

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

## Technical Data

### 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

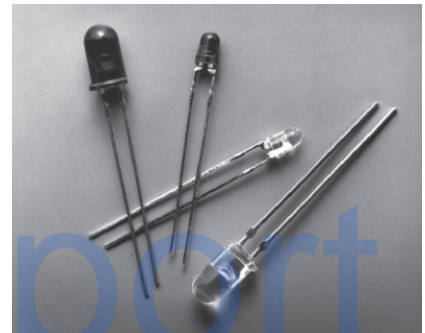
- Low Power Circuits
- Battery Powered Equipment
- Telecommunication Indicators

### 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

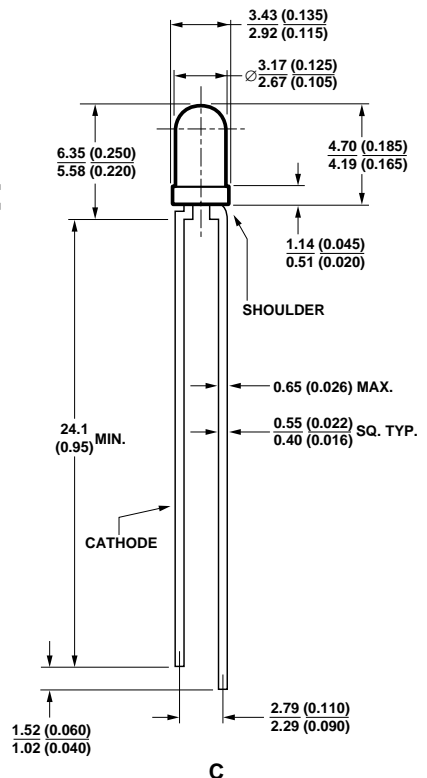
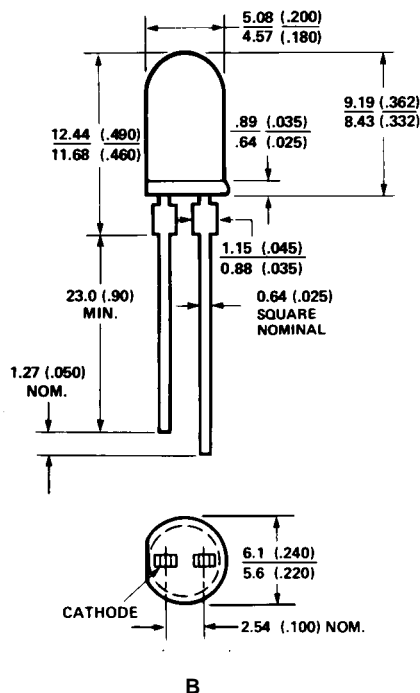
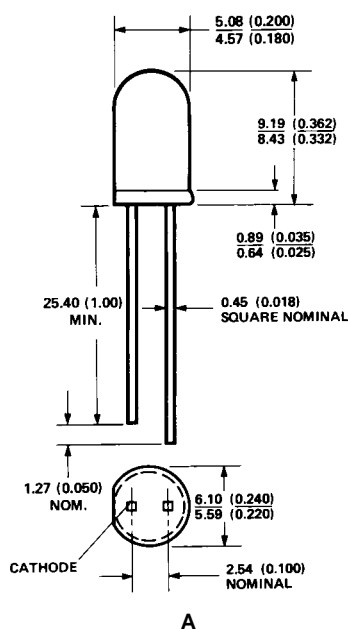
**HLMP-D150/D155**

**HLMP-K150/K155**



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.

