

HLMA-Qx00, HLMA-Px00 HLMT-Px00 and HLMT-Qx00

Subminiature High Performance AlInGaP LED Lamps



Data Sheet

SunPower Series

HLMA-PF00, HLMA-PG00, HLMA-PH00, HLMA-PL00, HLMA-QF00, HLMA-QG00, HLMA-QH00, HLMA-QL00, HLMT-PG00, HLMT-PH00, HLMT-PL00, HLMT-QG00, HLMT-QH00, HLMT-QL00

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.

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, 605 nm Orange, 615 nm Reddish-Orange, 622/626 nm Red, and 635 nm Red
- Ideal for space limited applications
- Axial leads
- Available with lead configurations for surface mount and through hole PC board mounting

Technology

These subminiature solid state lamps utilize one of the two newly developed aluminum indium gallium phosphide (AlInGaP) LED technologies. The HLMT-Devices are especially effective in very bright ambient lighting conditions. The colors 590 nm amber, 605 nm orange, 615 nm reddish-orange, 622/626 nm red, and 635 nm red are available with viewing angles of 15° for the domed devices and 125° for the flat top devices.

Device Selection Guide

| Part Number | λ_d (nm) | Typ. I_V (mcd) | Package Description | Viewing Angle $2\theta^{1/2}$ | Package Outline |
|-------------|---------------------|---------------------|------------------------|----------------------------------|--------------------|
| HLMA-QL00 | 590 | 500 | Domed, | 15° | B |
| HLMT-QL00 | 590 | 1000 | Nondiffused, | | |
| HLMA-QJ00 | 605 | 500 | Untinted | | |
| HLMA-QH00 | 615 | 500 | | | |
| HLMT-QH00 | 615 | 800 | | | |
| HLMA-QG00 | 626 | 500 | | | |
| HLMT-QG00 | 622 | 1000 | | | |
| HLMA-QF00 | 635 | 500 | | | |
| HLMA-PL00 | 590 | 75 | Flat Top, | 125° | A |
| HLMT-PL00 | 590 | 150 | Nondiffused, | | |
| HLMA-PJ00 | 605 | 75 | Untinted | | |
| HLMA-PH00 | 615 | 75 | | | |
| HLMT-PH00 | 615 | 120 | | | |
| HLMA-PG00 | 626 | 75 | | | |
| HLMT-PG00 | 622 | 150 | | | |
| HLMA-PF00 | 635 | 75 | | | |

