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**HEWLETT  
PACKARD**

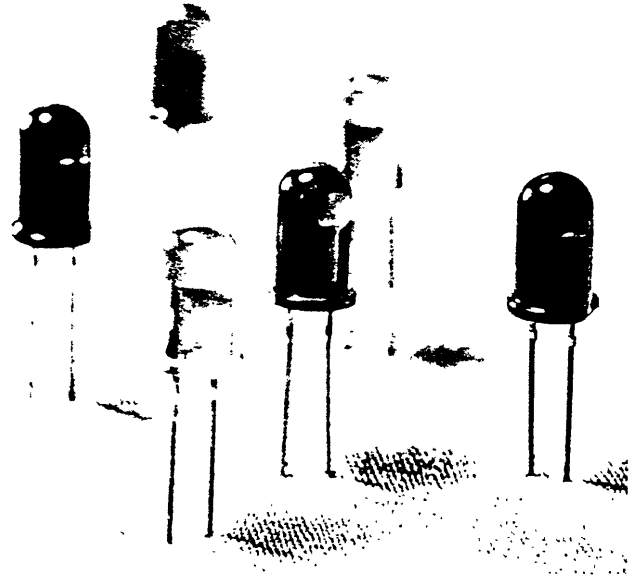
**T-1 3/4 (5mm)  
SOLID STATE LAMPS**

- HIGH EFFICIENCY • HLMP-3300 SERIES  
 YELLOW • HLMP-3400 SERIES  
 HIGH PERFORMANCE GREEN • HLMP-3500 SERIES

TECHNICAL DATA JANUARY 1984

**Features**

- HIGH INTENSITY
- CHOICE OF 3 BRIGHT COLORS  
 High Efficiency Red  
 Yellow  
 High Performance Green
- POPULAR T-1 $\frac{3}{4}$  DIAMETER PACKAGE
- LIGHT OUTPUT CATEGORIES
- WIDE VIEWING ANGLE AND NARROW VIEWING ANGLE TYPES
- GENERAL PURPOSE LEADS
- IC COMPATIBLE/LOW CURRENT REQUIREMENTS
- RELIABLE AND RUGGED

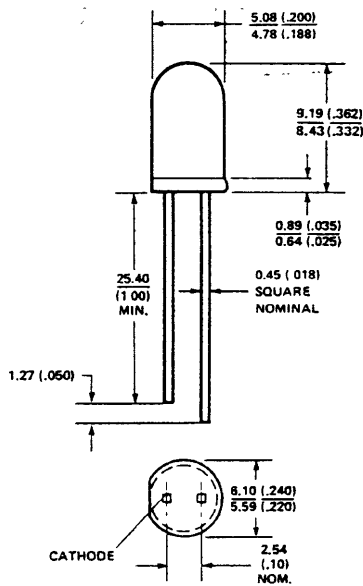


**Description**

The HLMP-3300 and the HLMP-3400 Series lamps are Gallium Arsenide Phosphide on Gallium Phosphide diodes emitting red and yellow light respectively. The HLMP-3500 Series lamps are green light emitting Gallium Phosphide diodes.

General purpose and selected brightness versions of both the diffused and non-diffused lens type are available in each family.

**Package Dimensions**



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

Part Number HLMP-	Application	Lens	Color
3300	Indicator - General Purpose	Diffused Wide Angle	High Efficiency Red
3301	Indicator - High Ambient		
3315	Illuminator/Point Source	Non Diffused Narrow Angle	
3316	Illuminator/High Brightness		
3400	Indicator General Purpose	Diffused Wide Angle	Yellow
3401	Indicator - High Ambient		
3415	Illuminator/Point Source	Non Diffused Narrow Angle	
3416	Illuminator/High Brightness		
3502	Indicator - General Purpose	Diffused Wide Angle	Green
3507	Indicator - High Ambient		
3517	Illuminator/Point Source	Non Diffused Narrow Angle	
3519	Illuminator/High Brightness		

