

# T-1<sup>3</sup>/<sub>4</sub> (5 mm), T-1 (3 mm), Low Current, Double Heterojunction AlGaAs Red LED Lamps

## Technical Data

### HLMP-D150/D155 HLMP-K150/K155

#### Features

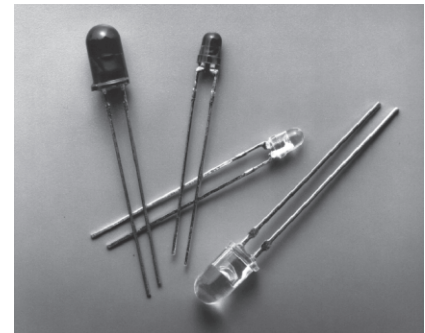
- Minimum Luminous Intensity Specified at 1 mA
- High Light Output at Low Currents
- Wide Viewing Angle
- Outstanding Material Efficiency
- Low Power/Low Forward Voltage
- CMOS/MOS Compatible
- TTL Compatible
- Deep Red Color

#### Applications

- Low Power Circuits
- Battery Powered Equipment
- Telecommunication Indicators

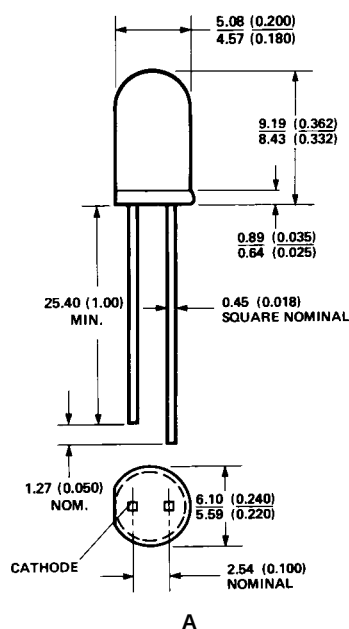
#### Description

These solid state LED lamps utilize newly developed double heterojunction (DH) AlGaAs/GaAs material technology. This LED material has outstanding light output efficiency at very low drive currents. The color is deep red at the dominant wavelength of 637 nanometres. These lamps are

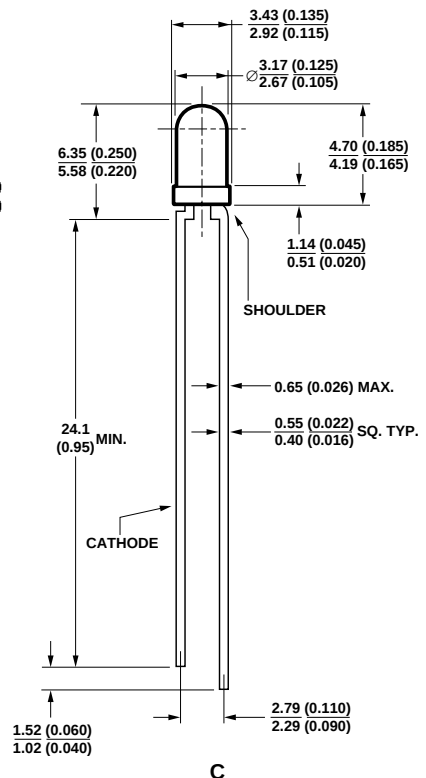
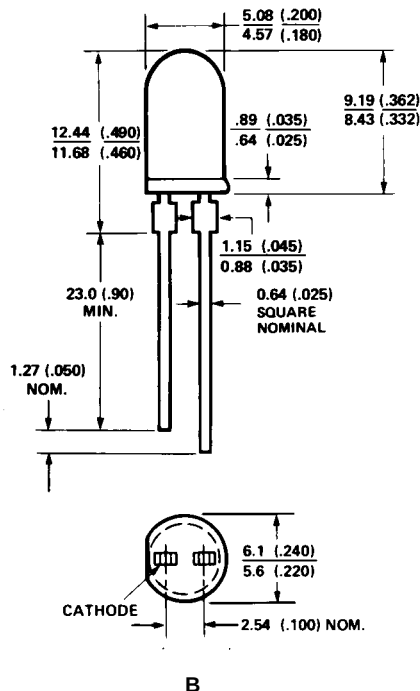


ideally suited for use in applications where high light output is required with minimum power output.

