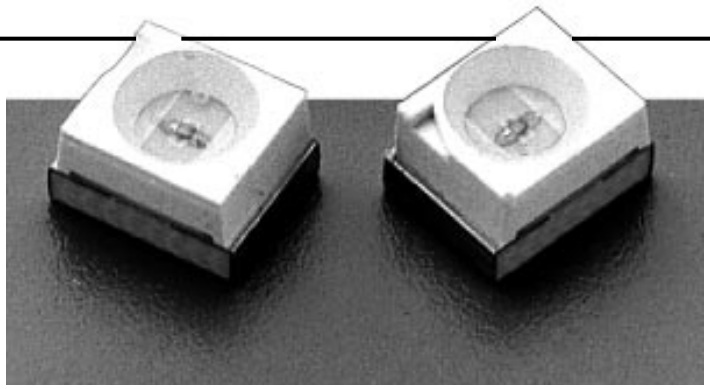
LumiLeds

A Philips Lighting and Agilent Technologies Joint Venture

# Technical Data

# High-Flux Surface Mount LED

**HSMB-HR00**
**HSMB-HD00**
**HSMB-HA00**



## Features

- **High-Flux Device**
- **Improved Reliability Through Elimination of Internal Wire Bond**
- **–55°C to 110°C Operating Temperature Range**
- **Compatible with IR and Through-the-Wave Solder Processes**
- **Available in 8 mm Tape on 178 mm (7") Reels; 2000 Pieces per Reel**

## Applications

- **Telltale Backlighting in Instrument Clusters**
- **Backlighting (LCD, Phones, Switches, Displays, Advertising)**
- **General Status Indicators**
- **Coupling into Light Guides**
- **Passenger Information Panels**
- **General Information Panels**

## Description

The HSMB-HX00 device is designed for applications requiring high-flux in surface mount designs. The product is ideal for telltale backlighting in automotive instrument clusters, LCD backlighting, or general status indication. The high light output lowers the cost of lighting by reducing the number of LEDs required for any application.

The HSMB-HX00 combines high reliability surface mount flip-chip LED construction with the world's brightest red and amber LED materials, LumiLed's TS AlInGaP material.

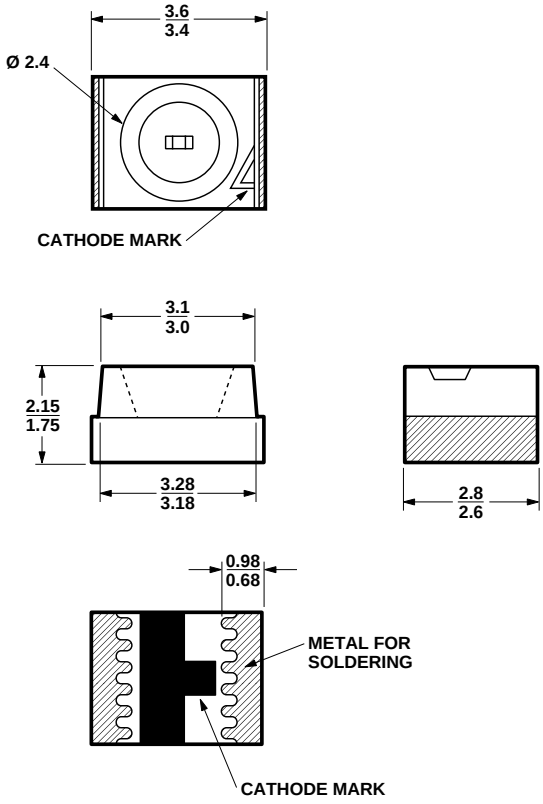
The package is compatible with IR and convective reflow soldering processes. These parts are also compatible with through-the-wave soldering processes.

## Device Selection Guide

| Part Number | Color Typical Dominant Wavelength[1] (nm) | Luminous Intensity $I_V$ (mcd) @ $I_F$ = 20 mA Min. | Luminous Intensity $I_V$ (mcd) @ $I_F$ = 20 mA Typ. | Viewing Angle[2] ($2\theta$ , Degrees) |
|---|---|---|---|---|
| HSMB-HR00-Q2T20 | Red 630 | 80 | 180 | 120 |
| HSMB-HD00-Q2T20 | Orange 605 | 80 | 220 | 120 |
| HSMB-HA00-Q1T20 | Amber 590 | 63 | 200 | 120 |

**Notes:**
1. The dominant wavelength, $\lambda_d$, is derived from the CIE Chromaticity Diagram and represents the perceived color of the LED.
2. $\theta_{1/2}$ is the off-axis angle where the luminous intensity is 1/2 of the peak intensity.