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

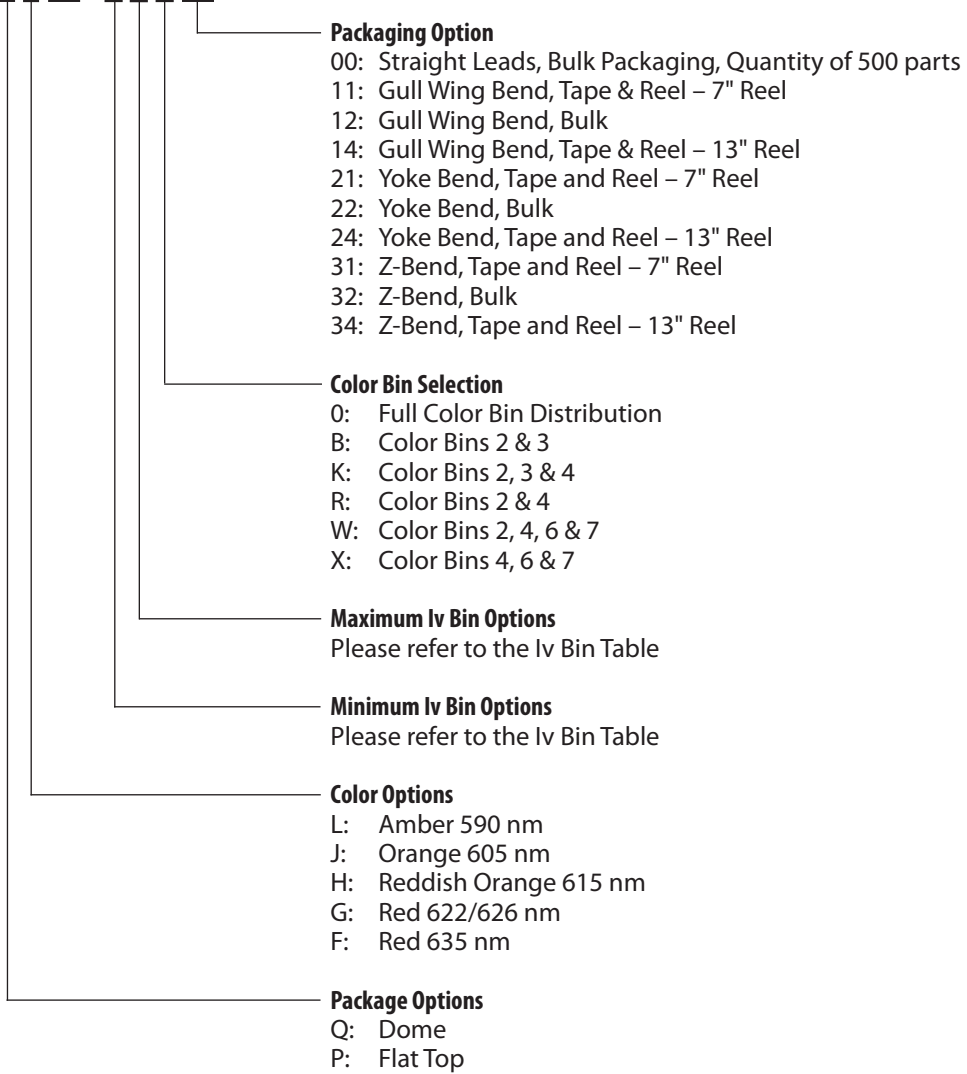
| Parameter | HLMA-xxxx | HLMT-xxxx | Unit |
|---|-----------|----------------------|------|
| Peak Forward Current ^[2] | 100 | 100 | mA |
| Average Forward Current ($I_{PEAK} = 100\text{ mA}$) ^[1,2] | 30 | 30 | mA |
| DC Forward Current ^[3,5,6] | 50 | 50 | mA |
| Power Dissipation | 120 | 130 | mW |
| Reverse Voltage ($I_R = 100\ \mu\text{A}$) | | 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 Temperature | | 260°C for 20 seconds | |

Notes:

1. Maximum I_{AVG} at $f = 1\text{ kHz}$.
2. Refer to Figure 5 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 10 mA and 30 mA are recommended for best long term performance.
6. Operation at currents below 5 mA is not recommended, please contact your Avago sales representative.