#### Package Dimensions



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



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## Selection Guide

| Package Description               | Device HLMP- | Luminous Intensity Iv (mcd)<br>at 1 mA |      |      | 2 $\theta$ <sup>1/2</sup> [1]<br>Degree | Package<br>Outline |
|-----------------------------------|--------------|----------------------------------------|------|------|-----------------------------------------|--------------------|
|                                   |              | Min.                                   | Typ. | Max. |                                         |                    |
| T-1 3/4 Red Tinted Diffused       | D150         | 1.3                                    | 3.0  | –    | 65                                      | A                  |
|                                   | D150-C00xx   | 1.3                                    | 3.0  | –    | 65                                      | A                  |
|                                   | D150-CD0xx   | 1.3                                    | 3.0  | 4.2  | 65                                      | A                  |
| T-1 3/4 Red Untinted Non-diffused | D155         | 5.4                                    | 10.0 | –    | 24                                      | B                  |
|                                   | D155-F00xx   | 5.4                                    | 10.0 | –    | 24                                      | B                  |
| T-1 Red Tinted Diffused           | K150         | 1.3                                    | 2.0  | –    | 60                                      | C                  |
|                                   | K150-C00xx   | 1.3                                    | 2.0  | –    | 60                                      | C                  |
|                                   | K150-CD0xx   | 1.3                                    | 3.0  | 4.2  | 60                                      | C                  |
| T-1 Red Untinted Non-diffused     | K155         | 2.1                                    | 3.0  | –    | 45                                      | C                  |
|                                   | K155-CD0xx   | 1.3                                    | 3.0  | 4.2  | 45                                      | C                  |
|                                   | K155-D00xx   | 2.1                                    | 3.0  | –    | 45                                      | C                  |
|                                   | K155-DE0xx   | 2.1                                    | 3.0  | 6.8  | 45                                      | C                  |

**Note:**

1.  $\theta_{1/2}$  is the off axis angle from lamp centerline where the luminous intensity is  $1/2$  the on-axis value.

## Part Numbering System

HLMP - x 1 xx - x x x xx

**Mechanical Option**

00: Bulk  
 01: Tape & Reel, Crimped Leads  
 02: Tape & Reel, Straight Leads  
 A1, B1: Right Angle Housing, Uneven Leads  
 A2, B2: Right Angle Housing, Even Leads  
 DD, DH: Ammo Pack

**Color Bin Options**

0: Full color bin distribution

**Maximum Iv Bin Options**

0: Open (No max. limit)  
 Others: Please refer to the Iv bin table

**Minimum Iv Bin Options**

Please refer to the Iv bin table

**Lens Option**

50: Tinted, Diffused  
 55: Untinted, Nondiffused

**Package Options**

D: T-1 $\frac{3}{4}$  (5 mm)  
 K: T-1 (3 mm)

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

|                                                                         |                     |
|-------------------------------------------------------------------------|---------------------|
| Peak Forward Current <sup>[1]</sup> .....                               | 300 mA              |
| Average Forward Current .....                                           | 20 mA               |
| DC Current <sup>[2]</sup> .....                                         | 30 mA               |
| Power Dissipation .....                                                 | 87 mW               |
| Reverse Voltage ( $I_R = 100\ \mu\text{A}$ ) .....                      | 5 V                 |
| Transient Forward Current (10 $\mu\text{s}$ Pulse) <sup>[3]</sup> ..... | 500 mA              |
| LED Junction Temperature .....                                          | 110°C               |
| Operating Temperature Range .....                                       | -20 to +100°C       |
| Storage Temperature Range .....                                         | -55 to +100°C       |
| Lead Soldering Temperature [1.6 mm (0.063 in.) from body] .....         | 260°C for 5 seconds |

**Notes:**

1. Maximum  $I_{PEAK}$  at  $f = 1\ \text{kHz}$ ,  $DF = 6.7\%$ .
2. Derate linearly as shown in Figure 4.
3. The transient peak current is the maximum non-recurring peak current the device can withstand without damaging the LED die and wire bonds. It is not recommended that the device be operated at peak currents beyond the Absolute Maximum Peak Forward Current.

