

HLMP-1301, HLMP-1401, HLMP-1503, HLMP-K401, HLMP-K600 T-1 (3 mm) Diffused LED Lamps



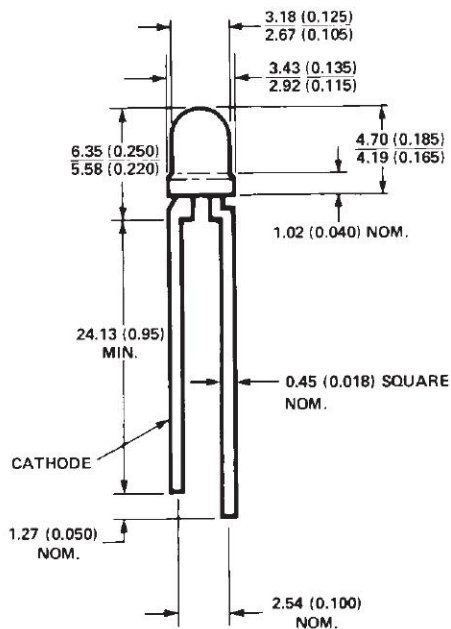
Data Sheet



Description

This family of T-1 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.

Package Dimensions



NOTES:

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

Features

- High intensity
- Choice of 4 bright colors
 - High Efficiency Red
 - Orange
 - Yellow
 - High Performance Green
- Popular T-1 diameter package
- Selected minimum intensities
- Wide viewing angle
- General purpose leads
- Reliable and rugged
- Available on tape and reel

Selection Guide

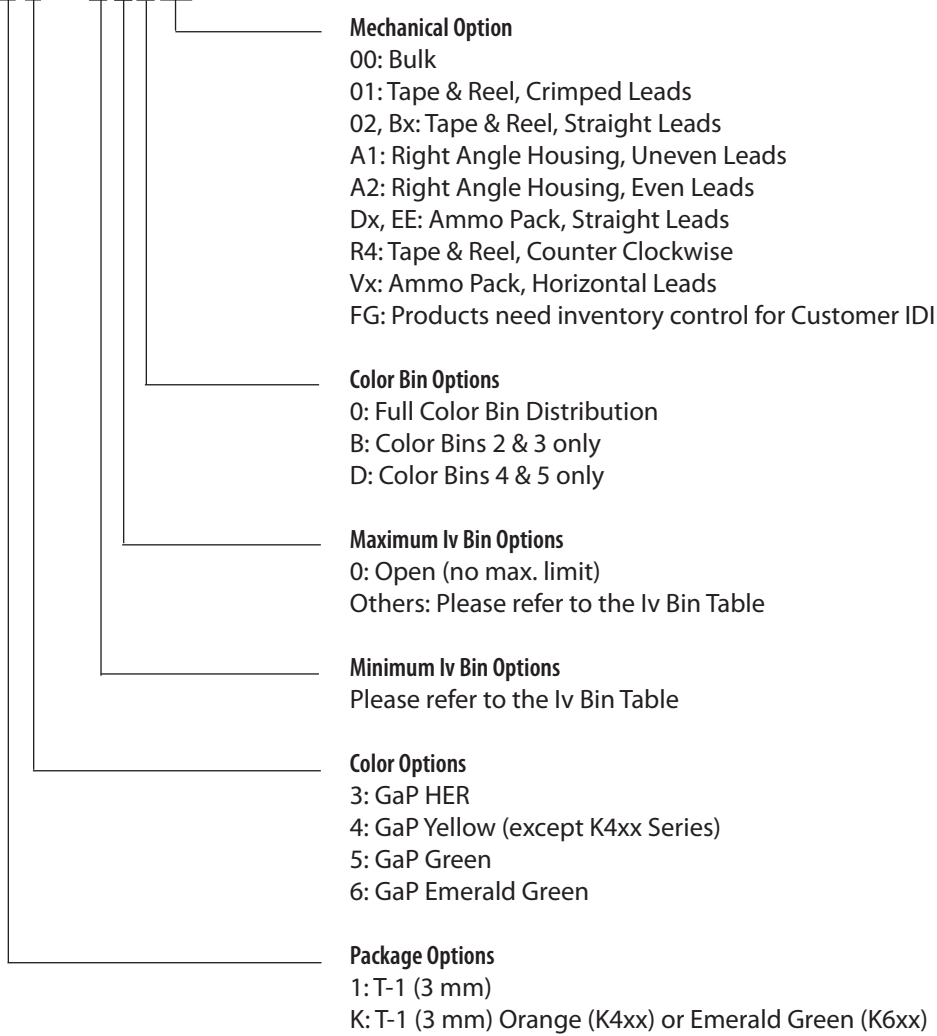
| Material | Color | Part Number | Luminous Intensity I _v (mcd) at 10 mA | |
|--------------|------------------------------|-----------------|--|------|
| | | | Min. | Max. |
| GaAsP on GaP | Red | HLMP-1301 | 3.4 | – |
| | | HLMP-1301-E00xx | 3.4 | – |
| | | HLMP-1301-FG0xx | 5.4 | 17.2 |
| | | HLMP-1301-G00xx | 8.6 | – |
| | | HLMP-1301-GH0xx | 8.6 | 27.6 |
| | Yellow | HLMP-1401 | 2.2 | – |
| | | HLMP-1401-D00xx | 3.6 | – |
| | | HLMP-1401-E00xx | 5.7 | – |
| | | HLMP-1401-EF0xx | 5.7 | 18.4 |
| | | HLMP-1401-EFBxx | 5.7 | 18.4 |
| | Orange | HLMP-K401 | 2.1 | – |
| | | HLMP-K401-E00xx | 3.4 | – |
| | | HLMP-K401-EF0xx | 3.4 | 10.8 |
| | | HLMP-K401-FGDxx | 5.4 | 17.2 |
| GaP | Green | HLMP-1503 | 1.0 | – |
| | | HLMP-1503-C00xx | 2.6 | – |
| | | HLMP-1503-D00xx | 4.2 | – |
| | | HLMP-1503-DE0xx | 4.2 | 13.4 |
| | | HLMP-1503-DEDxx | 4.2 | 13.4 |
| | Emerald Green ^[1] | HLMP-K600 | 1.0 | – |

