HEWLETT PACKARD

Integrated Resistor Lamps 5 Volt and 12 Volt in T-1 and T-1¾ Packages

Technical Data

HLMP-1100, HLMP-1120
HLMP-1600, HLMP-1601
HLMP-1620, HLMP-1621
HLMP-1640, HLMP-1641
HLMP-3105, HLMP-3112
HLMP-3600, HLMP-3601
HLMP-3650, HLMP-3651
HLMP-3680, HLMP-3681

SOLID STATE LAMPS

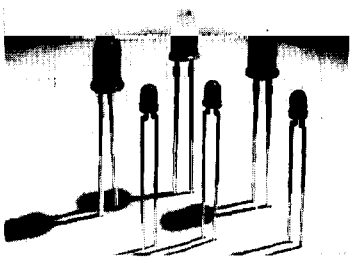
Features

- **Integral Current Limiting Resistor**
- **TTL Compatible**
  Requires no External Current Limiter with 5 Volt/12 Volt Supply
- **Cost Effective**
  Saves Space and Resistor Cost
- **Wide Viewing Angle**
- **Available in All Colors**
  Red, High Efficiency Red, Yellow, and High Performance Green in T-1 and T-1¾ Packages

Description

The 5 volt and 12 volt series lamps contain an integral current limiting resistor in series with the LED. This allows the lamp to be driven from a 5 volt/12 volt source without an external current limiter. The red LEDs are made from GaAsP on a GaAs substrate. The High Efficiency Red and Yellow devices use GaAsP on a GaP substrate.

The green devices use GaP on a GaP substrate. The diffused lamps provide a wide off-axis viewing angle.



The T-1¾ lamps are provided with sturdy leads suitable for wire wrap applications. The T-1¾ lamps may be front panel mounted by using the HLMP-0103 clip and ring.

Package Dimensions

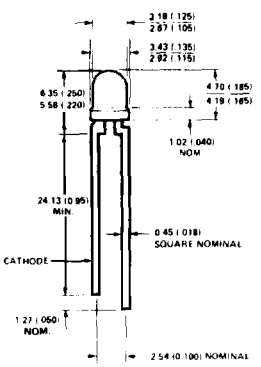


Figure A. T-1 Package.

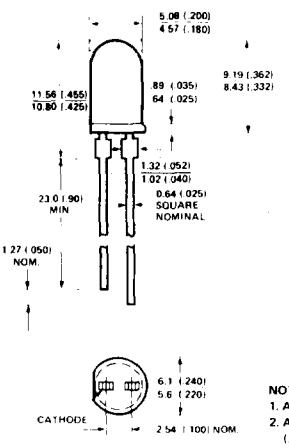


Figure B. T-1¾ Package.

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES (INCHES).
2. AN EPOXY MENISCUS MAY EXTEND ABOUT 1mm (.040") DOWN THE LEADS.

Selection Guide

Color	Part Number HLMP-	Package	Operating Voltage	I_v mcd		$2\theta_{1/2}$[1]	Package Outline
				Min.	Typ.		
Red	1100	T-1 Tinted Diffused	5	0.8	2.5	60°	A
	1120	T-1 Untinted Diffused	5	0.8	2.5	60°	A
	3105	T-1¾ Tinted Diffused	5	1.0	3.0	60°	B
	3112		12	1.0	3.0	60°	B
High Efficiency Red	1600	T-1 Tinted Diffused	5	2.0	8.0	60°	A
	1601		12				
	3600	T-1¾ Tinted Diffused	5			60°	B
	3601		12				
Yellow	1620	T-1 Tinted Diffused	5	2.0	8.0	60°	A
	1621		12				
	3650	T-1¾ Tinted Diffused	5			60°	B
	3661		12				
High Performance Green	1640	T-1 Tinted Diffused	5	2.0	8.0	60°	A
	1641		12				
	3680	T-1¾ Tinted Diffused	5			60°	B
	3681		12				

Note:
1. $\theta_{1/2}$ is the off-axis angle at which the luminous intensity is ½ the axial luminous intensity.

Absolute Maximum Ratings at $T_A = 25°C$

	Red/HER/ Yellow 5 Volt Lamps	Red/HER/ Yellow 12 Volt Lamps	Green 5 Volt Lamps	Green 12 Volt Lamps
DC Forward Voltage ($T_A = 25°C$)	7.5 Volts[2]	15 Volts[3]	7.5 Volts[2]	15 Volts[3]
Reverse Voltage ($I_R = 100\ \mu A$)	5 Volts	5 Volts	5 Volts	5 Volts
Operating Temperature Range	-40°C to 85°C	-40°C to 85°C	-20°C to 85°C	-20°C to 85°C
Storage Temperature Range	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C
Lead Soldering Temperature	260°C for 5 seconds			

Notes:
2. Derate from $T_A = 50°C$ at 0.071 V/°C, see Figure 3.
3. Derate from $T_A = 50°C$ at 0.086 V/°C, see Figure 4.