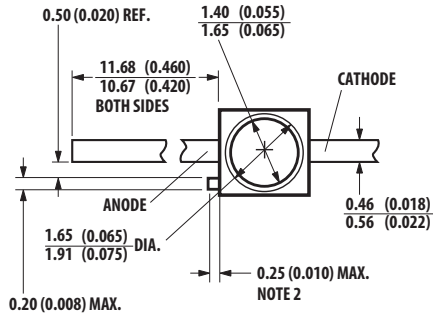
Part Numbering System

HLMx - x x 00 - x x x xx

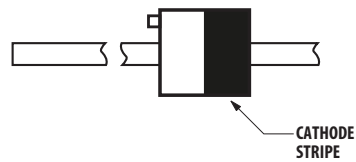
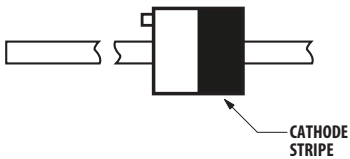
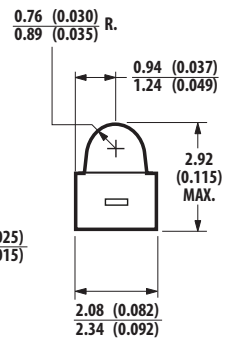
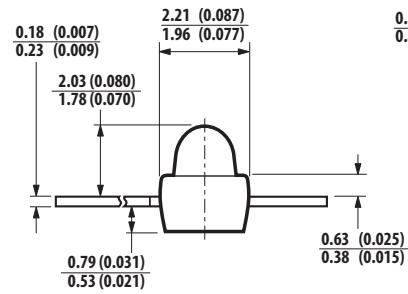
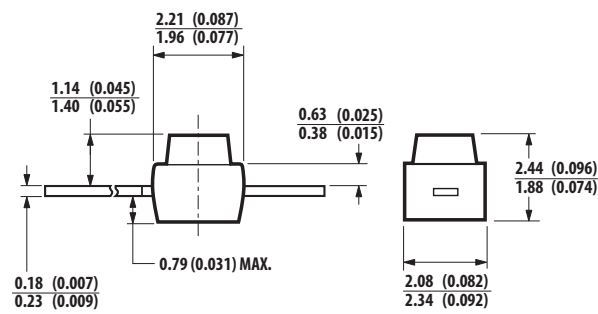
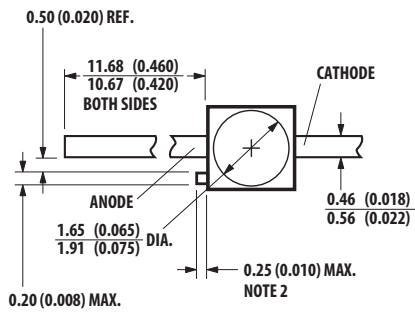


Package Dimensions

(A) Flat Top Lamps

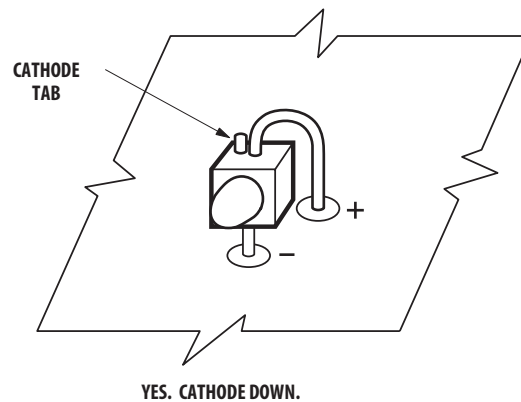
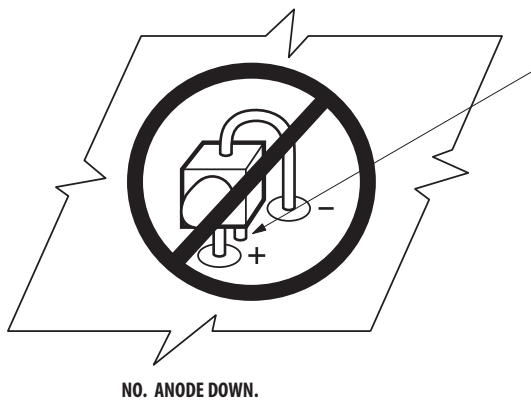


(B) Domed Lamps, Diffused and Nondiffused



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

Package Mounting



Proper right angle mounting to a PC board to prevent protruding cathode tab from shorting to anode connection.