Note:

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

Part Numbering System

HLMP - X X XX - X X X XX



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

| Parameter | HER/Orange | Yellow | Green | Units |
|---|-------------|-------------|-------------|------------------|
| Peak Forward Current | 90 | 60 | 90 | mA |
| Average Forward Current ^[1] | 25 | 20 | 25 | mA |
| DC Current ^[2] | 30 | 20 | 30 | A R |
| Reverse Voltage (IR = 100 μA) | 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 | -40 to +100 | -40 to +100 | -20 to +100 | $^\circ\text{C}$ |
| Storage Temperature Range | -40 to +100 | -40 to +100 | -40 to +100 | $^\circ\text{C}$ |

Notes:

1. See Figure 5 (HER/Orange), 10 (Yellow), or 15 (Green/Emerald Green) to establish pulsed operating conditions.
2. For Red, Orange, and Green series derate linearly from 50°C at $0.5\text{ mA}/^\circ\text{C}$. For Yellow series derate linearly from 50°C at $0.2\text{ mA}/^\circ\text{C}$.
3. For Red, Orange, and Green series derate power linearly from 25°C at $1.8\text{ mW}/^\circ\text{C}$. For Yellow series derate power linearly from 50°C at $1.6\text{ mW}/^\circ\text{C}$.
4. 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.

