



T-1^{3/4} (5 mm) High Intensity LED Lamps

Technical Data

HLMP-331x Series**HLMP-341x Series****HLMP-351x Series**

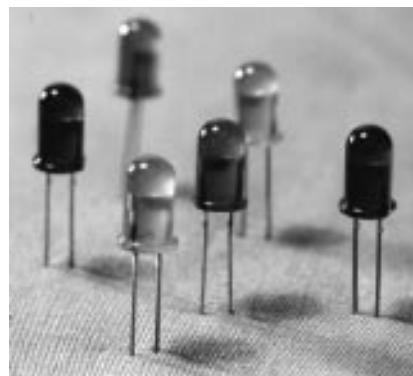
Features

- **High Intensity**
- **Choice of 3 Bright Colors**
High Efficiency Red
Yellow
High Performance Green
- **Popular T-1^{3/4} Diameter Package**
- **Selected Minimum Intensities**
- **Narrow Viewing Angle**
- **General Purpose Leads**

- **Reliable and Rugged**
- **Available on Tape and Reel**

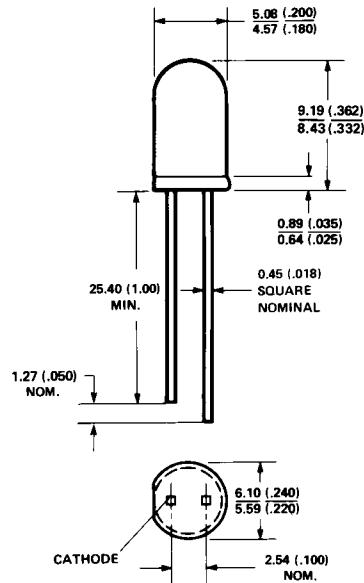
Description

This family of T-1^{3/4} nondiffused LED lamps is specially designed for applications requiring higher on-axis intensity than is achievable with a standard lamp. The light generated is focused to a narrow beam to achieve this effect.

**Selection Guide**

Color	Part Number	Luminous Intensity I _v (mcd) @ 10 mA	
		Min.	Max.
Red	HLMP-3315	13.8	-
	HLMP-3317	22.00	-
	HLMP-3316-I00xx	22.0	-
	HLMP-3316-LJ0xx	22.0	70.4
Yellow	HLMP-3415	9.2	-
	HLMP-3416	14.7	-
	HLMP-3416-G00xx	14.7	-
	HLMP-3416-LJ0xx	37.6	120.2
Green	HLMP-3517	6.7	-
	HLMP-3519	10.6	-
	HLMP-3519-F00xx	10.6	-
	HLMP-3519-LJ0xx	43.6	139.6

Package Dimensions



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

Part Numbering System

HLMP - 3 x 1 x - x x x xx

Mechanical Option

- 00: Bulk
- 01: Tape & Reel, Crimped Leads
- 02: Tape & Reel, Straight Leads
- B1: Right Angle Housing, Uneven Leads
- B2: Right Angle Housing, Even Leads

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

Brightness Level

- 5, 7: Less Brightness
- 6, 9: Higher Brightness

Color Options

- 3: GaP HER
- 4: GaP Yellow
- 5: GaP Green

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

Symbol	Description	Device HLMP-	Min.	Typ.	Max.	Units	Test Conditions
I_V	Luminous Intensity	3315	13.8	40.0		med	$I_F = 10 \text{ mA}$ (Figure 3)
		3316	22	60.0			
		3415	9.2	40.0		med	$I_F = 10 \text{ mA}$ (Figure 8)
$2\theta^{1/2}$	Including Angle Between Half Luminous Intensity Points	3416	14.7	50.0			
		3517	6.7	50.0		med	$I_F = 10 \text{ mA}$ (Figure 13)
		3519	10.6	70.0			
λ_{PEAK}	Peak Wavelength	3315		35		Deg.	$I_F = 10 \text{ mA}$ See Note 1 (Figure 6)
		3316		35			
		3415		35		Deg.	$I_F = 10 \text{ mA}$ See Note 1 (Figure 11)
λ_d	Dominant Wavelength	3416		35		Deg.	$I_F = 10 \text{ mA}$ See Note 1 (Figure 16)
		3517		24			
		3519		24			
$\Delta\lambda_{1/2}$	Spectral Line Halfwidth	331X		635		nm	Measurement at Peak (Figure 1)
		341X		583			
		351X		565			
τ_s	Speed of Response	331X		40		nm	
		341X		36			
		351X		28			
λ_d	Dominant Wavelength	331X		626		nm	See Note 2 (Figure 1)
		341X		585			
		351X		569			
C	Capacitance	331X		90		ns	
		341X		90			
		351X		500			
$R\theta_{J-PIN}$	Thermal Resistance	331X		11		pF	$V_F = 0; f = 1 \text{ MHz}$
		341X		15			
		351X		18			
V_F	Forward Voltage	331X		260		°C/W	Junction to Cathode Lead
		341X					
		351X					
V_R	Reverse Breakdown Volt.	331X		1.9	2.4	V	$I_F = 10 \text{ mA}$ (Figure 2)
		341X		2.0	2.4		$I_F = 10 \text{ mA}$ (Figure 7)
		351X		2.1	2.7		$I_F = 10 \text{ mA}$ (Figure 12)
η_V	Luminous Efficacy	All	5.0			V	$I_R = 100 \mu\text{A}$
		331X		145		lumens	See Note 3
		341X		500		Watt	
		351X		595			

