

T-1 (3 mm) Auto Insertable LED Lamps

Technical Data



HP SunPower Series

HLMP-N20X	HLMP-NG05
HLMP-N30X	HLMP-NH01
HLMP-N40X	HLMP-NJ01
HLMP-N50X	HLMP-NL05
HLMP-N60X	HLMP-N10X

Features

- **T-1 (3 mm) Auto Insertable Package**
- **AllInGaP SunPower Intensity**
- **High Light Output**
- **Tinted Diffused and Tinted Non-diffused Lens Options**
- **Wide Viewing Angle**
- **Variety of Colors**
- **Available with Straight or Formed Lead Tape and Reel Options**

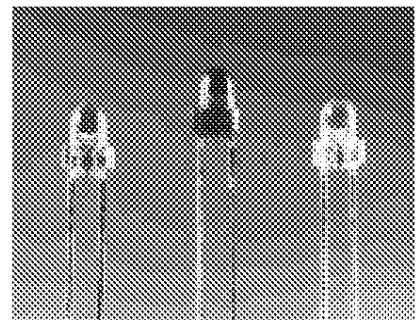
Description

This family of 3 mm LED Lamps is capable of withstanding automatic insertion and wave soldering processes.

Designed with a thick epoxy flange and soft leadframe material, it is ideal for clinch and cut operations.

Applications

- **General Purpose**
- **High Volume Manufacturing**



Device Selection Guides

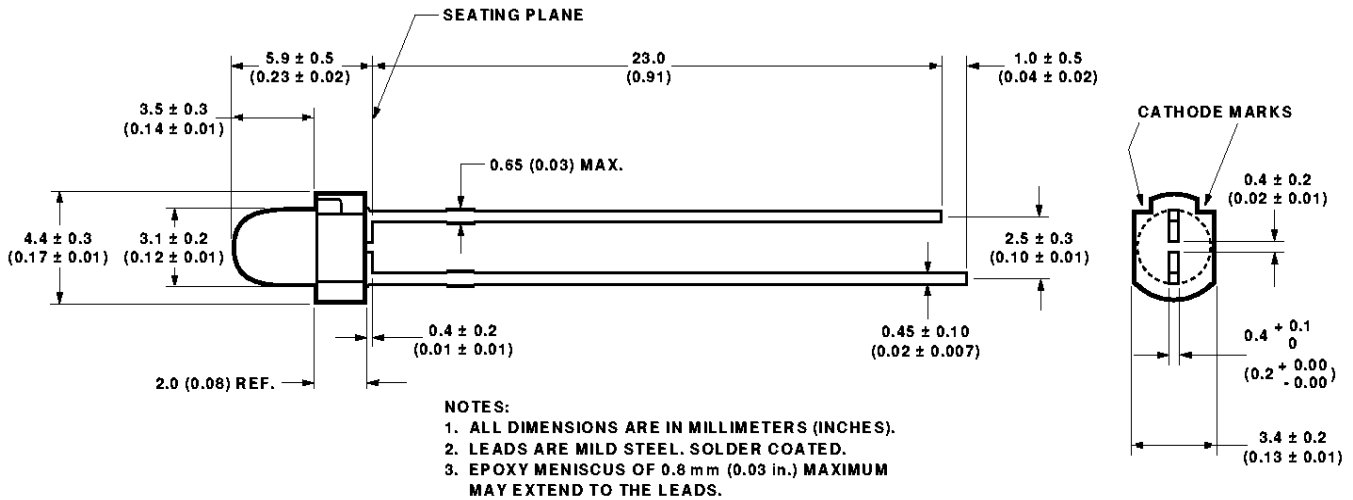
High Brightness Lamps		Package		Luminous Intensity	Viewing Angle
Color	Part Number	Diff.	Tint	Typ. mcd, If @ 20 mA	20 ¹ / ₂ (Degrees)
AllInGaP Red	HLMP-NG05		μ	250	45
AllInGaP Red Orange	HLMP-NH01			250	45
AllInGaP Orange	HLMP-NJ01			265	45
AllInGaP Amber	HLMP-NL05		μ	260	45
DH AS AlGaAs Red	HLMP-N100	X	μ	42	60
	HLMP-N105		μ	110	45