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

Symbol	Description	Device HLMP-	Min.	Typ.	Max.	Units	Test Conditions
I <sub>v</sub>	Luminous Intensity	3300	2.0	3.5		mcd	I <sub>F</sub> = 10 mA (Figure 3)
		3301	4.0	7.0			
		3315	12.0	18.0			
		3316	20.0	30.0			
		3400	2.0	4.0		mcd	I <sub>F</sub> = 10 mA (Figure 8)
		3401	4.0	8.0			
		3415	10.0	18.0			
		3416	20.0	30.0			
		3502	1.6	2.4		mcd	I <sub>F</sub> = 10 mA (Figure 3)
		3507	4.2	5.2			
		3517	6.7	10.0			
		3519	10.6	25.0			
2θ 1/2	Including Angle Between Half Luminous Intensity Points	3300		65		Deg.	I <sub>F</sub> = 10 mA See Note 1 (Figure 6)
		3301		65			
		3315		35			
		3316		35			
		3400		75		Deg.	I <sub>F</sub> = 10 mA See Note 1 (Figure 11)
		3401		75			
		3415		35			
		3416		35			
		3502		75°		Deg.	I <sub>F</sub> = 10 mA See Note 1 (Figure 16)
		3507		75°			
		3517		24°			
		3519		24°			
λ <sub>PEAK</sub>	Peak Wavelength	3300		635		nm	Measurement at Peak (Figure 1)
		3400		583			
		3500		565			
λ <sub>d</sub>	Dominant Wavelength	3300		626		nm	See Note 2 (Figure 1)
		3400		585			
		3500		569			
τ <sub>s</sub>	Speed of Response	3300		90		ns	
		3400		90			
		3500		500			
C	Capacitance	3300		16		pF	V <sub>F</sub> = 0; f = 1 MHz
		3400		18			
		3500		18			
θ <sub>JC</sub>	Thermal Resistance	3300				°C/W	Junction to Cathode Lead at Seating Plane
		3400		140			
		3500					
V <sub>F</sub>	Forward Voltage	3300	1.5	2.2	3.0	V	I <sub>F</sub> = 10 mA (Figure 2)
		3400	1.5	2.2	3.0		I <sub>F</sub> = 10 mA (Figure 7)
		3500	1.6	2.3	3.0		I <sub>F</sub> = 20 mA (Figure 12)
V <sub>BR</sub>	Reverse Breakdown Volt.	All	5.0			V	I <sub>R</sub> = 100 μA
η <sub>v</sub>	Luminous Efficacy	3300		147		lumens Watt	See Note 3
		3400		570			
		3500		630			

## 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,  $\lambda_d$ , 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  $\eta_v$  is the luminous efficacy in lumens/watt.

# Yellow HLMP-3400 Series

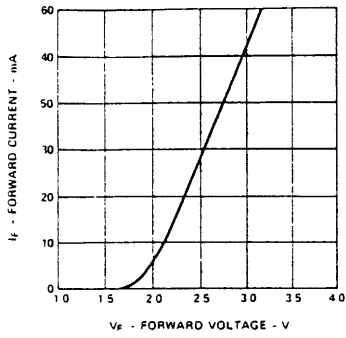


Figure 7. Forward Current vs. Forward Voltage Characteristics.

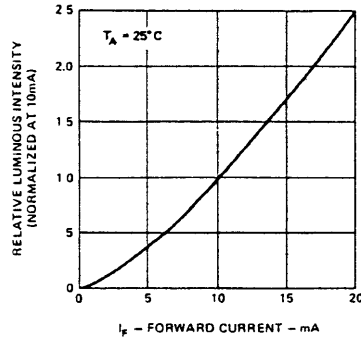


Figure 8. Relative Luminous Intensity vs. Forward Current.

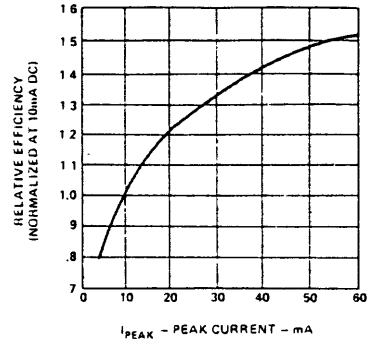


Figure 9. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

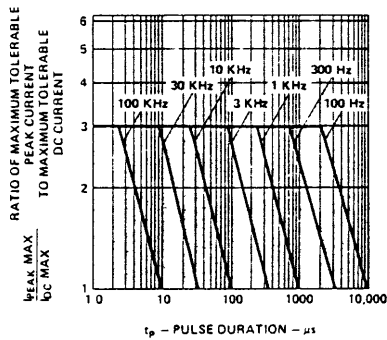


Figure 10. Maximum Tolerable Peak Current vs. Pulse Duration. ( $I_{DC}$  MAX as per MAX Ratings)

