous Intensity Points | High Efficiency Red Orange Yellow Green Emerald Green | | 60 60 60 60 60 | | Deg. | $I_F = 10 \text{ mA}$ See Note 1 |
| λ_{PEAK} | Peak Wavelength | High Efficiency Red Orange Yellow Green Emerald Green | | 635 600 583 565 558 | | nm | Measurement at Peak |

Optical/Electrical Characteristics at $T_A = 25^\circ\text{C}$ (cont.)

| Symbol | Parameter | Device HLMP- | Min. | Typ. | Max. | Units | Test Conditions |
|-----------------------|---------------------------|---|--------|---------------------------------|--------------------------|-----------------------|------------------------------------|
| $\Delta\lambda_{1/2}$ | Spectral Line Halfwidth | HER/Orange Yellow Green Emerald Green | | 40 36 28 24 | | nm | |
| λ_d | Dominant Wavelength | High Efficiency Red Orange Yellow Green Emerald Green | | 626 602 585 569 560 | | nm | See Note 2 |
| τ_s | Speed of Response | High Efficiency Red Orange Yellow Green Emerald Green | | 90 280 90 500 560 | | ns | |
| C | Capacitance | High Efficiency Red Orange Yellow Green Emerald Green | | 11 4 15 18 3100 | | pF | $V_F = 0$; $f = 1 \text{ MHz}$ |
| $R\theta_{J-PIN}$ | Thermal Resistance | All | | 260 | | $^\circ\text{C/W}$ | Junction to Cathode Lead |
| V_F | Forward Voltage | HER/Orange Yellow Green Emerald Green | | 1.9 2.0 2.1 2.1 | 2.4 2.4 2.7 2.7 | V | $I_F = 10 \text{ mA}$ |
| V_R | Reverse Breakdown Voltage | All | 5.0 | | | V | $I_R = 100 \mu\text{A}$ |
| η_v | Luminous Efficacy | High Efficiency Red Orange Yellow Green Emerald Green | - - | 145 380 500 595 656 | | <u>lumens</u> Watt | See Note 3 |

Notes:

- $\theta_{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
- The dominant wavelength, λ_d , is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
- 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.

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

| Parameter | HER/Orange | Yellow | Green/ Emerald Green | Units |
|--|------------------------------------|-------------|-------------------------|------------------|
| Peak Forward Current | 90 | 60 | 90 | mA |
| Average Forward Current ^[1] | 25 | 20 | 25 | mA |
| DC Current ^[2] | 30 | 20 | 30 | mA |
| Power Dissipation ^[3] | 135 | 85 | 135 | mW |
| Reverse Voltage ($I_R = 100 \mu\text{A}$) | 5 | 5 | 5 | V |
| Transient Forward Current ^[4] (10 μsec Pulse) | 500 | 500 | 500 | mA |
| LED Junction Temperature | 110 | 110 | 110 | $^\circ\text{C}$ |
| Operating Temperature Range | -55 to +100 | -55 to +100 | -20 to +100 | $^\circ\text{C}$ |
| Storage Temperature Range | | | -55 to +100 | |
| Lead Soldering Temperature [1.6 mm (0.063 in.) from body] | 260 $^\circ\text{C}$ for 5 seconds | | | |

Notes:

- See Figure 5 (Red/Orange), 10 (Yellow), or 15 (Green) to establish pulsed operating conditions.
- For Red, Orange and Green series derate linearly from 50 $^\circ\text{C}$ at 0.5 mA/ $^\circ\text{C}$. For Yellow series derate linearly from 50 $^\circ\text{C}$ at 0.2 mA/ $^\circ\text{C}$.
- 1.8 mW/ $^\circ\text{C}$. For Yellow series derate power linearly from 50 $^\circ\text{C}$ at 1.6 mW/ $^\circ\text{C}$.
- The transient peak current is the maximum non-recurring peak current that can be applied to the device without damaging the LED die and wirebond. It is not recommended that the device be operated at peak currents beyond the peak forward current listed in the Absolute Maximum Ratings.

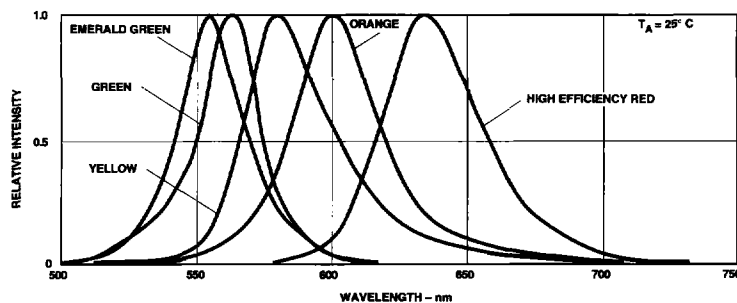


Figure 1. Relative Intensity vs. Wavelength.

T-1³/₄ High Efficiency Red, Orange Diffused Lamps

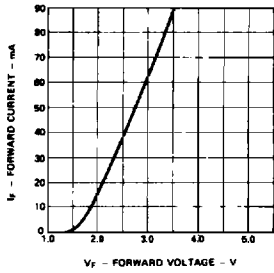


Figure 2. Forward Current vs. Forward Voltage Characteristics.