Notes:

- $\theta_{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
- The dominant wavelength, λ_d , is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
- 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 $T_A = 25^\circ\text{C}$

Parameter	331X Series	341X Series	351X Series	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 ($I_R = 100 \mu\text{A}$)	5	5	5	V
Transient Forward Current ^[4] (10 μsec Pulse)	500	500	500	mA
LED Junction Temperature	110	110	110	$^\circ\text{C}$
Operating Temperature Range	-55 to +100	-55 to +100	-20 to +100	$^\circ\text{C}$
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), 10 (Yellow), or 15 (Green) to establish pulsed operating conditions.
2. 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.
3. 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.
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.

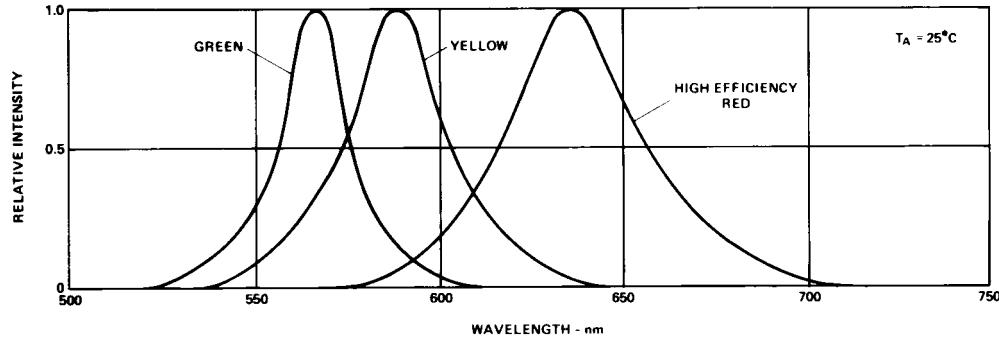


Figure 1. Relative Intensity vs. Wavelength.

High Efficiency Red HLMP-331X Series

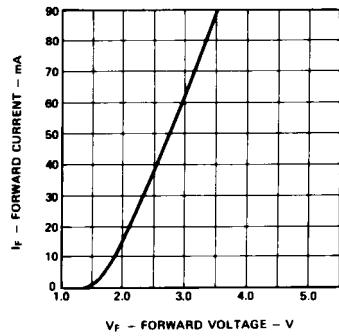


Figure 2. Forward Current vs. Forward Voltage Characteristics.

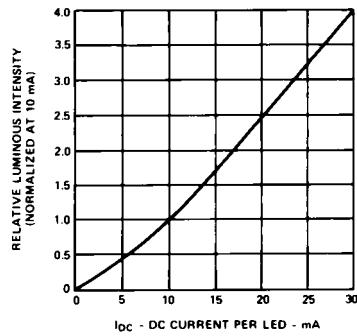


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

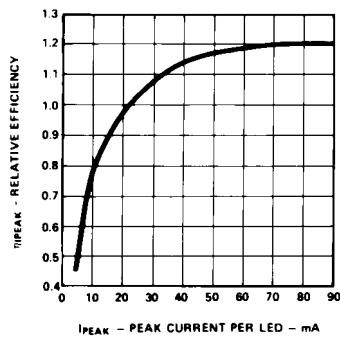


Figure 4. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.

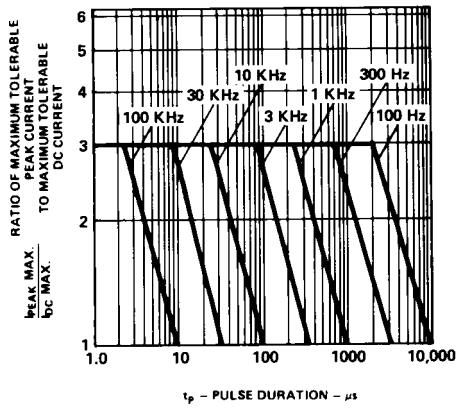


Figure 5. Maximum Tolerable Peak Current vs. Pulse Duration ($I_{DC\ MAX}$ as per MAX Ratings).