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

| Part Number | Luminous Intensity I_v (mcd) @ 20 mA ^[1] | | | Total Flux ϕ_v (lm) @ 20 mA ^[2] | Peak Wavelength λ_{peak} (nm) | Color, Dominant Wavelength λ_d ^[3] (nm) | Viewing Angle $2\theta_{1/2}$ Degrees ^[4] | Luminous Efficacy η_v ^[5] (lm/w) |
|-----------------|--|------|------|---|--|---|---|---|
| | Min. | Typ. | Max. | Typ. | Typ. | Typ. | Typ. | Typ. |
| HLMA-QL00-S00xx | 160 | 500 | – | 250 | 592 | 590 | 15 | 480 |
| HLMA-QL00-TU0xx | 250 | – | 800 | 250 | 592 | 590 | 15 | 480 |
| HLMA-QL00-TUKxx | 250 | – | 800 | 250 | 592 | 590 | 15 | 480 |
| HLMA-QL00-TV0xx | 250 | – | 1250 | 250 | 592 | 590 | 15 | 480 |
| HLMA-QL00-TVKxx | 250 | – | 1250 | 250 | 592 | 590 | 15 | 480 |
| HLMA-QL00-UV0xx | 400 | – | 1250 | 250 | 592 | 590 | 15 | 480 |
| HLMA-QL00-UVRxx | 400 | – | 1250 | 250 | 592 | 590 | 15 | 480 |
| HLMA-QL00-UWBxx | 400 | – | 2000 | 250 | 592 | 590 | 15 | 480 |
| HLMT-QL00-T00xx | 250 | 1000 | – | 800 | 592 | 590 | 15 | 480 |
| HLMA-QJ00-S00xx | 160 | 500 | – | 250 | 609 | 605 | 15 | 370 |
| HLMA-QH00-S00xx | 160 | 500 | – | 250 | 621 | 615 | 15 | 263 |
| HLMA-QH00-T00xx | 250 | 500 | – | 250 | 621 | 615 | 15 | 263 |
| HLMA-QH00-UW0xx | 400 | – | 2000 | 250 | 621 | 615 | 15 | 263 |
| HLMT-QH00-T00xx | 250 | 500 | – | 800 | 621 | 615 | 15 | 263 |
| HLMT-QH00-WX0xx | 1000 | – | 3200 | 800 | 621 | 615 | 15 | 263 |
| HLMA-QG00-S00xx | 160 | 500 | – | 250 | 635 | 626 | 15 | 150 |
| HLMA-QG00-TV0xx | 250 | – | 1250 | 250 | 635 | 626 | 15 | 150 |
| HLMT-QG00-T00xx | 250 | 1000 | – | 800 | 635 | 622 | 15 | 150 |
| HLMA-QF00-S00xx | 160 | 500 | – | 250 | 650 | 635 | 15 | 110 |
| HLMA-PL00-N00xx | 25 | 75 | – | 250 | 592 | 590 | 125 | 480 |
| HLMA-PL00-PRRxx | 40 | – | 200 | 250 | 592 | 590 | 125 | 480 |
| HLMA-PL00-PRXxx | 40 | – | 200 | 250 | 592 | 590 | 125 | 480 |
| HLMA-PL00-QRXxx | 63 | – | 200 | 250 | 592 | 590 | 125 | 480 |
| HLMT-PL00-POWxx | 40 | 150 | – | 800 | 592 | 590 | 125 | 480 |
| HLMA-PJ00-N00xx | 25 | 75 | – | 250 | 609 | 605 | 125 | 370 |
| HLMA-PH00-N00xx | 25 | 75 | – | 250 | 621 | 615 | 125 | 263 |
| HLMT-PH00-P00xx | 40 | 120 | – | 800 | 621 | 615 | 125 | 263 |
| HLMA-PG00-N00xx | 25 | 75 | – | 250 | 635 | 626 | 125 | 150 |
| HLMT-PG00-P00xx | 40 | 150 | – | 800 | 635 | 622 | 125 | 150 |
| HLMA-PF00-N00xx | 25 | 75 | – | 250 | 640 | 635 | 125 | 110 |

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 luminous intensity is 1/2 the peak intensity.
5. Radiant intensity, I_e , in watts/steradian, may be calculated 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.