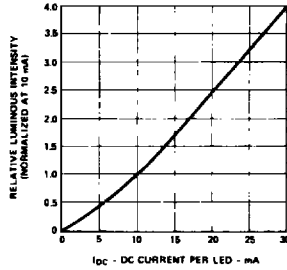


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

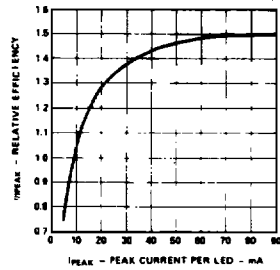


Figure 4. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.

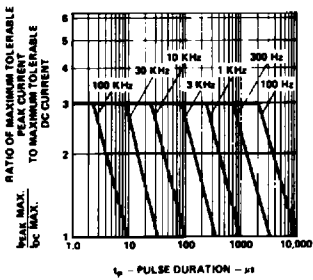


Figure 5. Maximum Tolerable Peak Current vs. Pulse Duration. (I_{DC} MAX as per MAX Ratings).

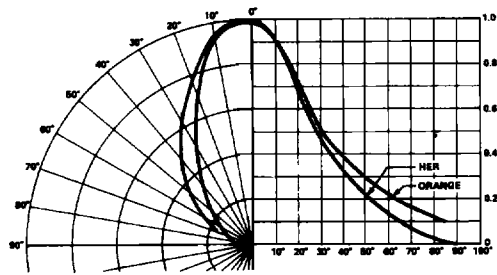


Figure 6. Relative Luminous Intensity vs. Angular Displacement.

T-1³/₄ Yellow Diffused Lamps

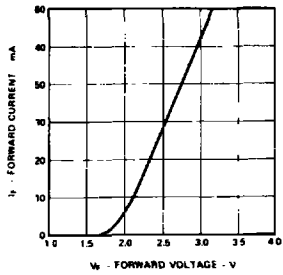


Figure 7. Forward Current vs. Forward Voltage Characteristics.

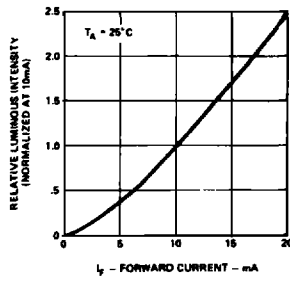


Figure 8. Relative Luminous Intensity vs. Forward Current.

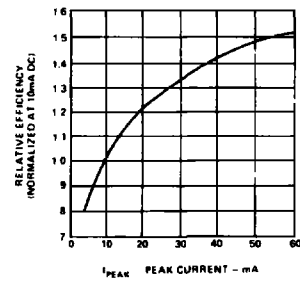


Figure 9. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

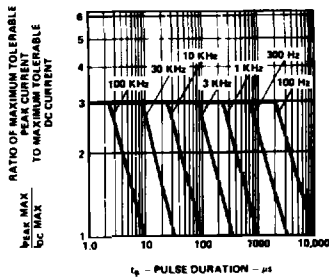


Figure 10. Maximum Tolerable Peak Current vs. Pulse Duration. (I_{DC} MAX as per MAX Ratings).

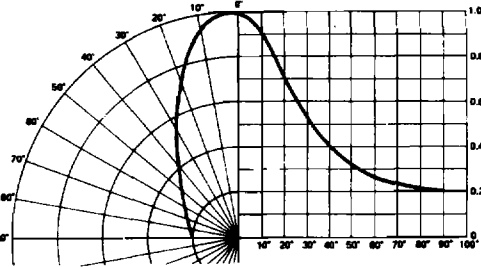


Figure 11. Relative Luminous Intensity vs. Angular Displacement.

T-1³/₄ Green/Emerald Green Diffused Lamps

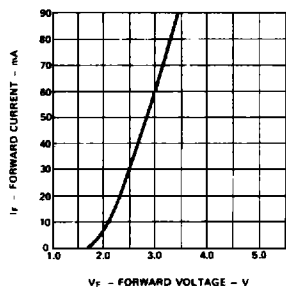


Figure 12. Forward Current vs. Forward Voltage Characteristics.

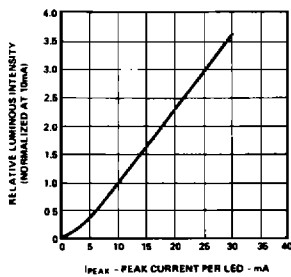


Figure 13. Relative Luminous Intensity vs. DC Forward Current.

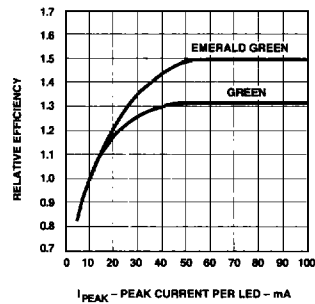


Figure 14. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.

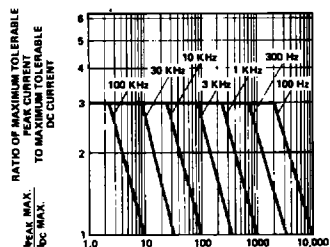


Figure 15. Maximum Tolerable Peak Current vs. Pulse Duration. ($I_{DC\ MAX}$ as per MAX Ratings).

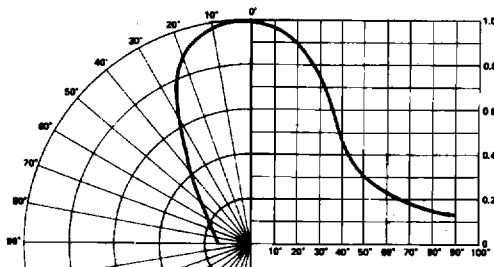


Figure 16. Relative Luminous Intensity vs. Angular Displacement.