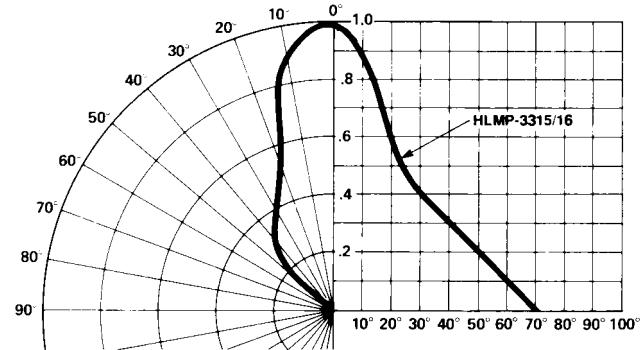


Figure 6. Relative Luminous Intensity vs. Angular Displacement.

Yellow HLMP-341X Series

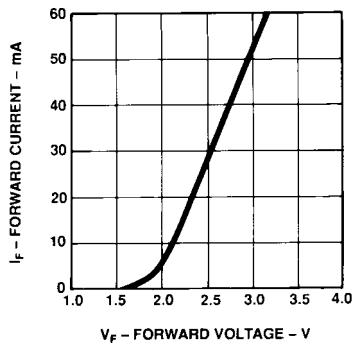


Figure 7. Forward Current vs. Forward Voltage Characteristics.

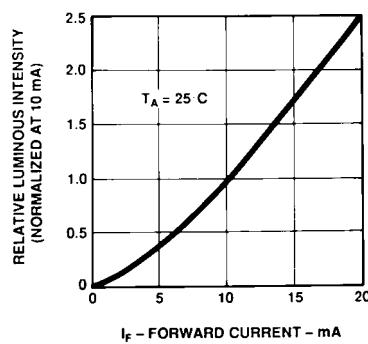


Figure 8. Relative Luminous Intensity vs. DC Forward Current.

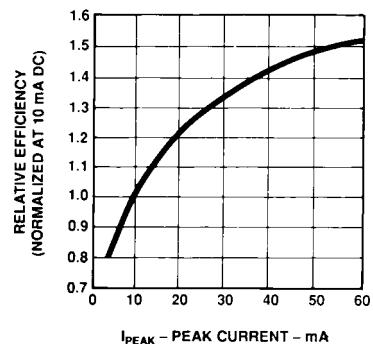


Figure 9. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

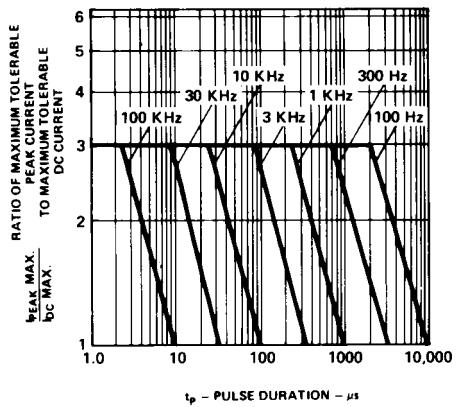


Figure 10. Maximum Tolerable Peak Current vs. Pulse Duration (I_{DC MAX} as per MAX Ratings).

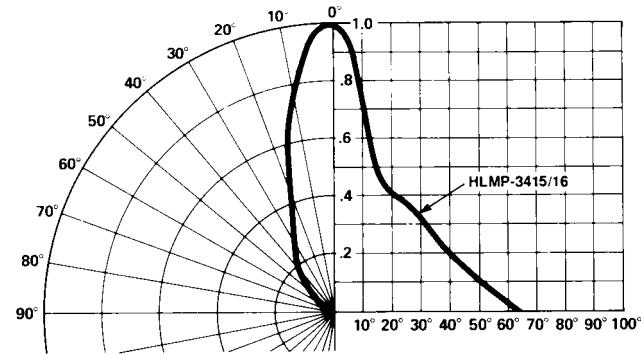


Figure 11. Relative Luminous Intensity vs. Angular Displacement.

Green HLMP-351X Series

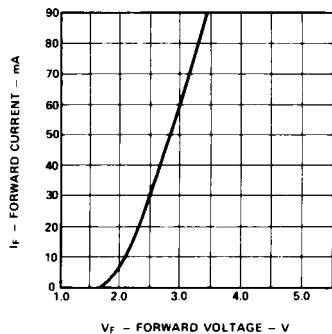


Figure 12. Forward Current vs. Forward Voltage Characteristics.

