HEWLETT PACKARD

T-1¾ (5 mm) Diffused Solid State Lamps

Technical Data

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

SOLID STATE LAMPS

Features

- **High Intensity**
- **Choice of 4 Bright Colors**
  High Efficiency Red
  Orange
  Yellow
  High Performance Green
- **Popular T-1¾ Diameter Package**
- **Selected Minimum Intensities**
- **Wide Viewing Angle**
- **General Purpose Leads**
- **Reliable and Rugged**
- **Available on Tape and Reel**

Description

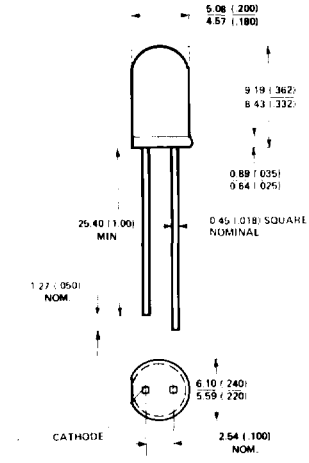
This family of T-1¾ lamps is widely used in general purpose indicator applications. Diffusants, tints, and optical design are balanced to yield superior light output and wide viewing angles. Several intensity choices are available in each color for increased design flexibility.

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	4.0	
3762	Premium Lamp	8.0	
D400	General Purpose	2.1	Orange (GaAsP on GaP)
D401	High Ambient	4.0	
3400	General Purpose	2.2	Yellow (GaAsP on GaP)
3401	High Ambient	4.0	
3862	Premium Lamp	8.0	
3502	General Purpose	1.6	Green (GaP) 565 nm
3507	High Ambient	4.2	
3962	Premium Lamp	8.0	
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 (.040") DOWN THE LEADS.

Optical/Electrical Characteristics at T_A = 25°C

Symbol	Parameter	Device HLMP-	Min.	Typ.	Max.	Units	Test Conditions
I_V	Luminous Intensity	High Efficiency Red				mcd	I_F = 10 mA
		3300	2.1	3.5			
		3301	4.0	7.0			
		3762	8.0	12.0			
		Orange					
		D400	2.1	3.5			
		D401	4.0	7.0			
		Yellow					
		3400	2.2	4.0			
		3401	4.0	8.0			
		3862	8.0	12.0			
		Green					
		3502	1.6	2.4			
		3507	4.2	5.2			
		3962	8.0	11.0			
		Emerald Green					
		D600	1.0	3.0			
$2\theta_{1/2}$	Included Angle Between Half Luminous Intensity Points	High Efficiency Red		60		Deg.	I_F = 10 mA See Note 1
		Orange		60			
		Yellow		60			
		Green		60			
		Emerald Green		60			
λ_{PEAK}	Peak Wavelength	High Efficiency Red		635		nm	Measurement at Peak
		Orange		600			
		Yellow		583			
		Green		565			
		Emerald Green		558			

Optical/Electrical Characteristics at T_A = 25°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 MHz
$R\theta_{J\text{-}PIN}$	Thermal Resistance	All		260		°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 mA
V_R	Reverse Breakdown Voltage	All	5.0			V	I_R = 100 µA
η_V	Luminous Efficacy	High Efficiency Red Orange Yellow Green Emerald Green	– – 	145 380 500 595 656		lumens/Watt	See Note 3

Notes:
1. $\theta_{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
2. The dominant wavelength, λ_d, is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
3. 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°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 μA)	5	5	5	V
Transient Forward Current[4] (10 μsec Pulse)	500	500	500	mA
LED Junction Temperature	110	110	110	°C
Operating Temperature Range	-55 to +100	-55 to +100	-20 to +100	°C
Storage Temperature Range			-55 to +100	
Lead Soldering Temperature [1.6 mm (0.063 in.) from body]	260°C for 5 seconds			

Notes:

1. See Figure 5 (Red/Orange), 10 (Yellow), or 15 (Green) to establish pulsed operating conditions.
2. For Red, Orange and Green series derate linearly from 50°C at 0.5 mA/°C. For Yellow series derate linearly from 50°C at 0.2 mA/°C.
3. 1.8 mW/°C. For Yellow series derate power linearly from 50°C at 1.6 mW/°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.

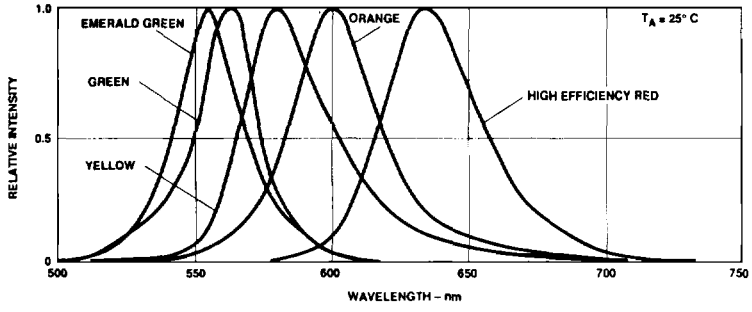


Figure 1. Relative Intensity vs. Wavelength.

T-1¾ High Efficiency Red, Orange Diffused Lamps

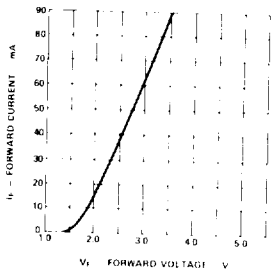


Figure 2. Forward Current vs. Forward Voltage Characteristics.