Electrical/Optical Characteristics at T_A = 25°C

Symbol	Description	Red			High Efficiency Red			Yellow			Green			Unit	Test Condition
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
λ_P	Peak Wavelength		655			635			583			565		nm	
λ_d	Dominant Wavelength		648			626			585			569		nm	Note 4
$\Delta\lambda 1/2$	Spectral Line Halfwidth		24			40			36			28		nm	
$R\theta_{J\text{-}PIN}$	Thermal Resistance		290			290			290			290		°C/W	Junction to Cathode Lead (Note 6)
$R\theta_{J\text{-}PIN}$	Thermal Resistance		210			210			210			210		°C/W	Junction to Cathode Lead (Note 7)
I_F	Forward Current 12 V Devices		13	20		13	20		13	20		13	20	mA	V_F = 12 V
I_F	Forward Current 5 V Devices		13	20		10	15		10	15		12	15	mA	V_F = 5 V
η_V	Luminous Efficacy		65			145			500			595		lumen /Watt	Note 2
V_R	Reverse Breakdown Voltage	5.0			5.0			5.0			5.0			V	I_R = 100 µA

Notes:

4. The dominant wavelength, λ_d, is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
5. 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.
6. For Figure A package type.
7. For Figure B package type.

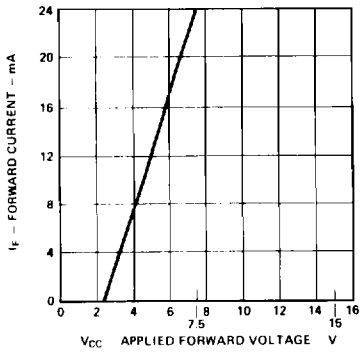


Figure 1. Forward Current vs. Applied Forward Voltage. 5 Volt Devices.

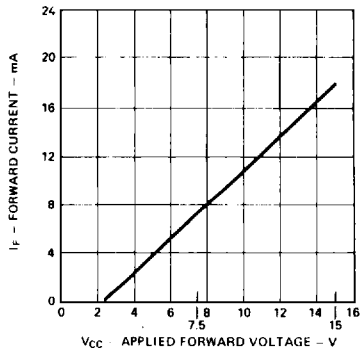


Figure 2. Forward Current vs. Applied Forward Voltage. 12 Volt Devices.

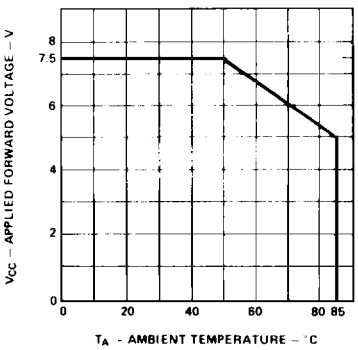


Figure 3. Maximum Allowed Applied Forward Voltage vs. Ambient Temperature $R\theta_{JA}$ = 175°C/W. 5 Volt Devices.

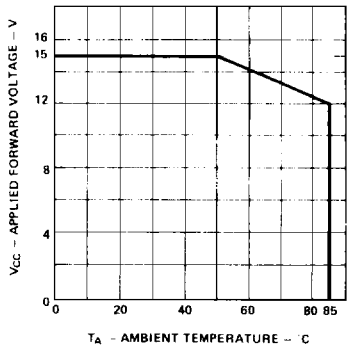


Figure 4. Maximum Allowed Applied Forward Voltage vs. Ambient Temperature $R\theta_{JA}$ = 175°C/W. 12 Volt Devices.

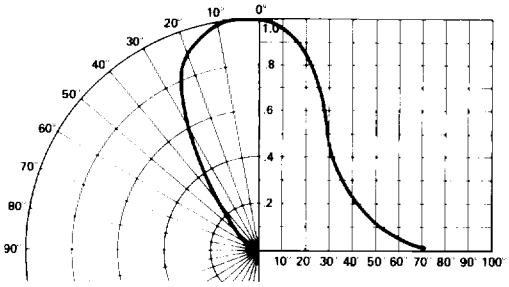


Figure 4. Relative Luminous Intensity vs. Angular Displacement for T-1 Package.

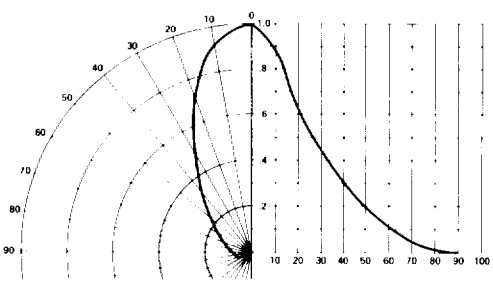


Figure 5. Relative Luminous Intensity vs. Angular Displacement for T-1¾ Package.

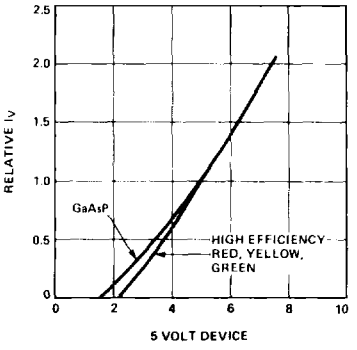


Figure 6. Relative Luminous Intensity vs. Applied Forward Voltage. 5 Volt Devices.

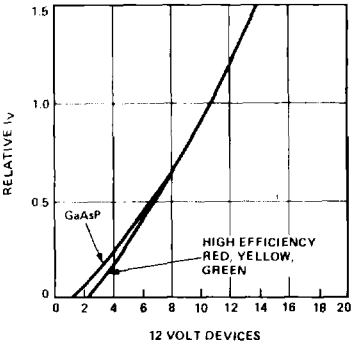


Figure 7. Relative Luminous Intensity vs. Applied Forward Voltage. 12 Volt Devices.