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

| Part Number | Forward Voltage V_F (Volts) @ $I_F = 20\text{mA}$ | | Reverse Breakdown Voltage V_R (Volts) @ $I_R = 100\mu\text{A}$ | | Thermal Resistance $R\theta_{J-PIN}$ ($^\circ\text{C}/\text{W}$) |
|-------------|--|------|---|------|--|
| | Typ. | Max. | Min. | Typ. | Typ. |
| HLMA-Qx00 | 1.9 | 2.4 | 5 | 25 | 170 |
| HLMT-Qx00 | 2.0 | 2.6 | 5 | 20 | 170 |
| HLMA-Px00 | 1.9 | 2.4 | 5 | 25 | 170 |
| HLMT-Px00 | 2.0 | 2.6 | 5 | 20 | 170 |

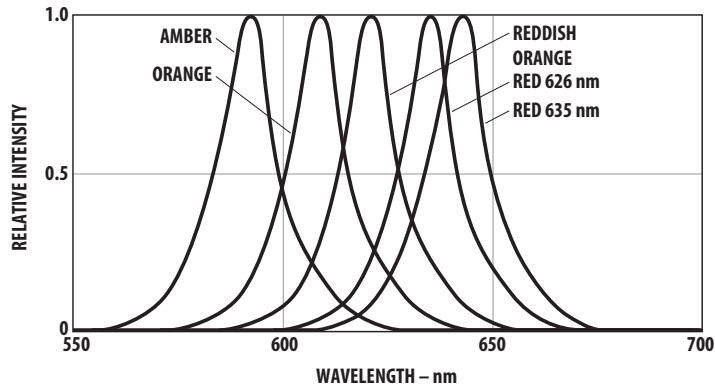


Figure 1. Relative intensity vs. wavelength.

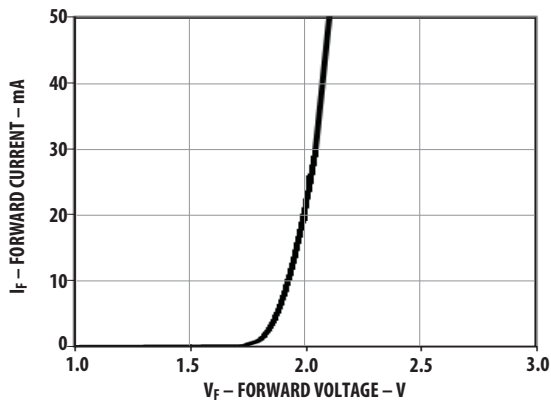


Figure 2a. Forward current vs. forward voltage. HLMA-xxxx.

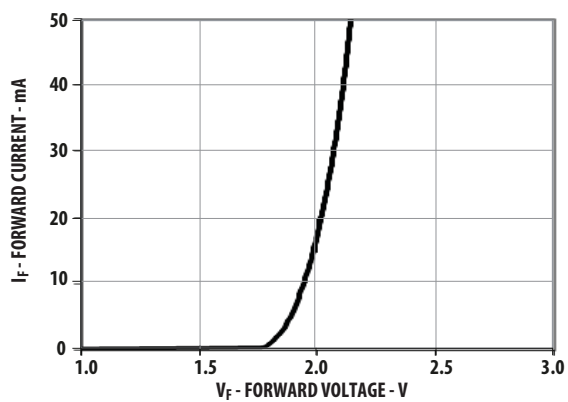


Figure 2b. Forward current vs. forward voltage. HLMT-xxxx.

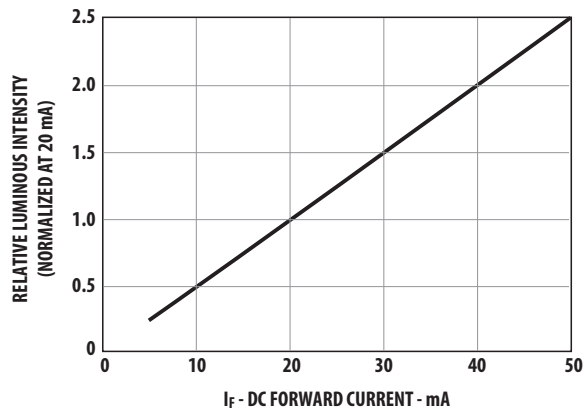


Figure 3a. Relative luminous intensity vs. DC forward current. HLMA-xxxx.