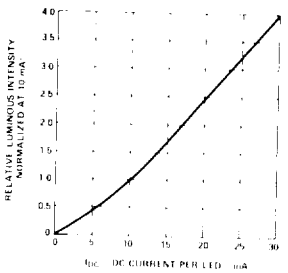


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

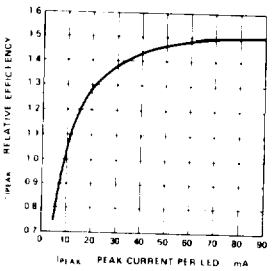


Figure 4. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.

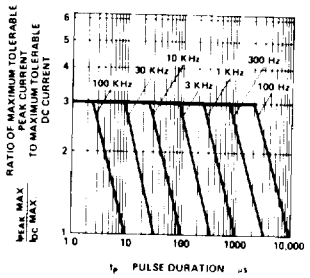


Figure 5. Maximum Tolerable Peak Current vs. Pulse Duration. (I_{DC} MAX as per MAX Ratings)

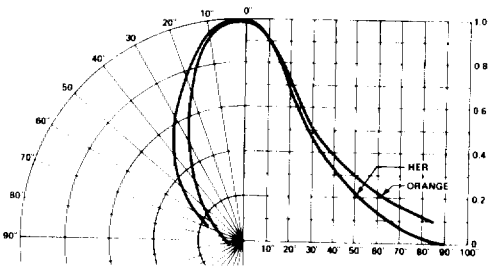


Figure 6. Relative Luminous Intensity vs. Angular Displacement.

T-1¾ Yellow Diffused Lamps

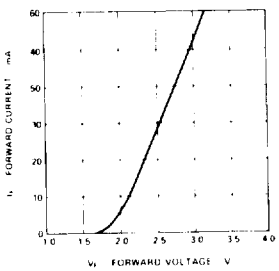


Figure 7. Forward Current vs. Forward Voltage Characteristics.

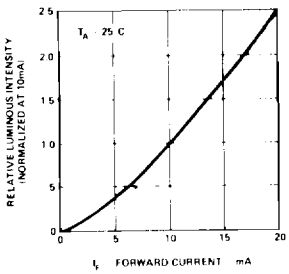


Figure 8. Relative Luminous Intensity vs. Forward Current.

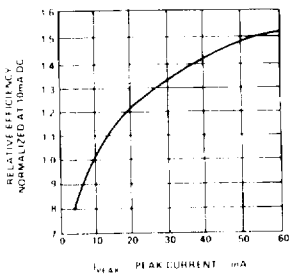


Figure 9. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

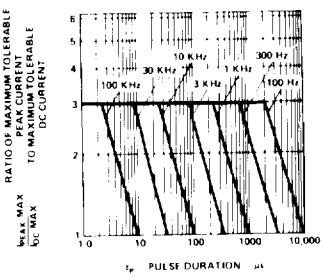


Figure 10. Maximum Tolerable Peak Current vs. Pulse Duration. (I_{DC} MAX as per MAX Ratings)

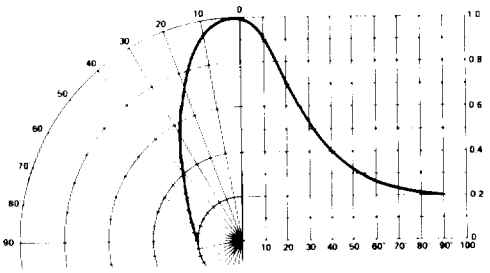


Figure 11. Relative Luminous Intensity vs. Angular Displacement.

T-1¾ Green/Emerald Green Diffused Lamps

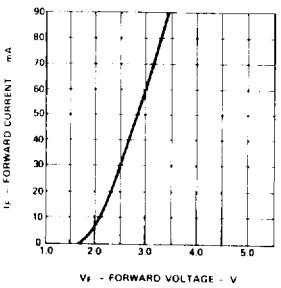


Figure 12. Forward Current vs. Forward Voltage Characteristics.

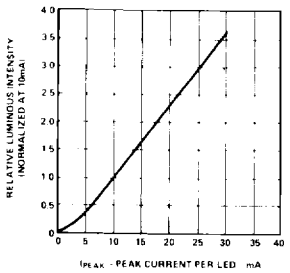


Figure 13. Relative Luminous Intensity vs. DC Forward Current.

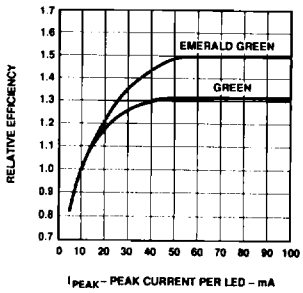


Figure 14. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.

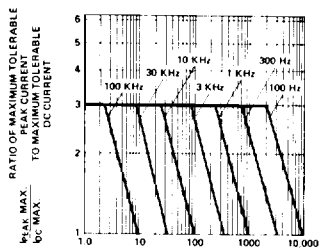


Figure 15. Maximum Tolerable Peak Current vs. Pulse Duration. (I_{DC} MAX as per MAX Ratings)

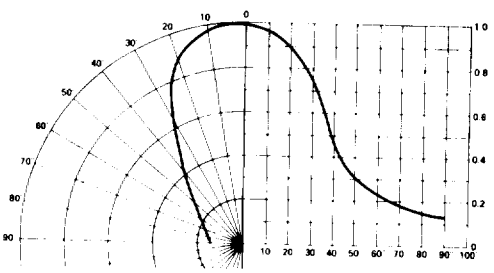


Figure 16. Relative Luminous Intensity vs. Angular Displacement.