High Efficiency Lamps		Package		Luminous Intensity	Viewing Angle
Color	Part Number	Diff.	Tint	Typ. mcd, If @ 10 mA	20 ¹ / ₂ (Degrees)
High Efficiency Red (HER)	HLMP-N200	X	X	12	60
	HLMP-N205		X	38	45
Yellow	HLMP-N300	X	X	15	60
	HLMP-N305		X	27	45
Orange	HLMP-N400	X	X	22	60
	HLMP-N405		X	28	45
High Performance Green	HLMP-N500	X	X	28	60
	HLMP-N505		X	48	45
Emerald Green	HLMP-N600	X	μ	4.5	60
	HLMP-N605		μ	10	45

Note:

1. 20¹/₂ is the off axis angle where the luminous intensity is 1/2 the on axis intensity.

Package Dimensions



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

Parameter	High Efficiency Red and Orange	Yellow	High Performance Green & Emerald Green	DH AS AlGaAs Red	AlInGaP Amber, Orange, Red-Orange, & Red	Units
DC Forward Current ^[1]	30	20	30	30	30 ^[2,3]	mA
Reverse Voltage ($I_r = 100\ \mu\text{A}$)	5					V
Junction Temperature, T_{jmax}	110					$^\circ\text{C}$
Storage Temperature Range	-40 to +85					$^\circ\text{C}$
Operating Temperature Range	-20 to +85				-40 to +85	$^\circ\text{C}$
Lead Soldering Temperature [1.6 mm (0.063 in.) from seating plane]	A) DIP/DRAG Soldering: 260 $^\circ\text{C}$ for 5 seconds B) Wave Solder Temperature: 245 $^\circ\text{C}$ for 3 seconds					

Notes:

1. See Figure 4 for maximum current derating vs. ambient temperature.
2. Suggested minimum DC current: 10 mA
3. Maximum Peak Pulsed Forward Current: 50 mA, 30 mA average.

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

Part Number	Forward Voltage Vf (Volts)			Capacitance C (pF) Vf = 0, f = 1 MHz Typ.	Thermal Resistance $R_{\theta J-PIN}$ ($^\circ\text{C/W}$)	Speed of Response τ_s (ns) Time Constant e^{-t/τ_s} Typ.
	Typ.	Max.	If (mA)			
HLMP-N10X	1.80	2.2	20	30	290	30
HLMP-N20X	1.90	2.4	10	11	290	90
HLMP-N30X	2.00	2.4	10	15	290	90
HLMP-N40X	1.90	2.4	10	4	290	280
HLMP-N50X	2.10	2.7	10	18	290	500
HLMP-N60X	2.10	2.7	10	35	290	3100
HLMP-NLOX ^[1]	2.02	2.4	20	40	240	20
HLMP-NJ01 ^[1]	1.98	2.4	20	40	240	20
HLMP-NH0X ^[1]	1.94	2.4	20	40	240	20
HLMP-NG0X ^[1]	1.90	2.4	20	40	240	20

Note:

1. Please contact your Hewlett Packard Sales Representative about operating currents below 10 mA.

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

Part Number	Luminous Intensity I_v (mcd) ^[1]			Peak Wavelength λ_{peak} (nm) Typ.	Color Dominant Wavelength λ_d ^[2] (nm) Typ.	Spectral Half Width Typ.	Luminous Efficacy η_v ^[3] (lm/W)
	Min.	Typ.	If (mA)				
HLMP-N100	13.8	42	20	645	637	27	80
HLMP-N105	35.2	110	20				
HLMP-N200	8.6	12	10	635	626	40	145
HLMP-N205	13.8	38	10				
HLMP-N300	9.2	15	10	583	585	36	500
HLMP-N305	14.7	27	10				
HLMP-N400	5.4	22	10	600	604	37	380
HLMP-N405	13.8	28	10				
HLMP-N500	10.6	28	10	565	570	28	595
HLMP-N505	17	48	10				
HLMP-N600	1	4.5	10	558	560	24	656
HLMP-N605	4.2	10	10				
HLMP-NL05	147	260	20	592	590	17	480
HLMP-NJ01	138	265	20	609	605	17	370
HLMP-NH01	138	250	20	621	615	17	260
HLMP-NG05	138	250	20	635	626	17	150

Notes:

1. The luminous intensity, I_v , is measured at the mechanical axis of the lamp package. The actual peak of the spatial radiation pattern may not be aligned with this axis.
2. The dominant wavelength, λ_d , is derived from the CIE Chromaticity Diagram and represents the color of the device.
3. 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 η_v is the luminous efficacy in lumens/watt.

