Subminiature High Performance AlInGaP LED Lamps

Technical Data

SunPower Series
HLMA-PH00 HLMT-PH00
HLMA-PL00 HLMT-PL00
HLMA-QH00 HLMT-QH00
HLMA-QL00 HLMT-QL00

Features

- **Subminiature Flat Top Package**
  Ideal for Backlighting and Light Piping Applications
- **Subminiature Dome Package**
  Nondiffused Dome for High Brightness
- **Wide Range of Drive Currents**
- **Colors: 590 nm Amber, 615 nm Reddish-Orange**
- **Ideal for Space Limited Applications**
- **Axial Leads**
- **Available with Lead Configurations for Surface Mount and Through Hole PC Board Mounting**

Description

Flat Top Package

The HLMX-PXXX flat top lamps use an untinted, nondiffused, truncated lens to provide a wide radiation pattern that is necessary for use in backlighting applications. The flat top lamps are also ideal for use as emitters in light pipe applications.

Dome Packages

The HLMX-QXXX dome lamps use an untinted, nondiffused lens to provide a high luminous intensity within a narrow radiation pattern.

Lead Configurations

All of these devices are made by encapsulating LED chips on axial lead frames to form molded epoxy subminiature lamp packages. A variety of package configuration options is available. These include special surface mount lead configurations, gull wing, yoke lead, or Z-bend. Right angle lead bends at 2.54 mm (0.100 inch) and 5.08 mm (0.200 inch) center spacing are available for through hole mounting. For more information refer to Standard SMT and Through Hole Lead Bend Options for Subminiature LED Lamps data sheet.

Technology

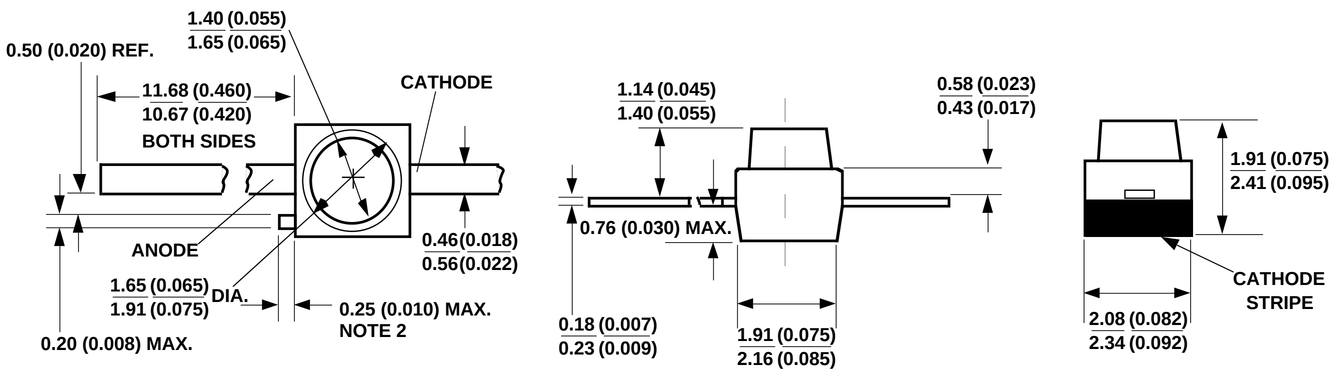
These subminiature solid state lamps utilize one of the two newly developed aluminum indium gallium phosphide (AlInGaP) LED technologies, either the absorbing substrate carrier technology (AS = HLMA-Devices) or the transparent substrate carrier technology (TS = HLMT-Devices). The TS HLMT-Devices are especially effective in very bright ambient lighting conditions. The colors 590 nm amber and 615 nm reddish-orange are available with viewing angles of 15° for the domed devices and 125° for the flat top devices.