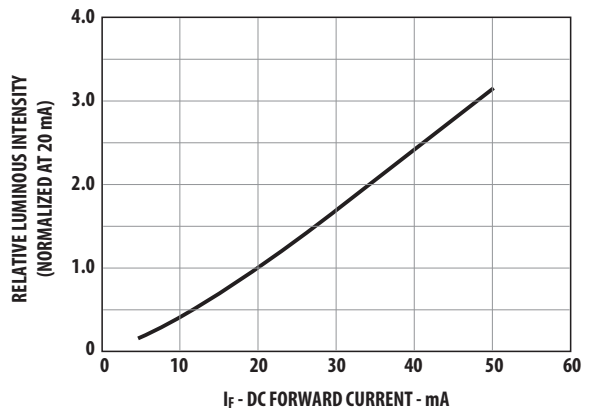


Figure 3b. Relative luminous intensity vs. DC forward current. HLMT-xxxx.

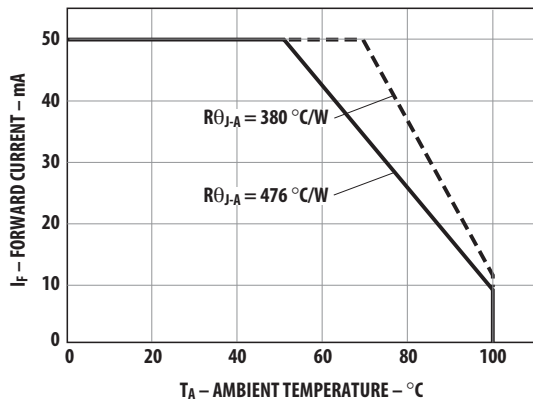


Figure 4. Maximum forward current vs. ambient temperature.

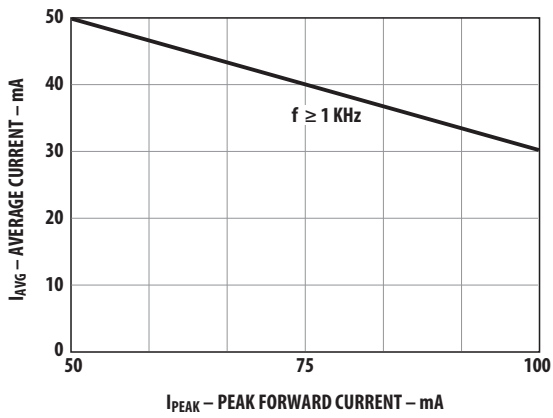


Figure 5a. Maximum average current vs. peak forward current. HLMA-xxxx.

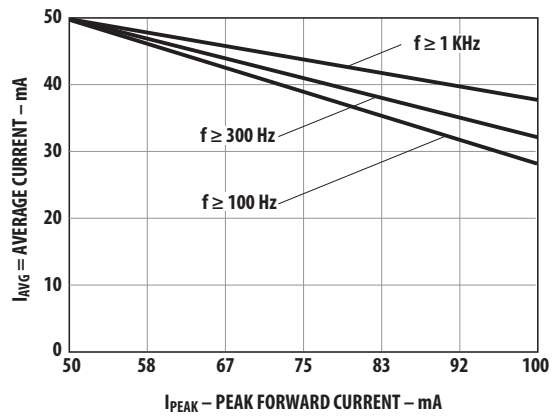


Figure 5b. Maximum average current vs. peak forward current. HLMT-xxxx.

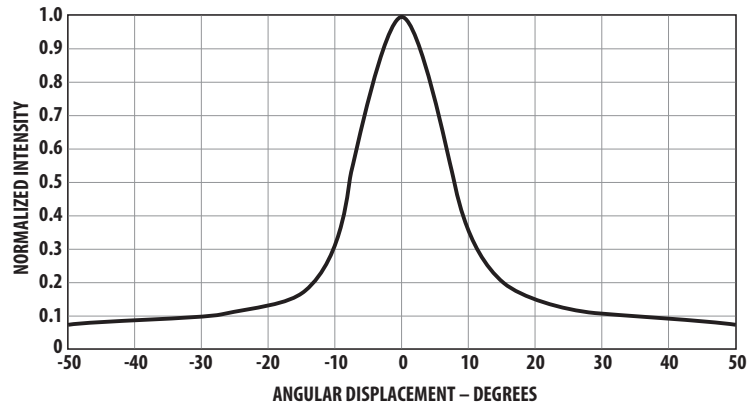


Figure 6. Relative luminous intensity vs. angular displacement for 15° device.