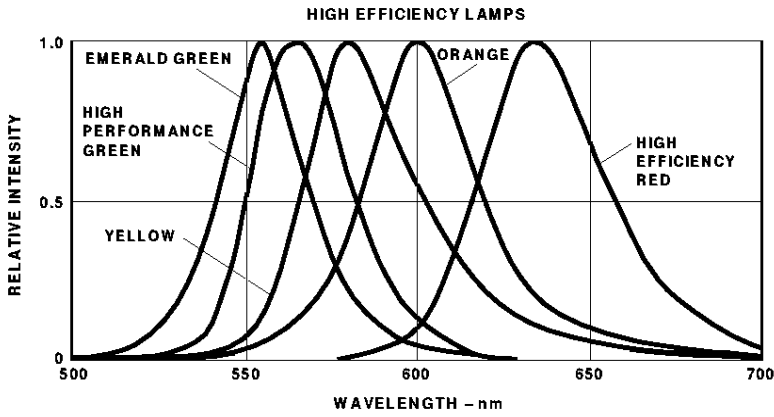
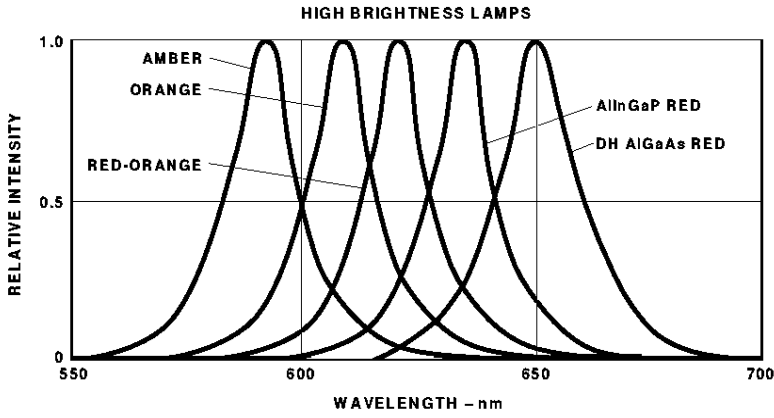


Figure 1. Relative Intensity vs. Peak Wavelength.

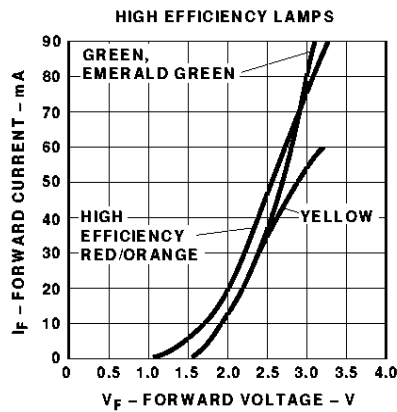
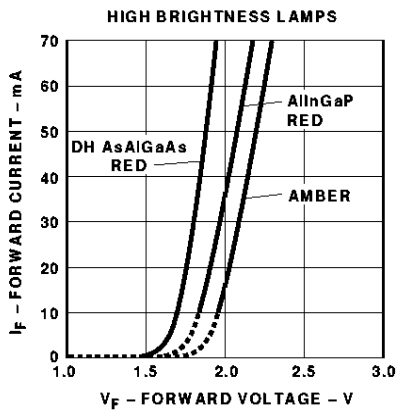


Figure 2. Forward Current vs. Forward Voltage.