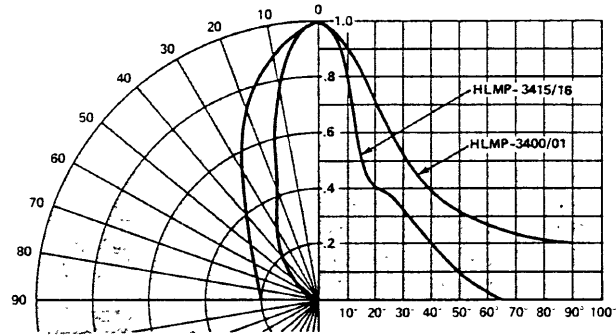


Figure 11. Relative Luminous Intensity vs. Angular Displacement.

# Green HLMP-3500 Series

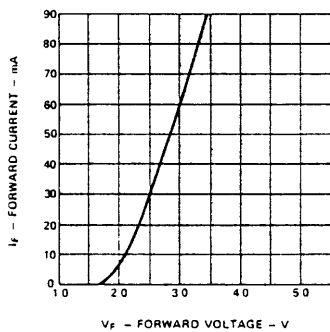


Figure 12. Forward Current vs. Forward Voltage Characteristics.

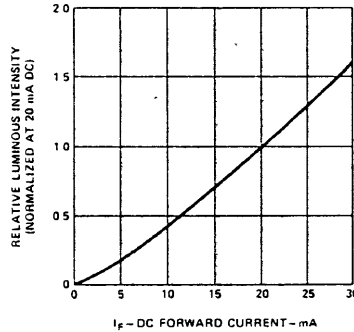


Figure 13. Relative Luminous Intensity vs. DC Forward Current.

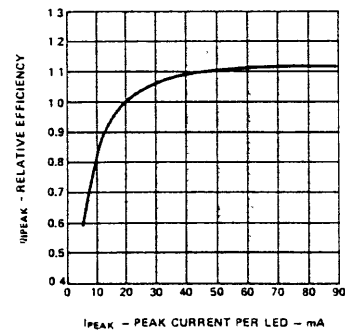


Figure 14. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.

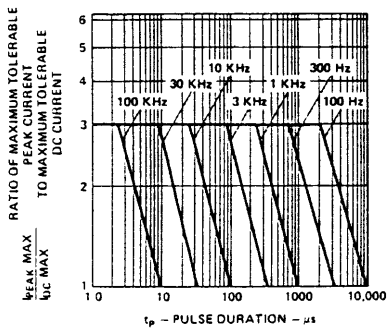


Figure 15. Maximum Tolerable Peak Current vs. Pulse Duration. ( $I_{DC}$  MAX as per MAX Ratings)

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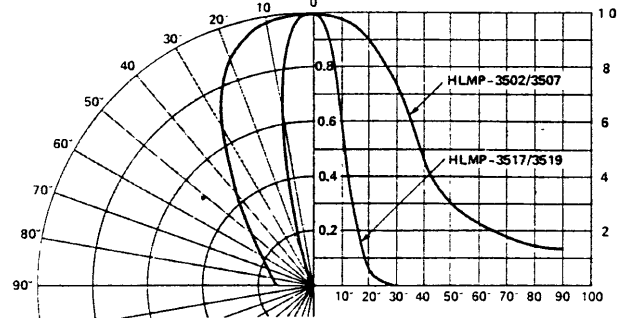


Figure 16. Relative Luminous Intensity vs. Angular Displacement. T-1 3/4 Lamp.

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

Parameter	3300 Series	3400 Series	3500 Series	Units
Peak Forward Current	90	60	90	mA
Average Forward Current <sup>[1]</sup>	25	20	25	mA
DC Current <sup>[2]</sup>	30	20	30	mA
Power Dissipation <sup>[3]</sup>	135	85	135	mW
Operating Temperature Range	-55 to +100	-55 to +100	-40 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:

- See Figure 5 (Red), 10 (Yellow) or 15 (Green) to establish pulsed operating conditions.
- For Red 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.
- For Red and Green series derate power linearly from 25° C at 1.8 mW/° C. For Yellow series derate power linearly from 50° C at 1.6 mW/° C.