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

| Symbol                | Description               | Min. | Typ.                                                           | Max. | Unit | Test Condition                          |
|-----------------------|---------------------------|------|----------------------------------------------------------------|------|------|-----------------------------------------|
| $V_F$                 | Forward Voltage           |      | 1.6                                                            | 1.8  | V    | $I_F = 1\ \text{mA}$                    |
| $V_R$                 | Reverse Breakdown Voltage | 5.0  | 15.0                                                           |      | V    | $I_R = 100\ \mu\text{A}$                |
| $\lambda_p$           | Peak Wavelength           |      | 645                                                            |      | nm   | Measurement at Peak                     |
| $\lambda_d$           | Dominant Wavelength       |      | 637                                                            |      | nm   | Note 1                                  |
| $\Delta\lambda^{1/2}$ | Spectral Line Halfwidth   |      | 20                                                             |      | nm   |                                         |
| $\tau_S$              | Speed of Response         |      | 30                                                             |      | ns   | Exponential Time Constant, $e^{-1}/T_S$ |
| C                     | Capacitance               |      | 30                                                             |      | pF   | $V_F = 0$ , $f = 1\ \text{MHz}$         |
| $R\theta_{J-PIN}$     | Thermal Resistance        |      | 260 <sup>[3]</sup><br>210 <sup>[4]</sup><br>290 <sup>[5]</sup> |      | °C/W | Junction to Cathode Lead                |
| $\eta_V$              | Luminous Efficacy         |      | 80                                                             |      | lm/W | Note 2                                  |

**Notes:**

1. The dominant wavelength,  $\lambda_d$ , is derived from the CIE chromaticity diagram and represents the color of the device.
2. The radiant intensity,  $I_e$ , in watts per steradian, may be found from the equation  $I_e = I_v/\eta_V$ , where  $I_v$  is the luminous intensity in candelas and  $\eta_V$  is luminous efficacy in lumens/watt.
3. HLMP-D150.
4. HLMP-D155.
5. HLMP-K150/-K155.

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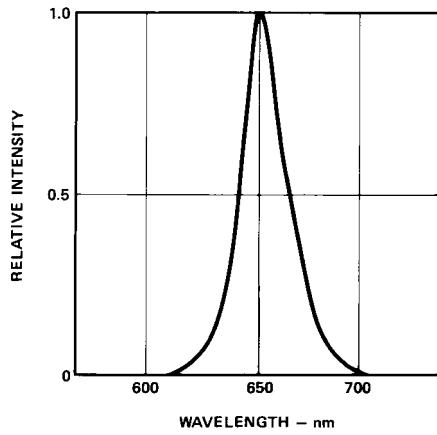


Figure 1. Relative Intensity vs. Wavelength.

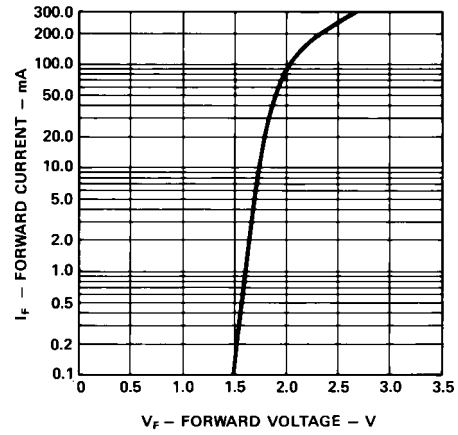


Figure 2. Forward Current vs. Forward Voltage.

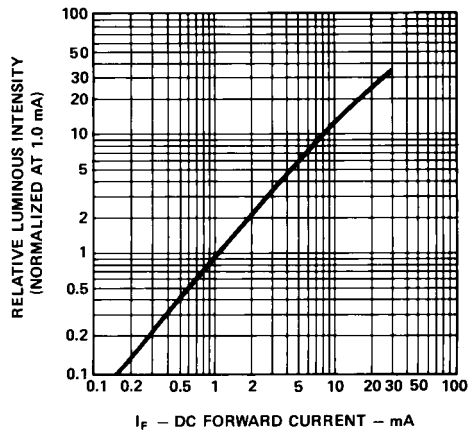


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

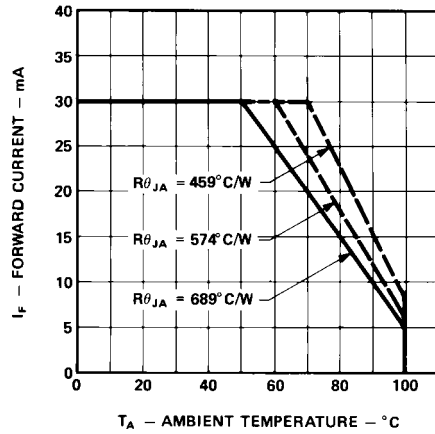
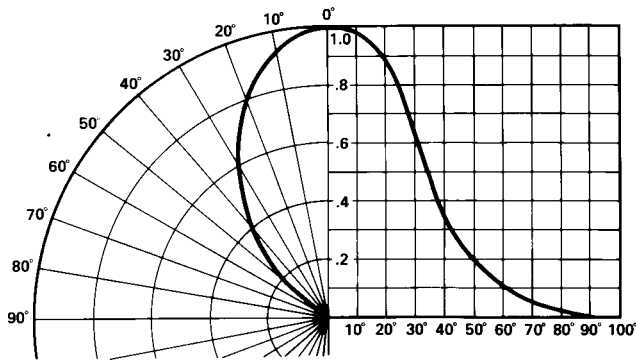
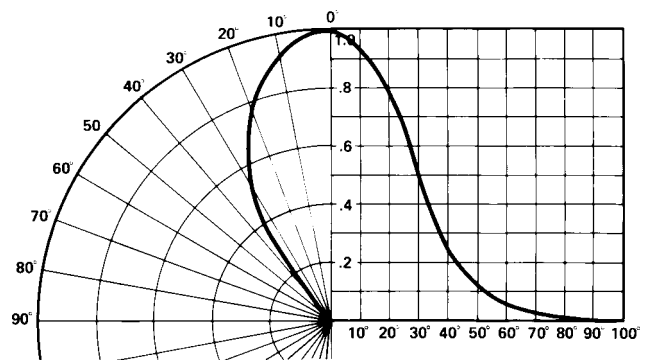