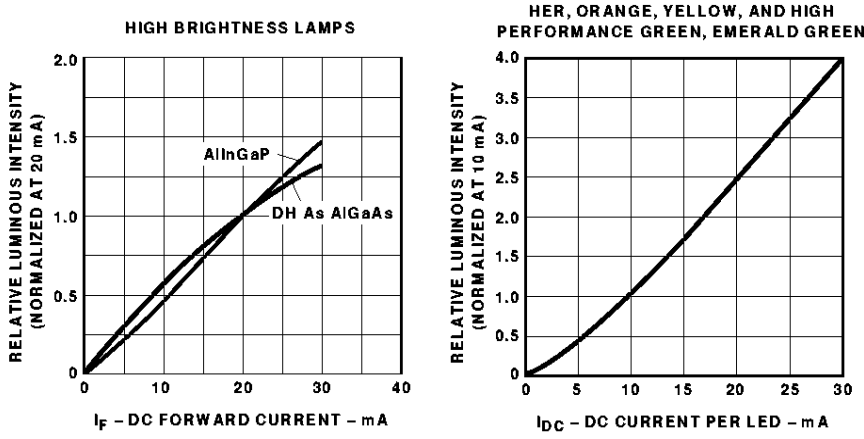


Figure 3. Relative Luminous Intensity vs. Forward Current.

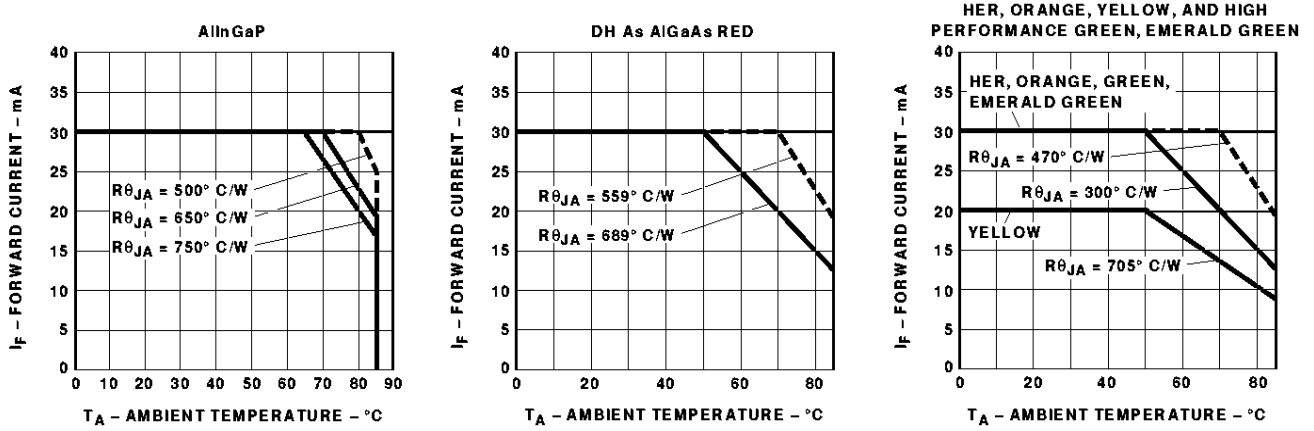


Figure 4. Maximum Forward DC Current vs. Ambient Temperature.

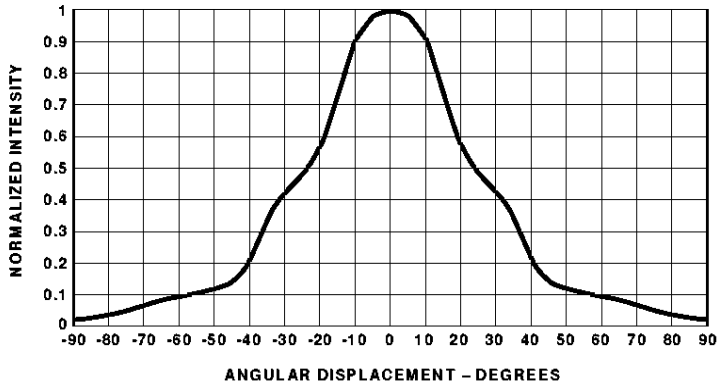


Figure 5. Representative Spatial Radiation Pattern for 45° Viewing Angle.