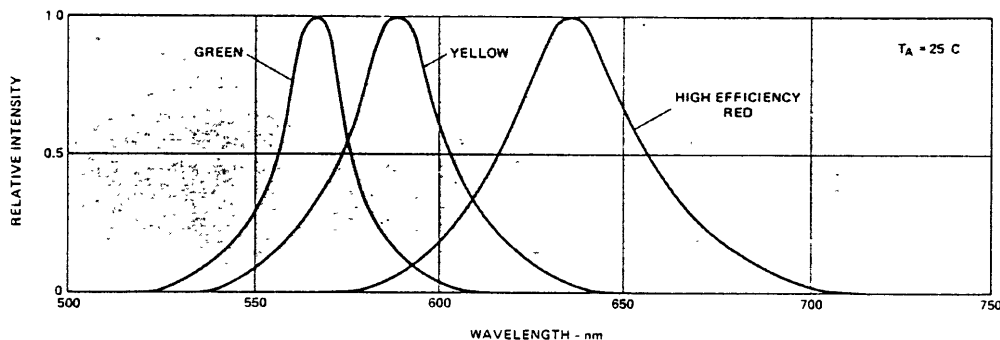


Figure 1. Relative Intensity vs. Wavelength

## High Efficiency Red HLMP-3300 Series

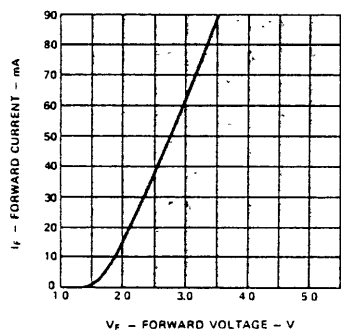


Figure 2. Forward Current vs. Forward Voltage Characteristics.

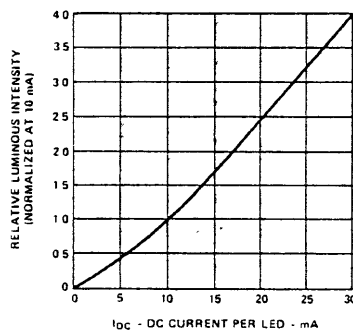


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

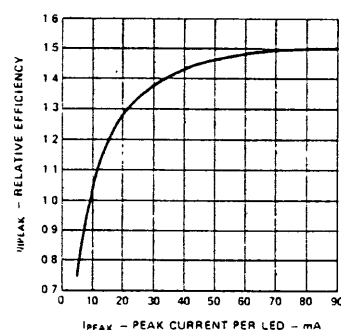


Figure 4. Relative Efficiency (Luminous Intensity per Unit Current) vs. LED Peak Current.

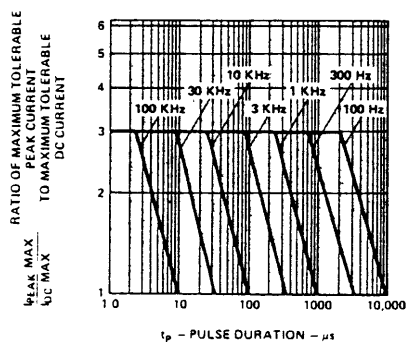


Figure 5. Maximum Tolerable Peak Current vs. Pulse Duration. ( $I_{DC\ MAX}$  as per MAX Ratings)

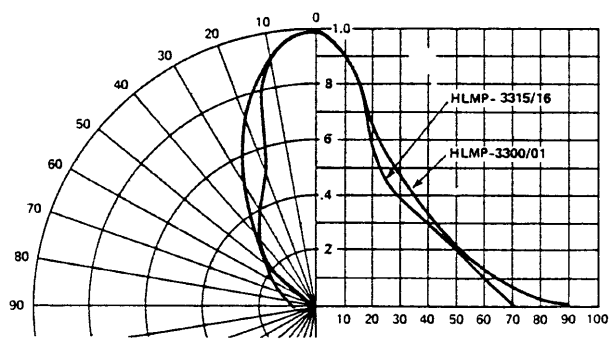


Figure 6. Relative Luminous Intensity vs. Angular Displacement.

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