Figure 4. Maximum Forward DC Current vs. Ambient Temperature. Derating Based on T<sub>J</sub> Max. = 110 °C.

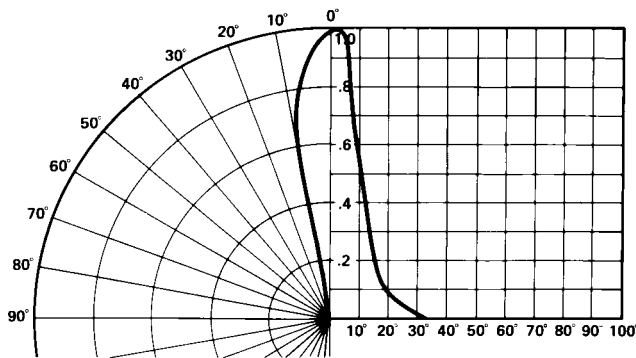
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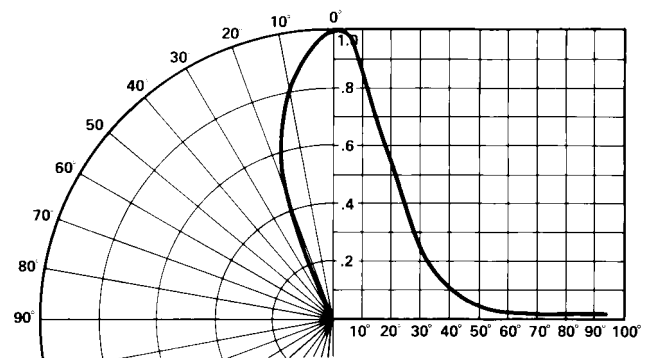
**Figure 5. Relative Luminous Intensity vs. Angular Displacement. HLMP-D150.**



**Figure 6. Relative Luminous Intensity vs. Angular Displacement. HLMP-K150.**



**Figure 7. Relative Luminous Intensity vs. Angular Displacement. HLMP-D155.**



**Figure 8. Relative Luminous Intensity vs. Angular Displacement. HLMP-K155.**

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### Intensity Bin Limits

| Color | Bin | Intensity Range (mcd) |         |
|-------|-----|-----------------------|---------|
|       |     | Min.                  | Max.    |
| Red   | C   | 1.5                   | 2.4     |
|       | 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 |

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

### Mechanical Option Matrix

| Mechanical Option Code | Definition                                                                                        |
|------------------------|---------------------------------------------------------------------------------------------------|
| 00                     | Bulk Packaging, minimum increment 500 pcs/bag                                                     |
| 01                     | Tape & Reel, crimped leads, minimum increment 1300 pcs for T-1 <sup>3/4</sup> , 1800 pcs for T-1  |
| 02                     | Tape & Reel, straight leads, minimum increment 1300 pcs for T-1 <sup>3/4</sup> , 1800 pcs for T-1 |
| A1                     | T-1, Right Angle Housing, uneven leads, minimum increment 500 pcs/bag                             |
| A2                     | T-1, Right Angle Housing, even leads, minimum increment 500 pcs/bag                               |
| B1                     | T-1 <sup>3/4</sup> , Right Angle Housing, uneven leads, minimum increment 500 pcs/bag             |
| B2                     | T-1 <sup>3/4</sup> , Right Angle Housing, even leads, minimum increment 500 pcs/bag               |
| DD                     | Ammo Pack, straight leads with minimum 2K increment                                               |
| DH                     | Ammo Pack, straight leads with minimum 2K increment                                               |

**Note:**

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

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