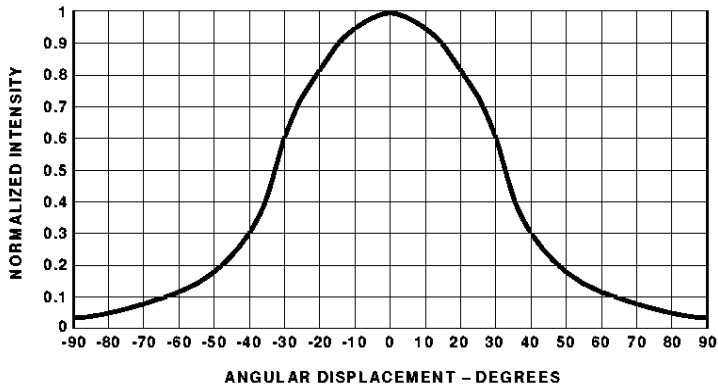


Figure 6. Representative Spatial Radiation Pattern for 60° Viewing Angle.

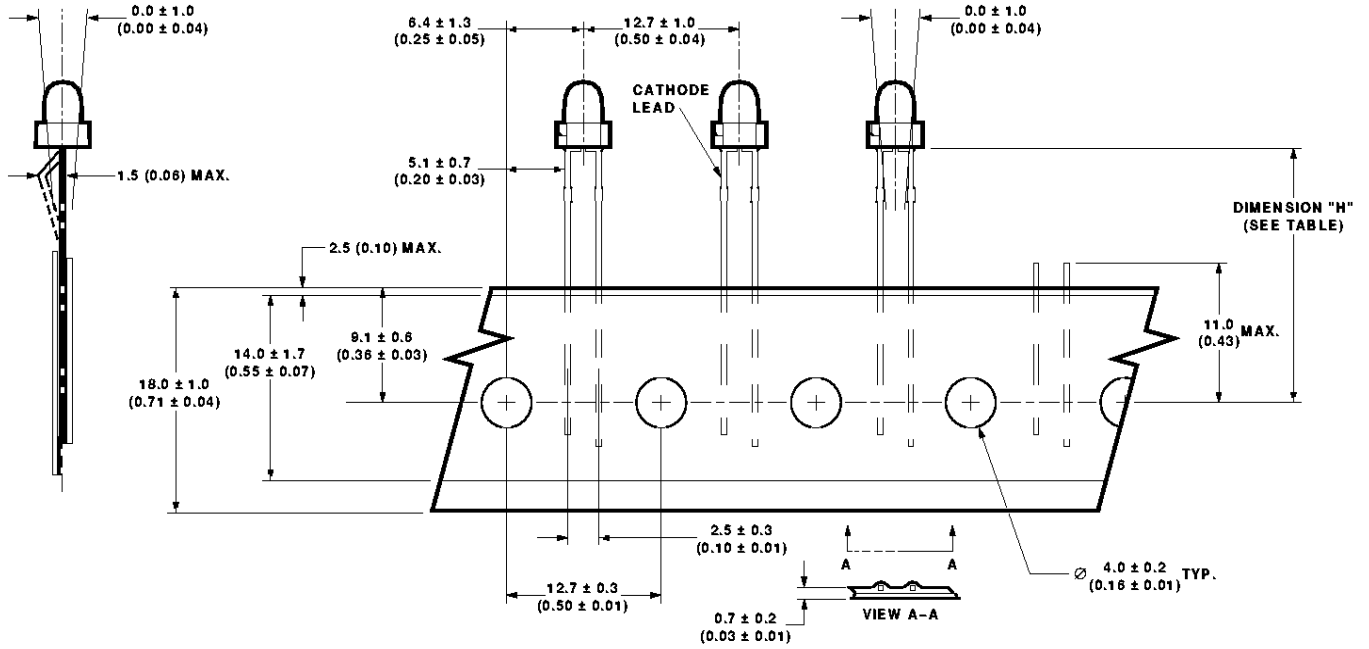
Taping Options

Option	Straight Lead		
	#002	#2CA	#2CD
Dimension "B"	-	-	-
Dimension "H"	20.5 ± 1.0 (0.81 ± 0.04)	18.0 ± 1.0 (0.71 ± 0.04)	20.5 ± 1.0 (0.81 ± 0.04)