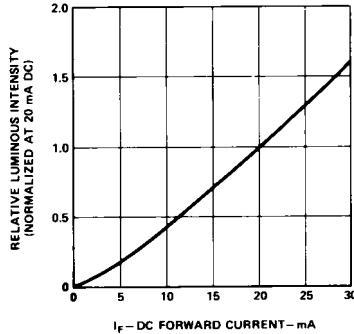


Figure 13. Relative Luminous Intensity vs. DC Forward Current.

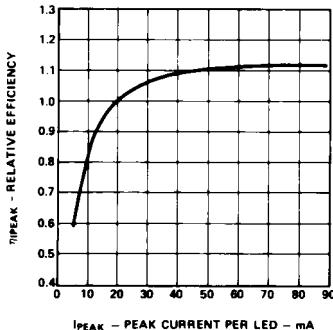


Figure 14. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak LED Current.

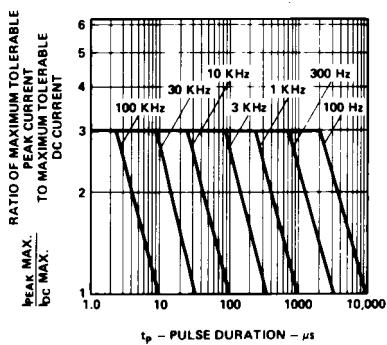


Figure 15. Maximum Tolerable Peak Current vs. Pulse Duration (I_{DC MAX} as per MAX Ratings).

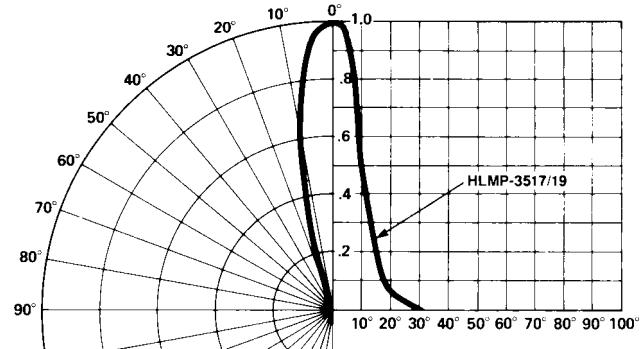


Figure 16. Relative Luminous Intensity vs. Angular Displacement. T-1^{3/4} Lamp.

Table 2. Intensity Bin Limit

Color	Bin	Intensity Range (mcd)	
		Min.	Max.
Red	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

Table 2. (Cont'd)

Color	Bin	Intensity Range (mcd)	
		Min.	Max.
Yellow	G	16.6	26.5
	H	26.5	42.3
	I	42.3	67.7
	J	67.7	108.2
	K	108.2	173.2
	L	173.2	250.0
	M	250.0	360.0
	N	360.0	510.0
	O	510.0	800.0
	P	800.0	1250.0
	Q	1250.0	1800.0
	R	1800.0	2900.0
	S	2900.0	4700.0
	T	4700.0	7200.0
	U	7200.0	11700.0
	V	11700.0	18000.0
	W	18000.0	27000.0

Table 2. (Cont'd)

Color	Bin	Intensity Range (mcd)	
		Min.	Max.
Green	E	7.6	12.0
	F	12.0	19.1
	G	19.1	30.7
	H	30.7	49.1
	I	49.1	78.5
	J	78.5	125.7
	K	125.7	201.1
	L	201.1	289.0
	M	289.0	417.0
	N	417.0	680.0
	O	680.0	1100.0
	P	1100.0	1800.0
	Q	1800.0	2700.0
	R	2700.0	4300.0
	S	4300.0	6800.0
	T	6800.0	10800.0
	U	10800.0	16000.0
	V	16000.0	25000.0
	W	25000.0	40000.0

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

Color Categories

Color	Cat #	Lambda (nm)	
		Min.	Max.
Green	6	561.5	564.5
	5	564.5	567.5
	4	567.5	570.5
	3	570.5	573.5
	2	573.5	576.5
Yellow	1	582.0	584.5
	3	584.5	587.0
	2	587.0	589.5
	4	589.5	592.0
	5	592.0	593.0

Tolerance for each bin limit is \pm 0.5 nm.

Mechanical Option Matrix

Mechanical Option Code	Definition
00	Bulk Packaging, minimum increment 500 pcs/bag
01	Tape & Reel, crimped leads, minimum increment 1300 pcs/bag
02	Tape & Reel, straight leads, minimum increment 1300 pcs/bag
B1	Right Angle Housing, uneven leads, minimum increment 500 pcs/bag
B2	Right Angle Housing, even leads, minimum increment 500 pcs/bag

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.



Agilent Technologies

www.semiconductor.agilent.com

Data subject to change.

Copyright © 2001 Agilent Technologies, Inc.

July 16, 2001

Obsoletes 5964-9293E (4/96)

5988-2146EN