Device Selection Guide

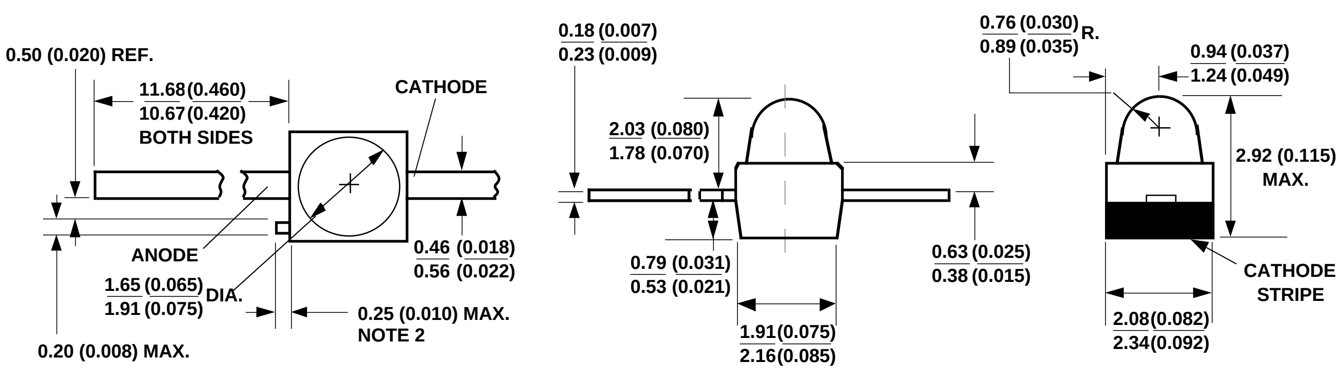
Package Description	Viewing Angle $2\theta^1/_2$	Amber λ_d = 590 nm	Reddish-Orange λ_d = 615 nm	Package Outline
Domed, Nondiffused Untinted	28°	HLMA-QL00 HLMT-QL00	HLMA-QH00 HLMT-QH00	B
Flat Top, Nondiffused, Untinted	125°	HLMA-PL00 HLMT-PL00	HLMA-PH00 HLMT-PH00	A

Package Dimensions

(A) Flat Top Lamps



(B) Domed Lamps, Diffused and Nondiffused



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).
2. PROTRUDING SUPPORT TAB IS CONNECTED TO CATHODE LEAD.

Absolute Maximum Ratings at T_A = 25°C

HLMA-QL00/QH00/PL00/PH00

Peak Forward Current[2] .... 200 mA
Average Forward Current (I_{PEAK} = 200 mA)[1,2] .... 45 mA
DC Forward Current[3,5,6] .... 50 mA
Power Dissipation .... 105 mW

HLMT-QL00/QH00/PL00/PH00

Peak Forward Current[2] .... 100 mA
Average Forward Current (I_{PEAK} = 100 mA)[1,2] .... 37 mA
DC Forward Current[3,5,6] .... 50 mA
Power Dissipation .... 120 mW

All Devices

Reverse Voltage (I_R = 100 µA) .... 5 V
Transient Forward Current (10 µs Pulse)[5] .... 500 mA
Operating Temperature Range .... -40 to +100°C
Storage Temperature Range .... -55 to +100°C
LED Junction Temperature .... 110°C
Lead Soldering Temperature
  [1.6 mm (0.063 in.) from body .... 260°C for 5 seconds
SMT Reflow Soldering Temperatures
  Convective Reflow .... 235°C Peak, above 183°C for 90 seconds
  Vapor Phase Reflow .... 215°C for 3 minutes

Notes:

1. Maximum I_{AVG} at f = 1 kHz.
2. Refer to Figure 6 to establish pulsed operating conditions.
3. Derate linearly as shown in Figure 4.
4. The transient peak current is the maximum non-recurring peak current these devices can withstand without damaging the LED die and wire bonds. Operation at currents above Absolute Maximum Peak Forward Current is not recommended.
5. Drive currents between 5 mA and 30 mA are recommended for best long term performance.
6. Operation at currents below 5 mA is not recommended, please contact your Hewlett-Packard sales representative.

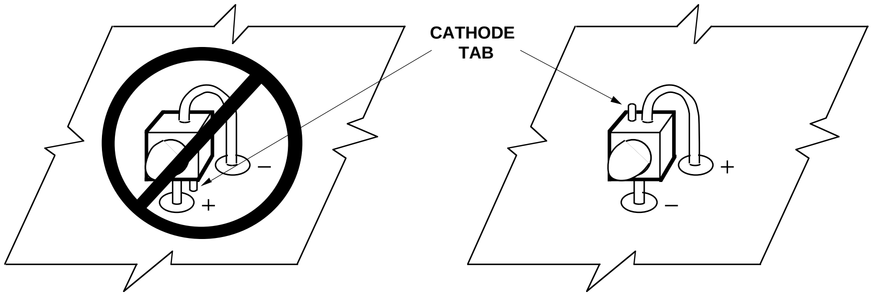


Figure 1. Proper Right Angle Mounting to a PC Board to Prevent Protruding Cathode Tab from Shorting to Anode Connection.

Optical Characteristics at T_A = 25°C

Part Number HLMA-	Luminous Intensity I_V (mcd) @ 20 mA[1] Min.	Typ.	Total Flux ϕ_V (mlm) @ 20 mA[2] Typ.	Peak Wavelength λ_{peak} (nm) Typ.	Color, Dominant Wavelength λ_d[3] (nm) Typ.	Viewing Angle 2 $\theta_{1/2}$ Degrees[4] Typ.	Luminous Efficacy η_v[5] (lm/w)
QL00	135	500	250	592	590	15	480
QH00	135	500	250	621	615	15	263
PL00	23	75	250	592	590	125	480
PH00	22	75	250	621	615	125	263
HLMT-							
QL00	300	1000	800	592	590	15	480
QH00	290	800	800	621	615	15	263
PL00	46	150	800	592	590	125	480
PH00	35	120	800	621	615	125	263

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. ϕ_v is the total luminous flux output as measured with an integrating sphere.
3. The dominant wavelength, λ_d, is derived from the CIE Chromaticity Diagram and represents the color of the device.
4. $\theta_{1/2}$ is the off-axis angle where the liminous intensity is 1/2 the peak intensity.
5. Radiant intensity, I_v, in watts/steradian, may be calculated from the equation $I_v = I_v/\eta_v$, where I_v is the luminous intensity in candelas and η_v is the luminous efficacy in lumens/watt.