## Selection Guide

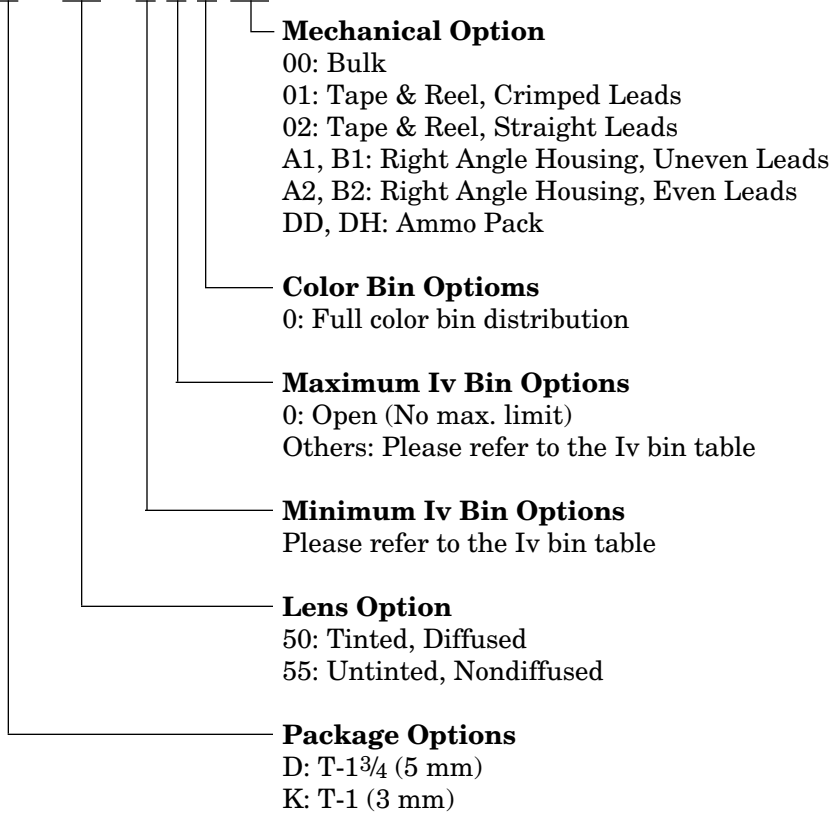
Package Description	Device HLMP-	Luminous Intensity Iv (mcd) at 1 mA			2 $\theta_{1/2}$ <sup>[1]</sup> Degree	Package Outline
		Min.	Typ.	Max.		
T-1 3/4 Red Tinted Diffused	D150	1.3	3.0	–	65	A
	D150-C00xx	1.3	3.0	–	65	A
	D150-CD0xx	1.3	3.0	4.2	65	A
T-1 3/4 Red Untinted Non-diffused	D155	5.4	10.0	–	24	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



### 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  $I_{\text{PEAK}}$  at  $f = 1 \text{ kHz}$ ,  $\text{DF} = 6.7\%$ .
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, $e^{-t}/T_S$
C	Capacitance		30		pF	$V_F = 0$ , $f = 1 \text{ MHz}$
$R\theta_{\text{J-PIN}}$	Thermal Resistance		260 <sup>[3]</sup> 210 <sup>[4]</sup> 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.

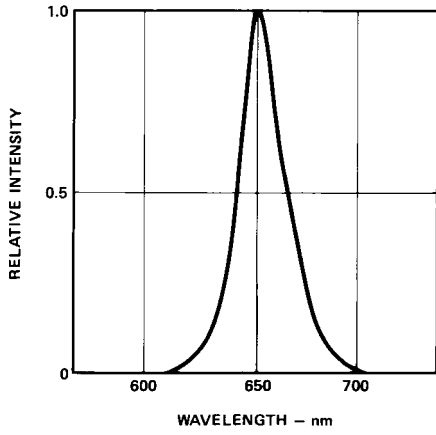


Figure 1. Relative Intensity vs. Wavelength.

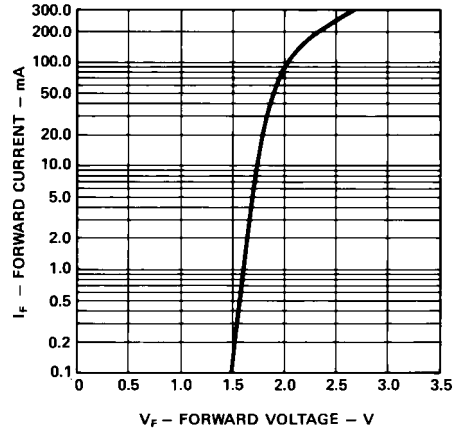


Figure 2. Forward Current vs. Forward Voltage.