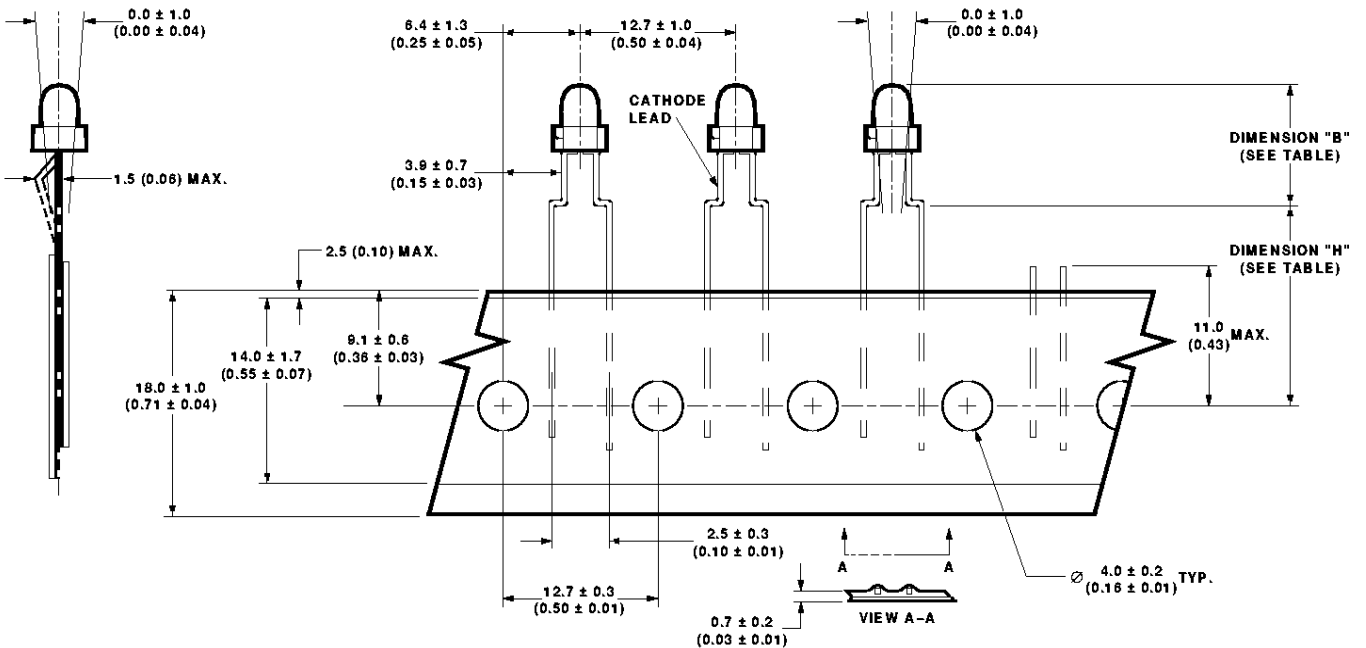
Option	Formed Lead						
	#2UK	#2UL	#2UM	#2UN	#2UP	#2UQ	#2UR
Dimension "B"	12.0 ± 1.0 (0.47 ± 0.04)	9.0 ± 1.0 (0.35 ± 0.04)	10.0 ± 1.0 (0.39 ± 0.04)	11.0 ± 1.0 (0.43 ± 0.04)	13.0 ± 1.0 (0.51 ± 0.04)	14.0 ± 1.0 (0.55 ± 0.04)	15.0 ± 1.0 (0.59 ± 0.04)
Dimension "H"	16.0 ± 1.0 (0.63 ± 0.04)						

Units: mm (inches)