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

| Symbol | Description | Device HLMP- | Min. | Typ. | Max. | Units | Test Conditions |
|--------------------------|---|---------------------|------|------|------|--------------------|------------------------------------|
| $2\theta^{1/2}$ | Included Angle Between Half Luminous Intensity Points | All | | 60 | | Deg. | $I_F = 10\text{ mA}$ See Note 1 |
| λ_{PEAK} | Peak Wavelength | High Efficiency Red | | 635 | | nm | Measurement at Peak |
| | | Orange | | 600 | | | |
| | | Yellow | | 583 | | | |
| | | Green | | 565 | | | |
| | | Emerald Green | | 558 | | | |
| λ_d | Dominant Wavelength | High Efficiency Red | | 626 | | nm | See Note 2 |
| | | Orange | | 602 | | | |
| | | Yellow | | 585 | | | |
| | | Green | | 569 | | | |
| | | Emerald Green | | 560 | | | |
| $\Delta\lambda^{1/2}$ | Spectral Line Halfwidth | High Efficiency Red | | 40 | | nm | |
| | | Yellow | | 36 | | | |
| | | Green | | 28 | | | |
| | | Emerald Green | | 24 | | | |
| τ_s | Speed of Response | High Efficiency Red | | 90 | | ns | |
| | | Orange | | 280 | | | |
| | | Yellow | | 90 | | | |
| | | Green | | 500 | | | |
| | | Emerald Green | | 3100 | | | |
| C | Capacitance | High Efficiency Red | | 11 | | pF | $V_F = 0;$ $f = 1\text{ MHz}$ |
| | | Orange | | 4 | | | |
| | | Yellow | | 15 | | | |
| | | Green | | 18 | | | |
| | | Emerald Green | | 35 | | | |
| $R\theta_{\text{J-PIN}}$ | Thermal Resistance | All | | 290 | | $^\circ\text{C/W}$ | Junction to Cathode Lead |
| V_F | Forward Voltage | HER/Orange | 1.5 | 1.9 | 2.4 | V | $I_F = 10\text{ mA}$ |
| | | Yellow | 1.5 | 2.0 | 2.4 | | |
| | | Green | 1.5 | 2.1 | 2.7 | | |
| | | Emerald Green | | 2.1 | 2.7 | | |
| V_R | Reverse Breakdown Voltage | All | 5.0 | | | V | $I_R = 100\text{ }\mu\text{A}$ |
| η_V | Luminous Efficacy | High Efficiency Red | | 145 | | lumens | See Note 3 |
| | | Orange | | 380 | | watt | |
| | | Yellow | | 500 | | | |
| | | Green | | 595 | | | |
| | | Emerald Green | | 655 | | | |

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.

Intensity Bin Limits

| Color | Bin | Intensity Range (mcd) | |
|------------|---------|-----------------------|---------|
| | | Min. | Max. |
| Red/Orange | D | 2.4 | 3.8 |
| | E | 3.8 | 6.1 |
| | F | 6.1 | 9.7 |
| | G | 9.7 | 15.5 |
| | H | 15.5 | 24.8 |
| | I | 24.8 | 39.6 |
| | J | 39.6 | 63.4 |
| | K | 63.4 | 101.5 |
| | L | 101.5 | 162.4 |
| | M | 162.4 | 234.6 |
| | N | 234.6 | 340.0 |
| | O | 340.0 | 540.0 |
| | P | 540.0 | 850.0 |
| | Q | 850.0 | 1200.0 |
| | R | 1200.0 | 1700.0 |
| | S | 1700.0 | 2400.0 |
| | T | 2400.0 | 3400.0 |
| | U | 3400.0 | 4900.0 |
| | V | 4900.0 | 7100.0 |
| | W | 7100.0 | 10200.0 |
| X | 10200.0 | 14800.0 | |
| Y | 14800.0 | 21400.0 | |
| Z | 21400.0 | 30900.0 | |
| Yellow | C | 2.5 | 4.0 |
| | D | 4.0 | 6.5 |
| | E | 6.5 | 10.3 |
| | F | 10.3 | 16.6 |
| | G | 16.6 | 26.5 |
| | H | 26.5 | 42.3 |
| | I | 42.3 | 67.7 |
| | J | 67.7 | 108.2 |
| | K | 108.2 | 173.2 |
| | L | 173.2 | 250.0 |
| | M | 250.0 | 360.0 |
| | N | 360.0 | 510.0 |
| | O | 510.0 | 800.0 |
| | P | 800.0 | 1250.0 |
| | Q | 1250.0 | 1800.0 |
| | R | 1800.0 | 2900.0 |
| | S | 2900.0 | 4700.0 |
| T | 4700.0 | 7200.0 | |
| U | 7200.0 | 11700.0 | |
| V | 11700.0 | 18000.0 | |
| W | 18000.0 | 27000.0 | |