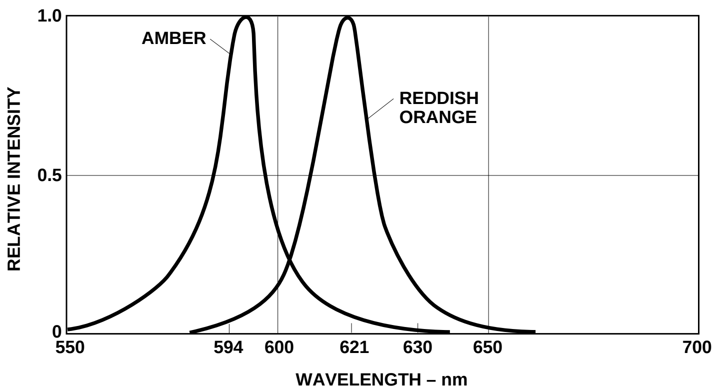


Figure 1. Relative Intensity vs. Wavelength. All Devices.

Electrical Characteristics at T_A = 25°C

Part Number HLMA-	Forward Voltage V_F (Volts) @ I_F = 20 mA Typ.	Max.	Reverse Breakdown V_R (Volts) @ I_R = 100 µA Min.	Typ.	Capacitance C (pF) V_F = 0, f = 1 MHz Typ.	Thermal Resistance $R\theta_{J\text{-}PIN}$ (°C/W)	Speed of Response τ_s (ns) Time Constant e^{-t/τ_s} Typ.
QL00	1.9	2.4	5	25	40	170	13
QH00	1.9	2.4	5	25	40	170	13
PL00	1.9	2.4	5	25	40	170	13
PH00	1.9	2.4	5	25	40	170	13
HLMT-							
QL00	2.0	2.4	5	20	70	170	13
QH00	2.0	2.4	5	20	70	170	13
PL00	2.0	2.4	5	20	70	170	13
PH00	2.0	2.4	5	20	70	170	13

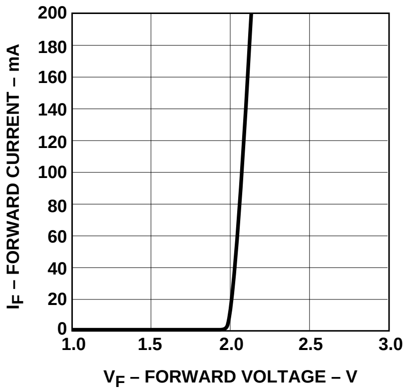


Figure 2a. Forward Current vs. Forward Voltage. HLMA-QL00/QH00/PL00/PH00.

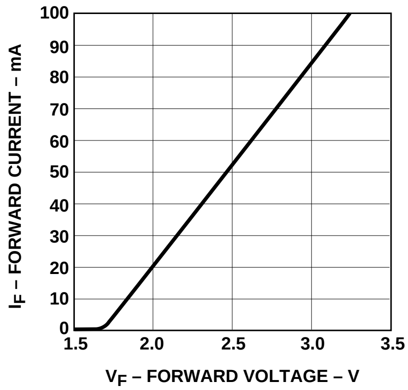


Figure 2b. Forward Current vs. Forward Voltage. HLMT-QL00/QH00/PL00/PH00.

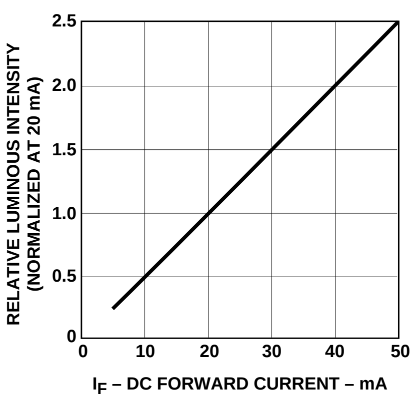


Figure 3a. Relative Luminous Intensity vs. DC Forward Current. HLMA-QL00/QH00/PL00/PH00.