Tape Outline Drawing



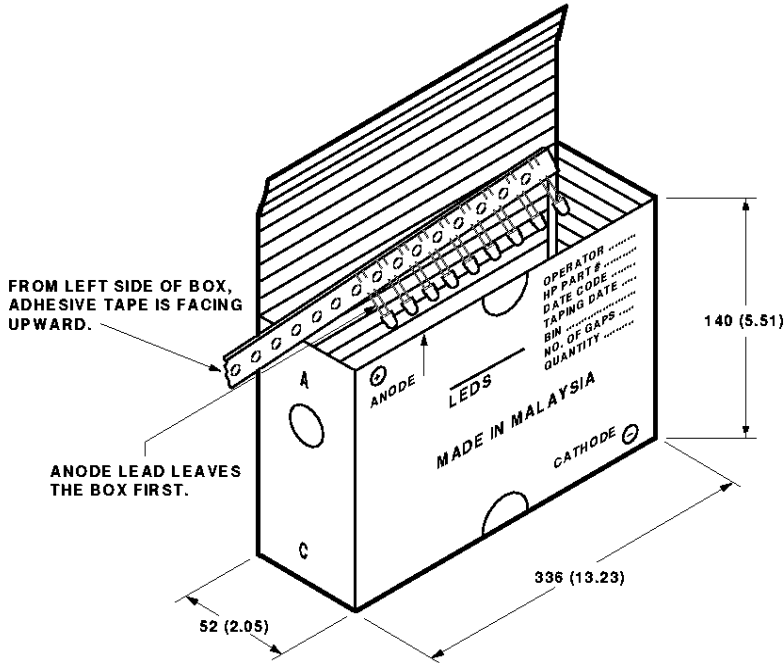
STRAIGHT LEAD



FORMED LEAD

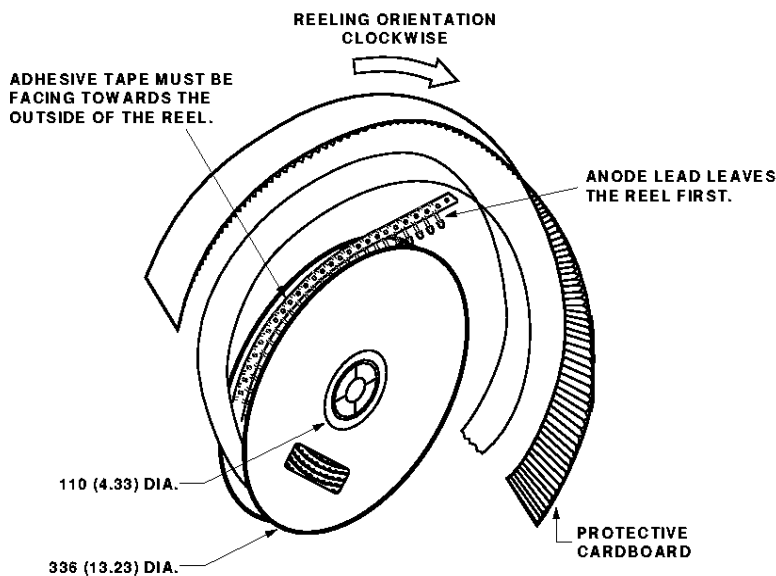
Package Options

Lead Option	Ammo Pack (1000 pcs.)	Tape & Reel (2000 pcs.)
Straight Lead	#2C —	#002
Formed Lead	#2U —	—



DIMENSIONS IN MILLIMETERS (INCHES).

AMMO PACK (for All options except #002)



DIMENSIONS IN MILLIMETERS (INCHES).

TAPE & REEL (for option #002 only)

Recommended Assembly Condition

- A single-sided phenolic printed circuit board (PCB) is preferred. Double-sided PCB and other materials may cause greater lead stress. Recommended through-hole diameter is 0.9 to 2.0 mm. Leadlength below the PCB should be 1.5 to 2.0 mm, and the clinching angle (angle between the lead and PCB) should be 30 ± 10 degrees.
- If SMT devices and an adhesive are used on the same pcb as these lamps, the adhesive should be cured before the lamps are auto-inserted. If curing must be done after lamp insertion, the cure temperature and time should not exceed 140°C, 100 seconds. This is the temperature of the surface normal to the IR source.

Solder Condition:

Preheat: Temperature ramp rate of 2 to 4°C per second. Do not exceed 150°C delta temperature between preheat and solder temperatures. The maximum time at preheat should not exceed 10 seconds.

Solder: 245°C maximum, 3 seconds (1.6 mm below seating plane).

For technical assistance or the location of your nearest Hewlett-Packard sales office, distributor or representative call:

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

Far East/Australasia: Call your local HP sales office.

Japan: (81 3) 3335-8152

Europe: Call your local HP sales office.

Data subject to change.

Copyright © 1997 Hewlett-Packard Co.

Printed in U.S.A. 5965-9779E (7/97)