Intensity Bin Limits, continued

| Color | Bin | Intensity Range (mcd) | |
|-------------------------|---------|-----------------------|--------|
| | | Min. | Max. |
| Green/ Emerald Green | A | 1.1 | 1.8 |
| | B | 1.8 | 2.9 |
| | C | 2.9 | 4.7 |
| | D | 4.7 | 7.6 |
| | E | 7.6 | 12.0 |
| | F | 12.0 | 19.1 |
| | G | 19.1 | 30.7 |
| | H | 30.7 | 49.1 |
| | I | 49.1 | 78.5 |
| | J | 78.5 | 125.7 |
| | K | 125.7 | 201.1 |
| | L | 201.1 | 289.0 |
| | M | 289.0 | 417.0 |
| | N | 417.0 | 680.0 |
| | O | 680.0 | 1100.0 |
| | P | 1100.0 | 1800.0 |
| | Q | 1800.0 | 2700.0 |
| | R | 2700.0 | 4300.0 |
| | S | 4300.0 | 6800.0 |
| T | 6800.0 | 10800.0 | |
| U | 10800.0 | 16000.0 | |
| V | 16000.0 | 25000.0 | |
| W | 25000.0 | 40000.0 | |

Maximum tolerance for each bin limit is $\pm 18\%$.

Color Categories

| Color | Category # | Lambda (nm) | |
|---------------|------------|-------------|-------|
| | | Min. | Max. |
| Emerald Green | 9 | 522.5 | 555.5 |
| | 8 | 555.5 | 558.5 |
| | 7 | 558.5 | 561.5 |
| | 6 | 561.5 | 564.5 |
| Green | 6 | 561.5 | 564.5 |
| | 5 | 564.5 | 567.5 |
| | 4 | 567.5 | 570.5 |
| | 3 | 570.5 | 573.5 |
| | 2 | 573.5 | 576.5 |
| Yellow | 1 | 582.0 | 584.5 |
| | 3 | 584.5 | 587.0 |
| | 2 | 587.0 | 589.5 |
| | 4 | 589.5 | 592.0 |
| | 5 | 592.0 | 593.0 |
| Orange | 1 | 597.0 | 599.5 |
| | 2 | 599.5 | 602.0 |
| | 3 | 602.0 | 604.5 |
| | 4 | 604.5 | 607.5 |
| | 5 | 607.5 | 610.5 |
| | 6 | 610.5 | 613.5 |
| | 7 | 613.5 | 616.5 |
| | 8 | 616.5 | 619.5 |

Tolerance for each bin limit is ± 0.5 nm.

Mechanical Option Matrix

| Mechanical Option Code | Definition |
|-------------------------------|---|
| 00 | Bulk Packaging, minimum increment 500 pcs/bag |
| 01 | Tape & Reel, crimped leads, minimum increment 1800 pcs/bag |
| 02 | Tape & Reel, straight leads, minimum increment 1800 pcs/bag |
| A1 | Right Angle Housing, uneven leads, minimum increment 500 pcs/bag |
| A2 | Right Angle Housing, even leads, minimum increment 500 pcs/bag |
| BG | Tape & Reel, straight leads in 2K increment |
| BJ | Tape & Reel, straight leads in 2K increment |
| DD | Ammo Pack, straight leads in 2K increment |
| DJ | Ammo Pack, straight leads in 2K increment |
| EE | Ammo Pack, straight leads in 5K increment |
| R4 | Tape & Reel, straight leads, counter clockwise, anode lead leaving the reel first |
| VA | Ammo Pack, horizontal leads in 2K increment |
| VB | Ammo Pack, horizontal leads in 2K increment |
| FG | Inventory Control for Customer IDI |

Note: All categories are established for classification of products. Products may not be available in all categories. Please contact your local Avago representative for further clarification/information.