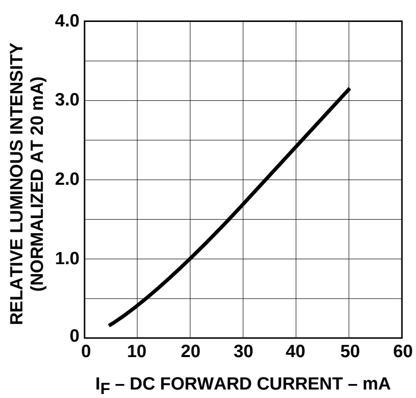


Figure 3b. Relative Luminous Intensity vs. DC Forward Current. HLMT-QL00/QH00/PL00/PH00.

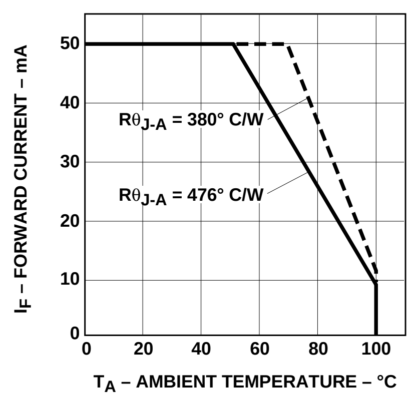


Figure 4. Maximum Forward Current vs. Ambient Temperature for HLMA-/HLMT-QL00/QH00/PL00/PH00. Derating Based on T_JMAX = 110 °C.

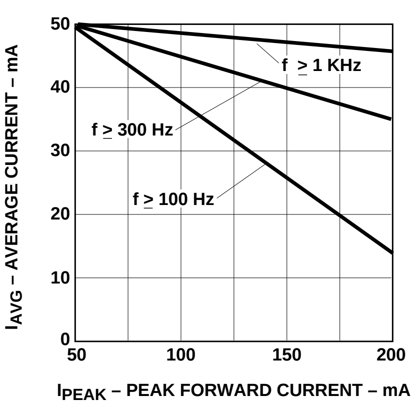


Figure 5a. Maximum Average Current vs. Peak Forward Current for HLMA-QL00/QH00/PL00/PH00.

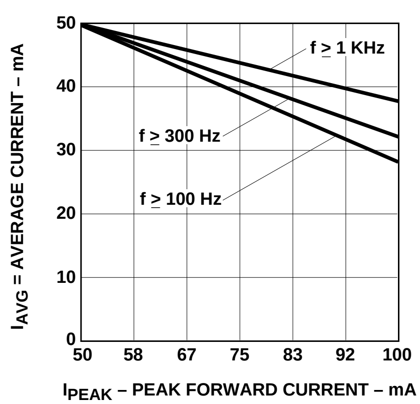


Figure 5b. Maximum Average Current vs. Peak Forward Current for HLMT-QL00/QH00/PL00/PH00.

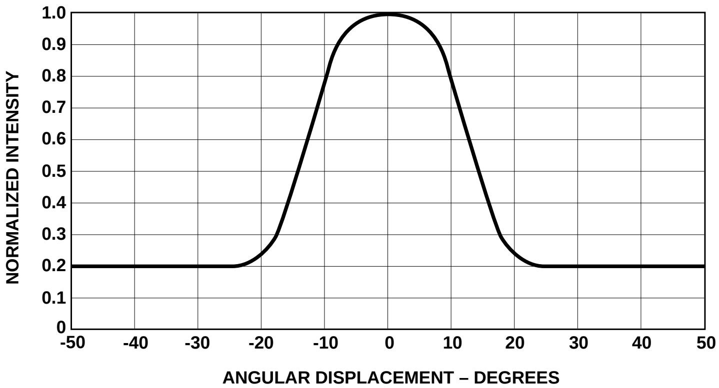


Figure 6. Relative Luminous Intensity vs. Angular Displacement for HLMA-/HLMT-QL00/-QH00.

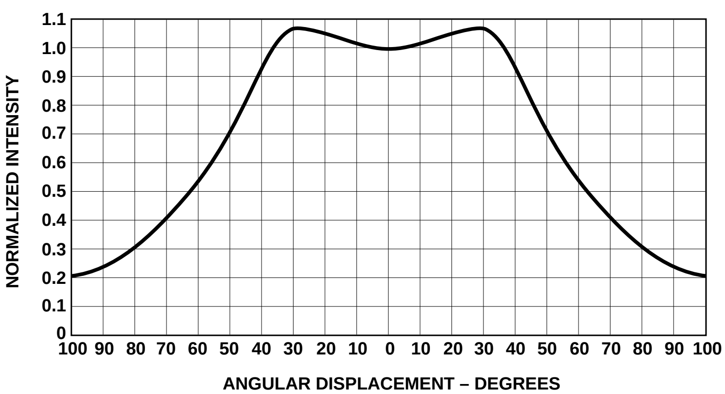


Figure 7. Relative Luminous Intensity vs. Angular Displacement for HLMA-/HLMT-PL00/-PH00.

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