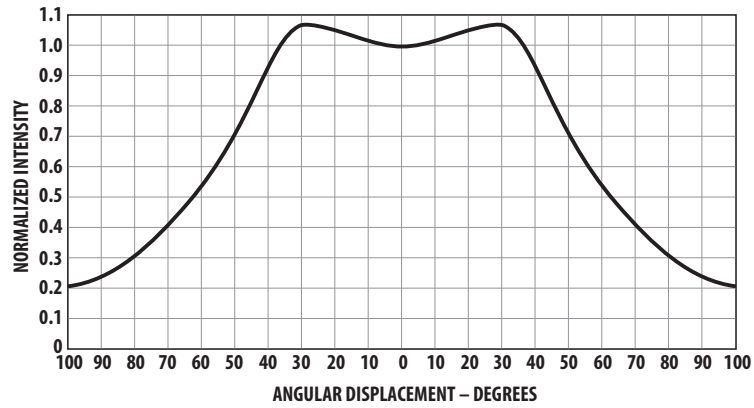


Figure 7. Relative luminous intensity vs. angular displacement for 125° device.

Intensity Bin Limits

| Bin | Min. | Max. |
|-----|------|------|
| N | 25 | 50 |
| P | 40 | 80 |
| Q | 63 | 125 |
| R | 100 | 200 |
| S | 160 | 320 |
| T | 250 | 500 |
| U | 400 | 800 |
| V | 630 | 1250 |
| W | 1000 | 2000 |
| X | 1600 | 3200 |
| Y | 2500 | 5000 |

Color Bin Limits

| Package | Bin | Min. | Max. |
|---------|--------|-------------------|-------------------|
| Yellow | 0 | Full Distribution | |
| | 3 | 584.0 | 587.5 |
| | 2 | 586.5 | 590.0 |
| | 4 | 589.0 | 592.5 |
| | 6 | 591.5 | 595.0 |
| | 7 | 594.0 | 597.5 |
| | Orange | 0 | Full Distribution |
| 2 | | 599.0 | 602.5 |
| 3 | | 601.5 | 604.0 |
| 4 | | 603.8 | 608.2 |
| 5 | | 606.8 | 611.2 |

Mechanical Option Matrix

Mechanical

| Option Code | Definition |
|-------------|--|
| 00 | Straight Leads, Bulk Packaging, Quantity of 500 Parts |
| 11 | Gull Wing Leads, 12 mm Tape on 7 in. Dia. Reel, 1500 Parts per Reel |
| 12 | Gull Wing Leads, Bulk Packaging, Quantity of 500 Parts |
| 14 | Gull Wing Leads, 12 mm Tape on 13 in. Dia. Reel, 6000 Parts per Reel |
| 21 | Yoke Leads, 12 mm Tape on 7 in. Dia. Reel, 1500 Parts per Reel |
| 22 | Yoke Leads, Bulk Packaging, Quantity of 500 Parts |
| 24 | Yoke Leads, 12 mm Tape on 13 in. Dia. Reel, 6000 Parts per Reel |
| 31 | Z-Bend Leads, 12 mm Tape on 7 in. Dia. Reel, 1500 Parts per Reel |
| 32 | Z-Bend Leads, Bulk Packaging, Quantity of 500 Parts |
| 34 | Z-Bend Leads, 12 mm Tape on 13 in. Dia. Reel, 6000 Parts per Reel |

Note:

All categories are established for classification of products. Products may not be available in all categories. Please contact your local Avago representative for further clarification/information.

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