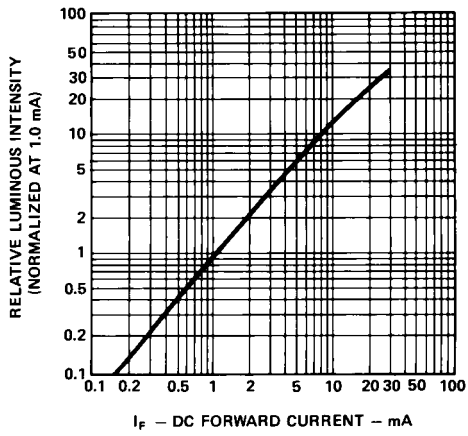


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

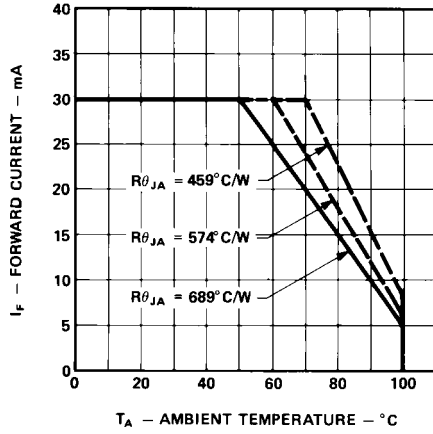
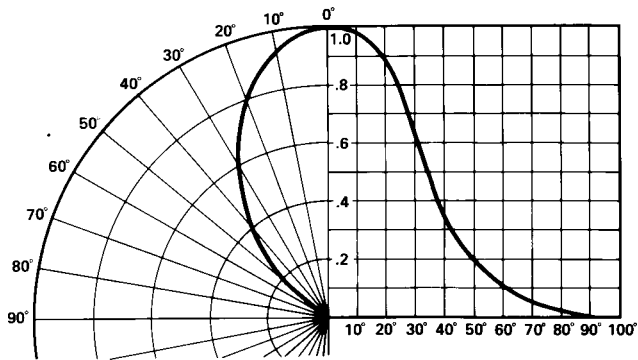
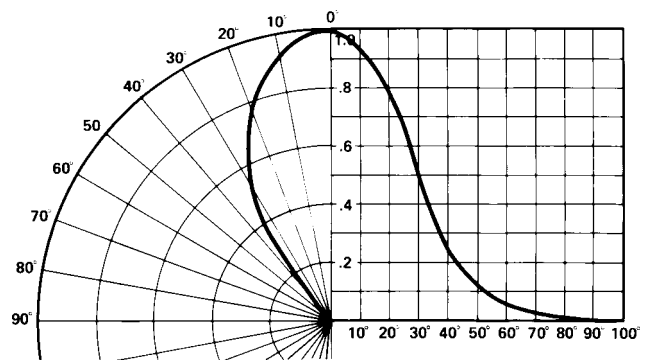


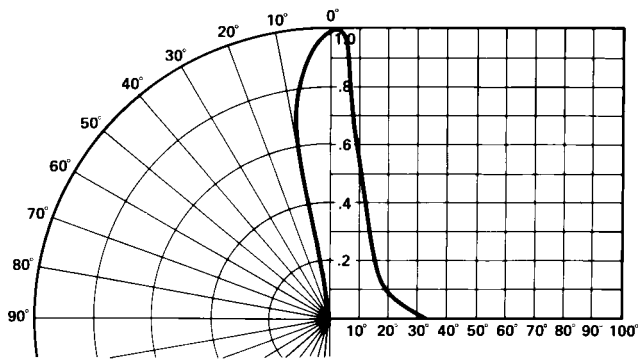
Figure 4. Maximum Forward DC Current vs. Ambient Temperature. Derating Based on  $T_J$  Max. = 110 °C.



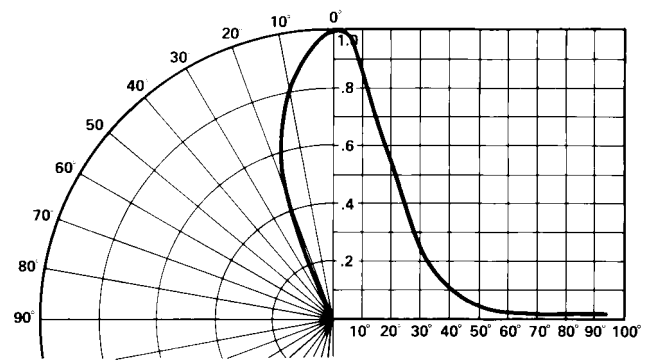
**Figure 5. Relative Luminous Intensity vs. Angular Displacement. HLMP-D150.**



**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.**

## 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.

**[www.agilent.com/semiconductors](http://www.agilent.com/semiconductors)**

For product information and a complete list of distributors, please go to our web site.

For technical assistance call:

Americas/Canada: +1 (800) 235-0312 or  
(408) 654-8675

Europe: +49 (0) 6441 92460

China: 10800 650 0017

Hong Kong: (+65) 271 2451

India, Australia, New Zealand: (+65) 271 2394

Japan: (+81 3) 3335-8152(Domestic/International), or 0120-61-1280(Domestic Only)

Korea: (+65) 271 2194

Malaysia, Singapore: (+65) 271 2054

Taiwan: (+65) 271 2654

Data subject to change.

Copyright © 2001 Agilent Technologies, Inc.

Obsoletes 5968-1438EN

December 11, 2001

5988-2229EN