## Package Dimensions




ALL DIMENSIONS IN MILLIMETERS

## Absolute Maximum Ratings at $T_A$ = 25°C for HSMB-HR00/HA00/HD00

| Parameter | Max. Rating | Units |
|---|---|---|
| DC Forward Current[1] | 30 | mA |
| Power Dissipation ($T_A \leq 70°C$) | 100 | mW |
| Average Forward Current | 30 | mA |
| Junction Temperature | 125 | °C |
| Reverse Voltage ($I_R$ = 100 µA) | 5 | V |
| Operating Temperature Range | -55 to 110 | °C |
| Storage Temperature Range | -55 to 110 | °C |

**Note:**
1. Derate linearly as shown in Figure 6 for temperatures above 70°C.

## Optical Characteristics at $T_A$ = 25°C

| Luminous Part Number | Color | Color, Dominant Wavelength[1] $\lambda_d$ (nm) Typ. | Peak Wavelength $\lambda_{peak}$ (nm) Typ. | Luminous Intensity $I_V$ (mcd) @ $I_F$ = 20 mA Min. | Intensity $I_V$ (mcd) @ $I_F$ = 20 mA Typ. |
|---|---|---|---|---|---|
| HSMB-HR00 | Red | 630 | 640 | 80 | 180 |
| HSMB-HD00 | Orange | 605 | 610 | 80 | 220 |
| HSMB-HA00 | Amber | 590 | 594 | 63 | 200 |

**Note:**

## Optical Characteristics at $T_A$ = 25°C, continued

| Part Number | Color | Luminous Flux[2] @ 20 mA (mlm) Min. | Typ. | Luminous Efficiency[3] $\Phi v/P_{in}$ (lm/W) Typ. | Viewing Angle[4] ($2\theta_{1/2}$, Degrees) Typ. |
|---|---|---|---|---|---|
| HSMB-HR00 | Red | 200 | 450 | 10 | 120 |
| HSMB-HD00 | Orange | 200 | 550 | 11 | 120 |
| HSMB-HA00 | Amber | 180 | 530 | 11 | 120 |

**Notes:**
2. Luminous flux values are not measured in production.
3. Luminous Efficiency = emitted luminous flux/electrical power input.
4. $\theta_{1/2}$ is the off-axis angle where the luminous intensity is 1/2 of the peak intensity.

## Electrical Characteristics at $T_A$ = 25°C

| Part Number | Color | Forward Voltage $V_F$ (Volts) @ $I_F$ = 20 mA Min. | Forward Voltage $V_F$ (Volts) @ $I_F$ = 20 mA Typ. | Forward Voltage $V_F$ (Volts) @ $I_F$ = 20 mA Max. | Reverse Voltage $V_R$ (Volts) @ $I_R$ = 100 μA Min. |
|---|---|---|---|---|---|
| HSMB-HR00 | Red | 1.70 | 2.30 | 3.00 | 5.0 |
| HSMB-HD00 | Orange | 1.85 | 2.40 | 3.15 | 5.0 |
| HSMB-HA00 | Amber | 1.90 | 2.45 | 3.20 | 5.0 |

## Electrical Characteristics at $T_A$ = 25°C, continued

| Part Number | Color | Thermal Resistance of Device $R\theta_{J\text{-}PIN}$ (°C/W) | Thermal Resistance on PC Board (≥ 16 mm² Pad Size, FR4) $R\theta_{J\text{-}AIR}$ (°C/W) | Capacitance C (pF) $V_F$ = 0, f = 1 MHz Typ. |
|---|---|---|---|---|
| HSMB-HR00 | Red | 280 | 480 | 25 |
| HSMB-HD00 | Orange | 280 | 480 | 25 |
| HSMB-HA00 | Amber | 280 | 480 | 25 |

## Intensity Bin Definitions

**(Check with LumiLeds Sales Engineer for availability of bin selections)**

| Bin ID | Intensity (mcd) |
|---|---|
| Q1 | 63.0 – 100.0 |
| Q2 | 80.0 – 125.0 |
| R1 | 100.0 – 160.0 |
| R2 | 125.0 – 200.0 |
| S1 | 160.0 – 250.0 |
| S2 | 200.0 – 320.0 |
| T1 | 250.0 – 400.0 |
| T2 | 320.0 – 500.0 |

## Amber Color Bin Definitions, HSMB-HA00 only

| Bin ID | Dominant Wavelength (nm) |
|---|---|
| B | 584.0 – 587.5 |
| C | 586.5 – 590.0 |
| D | 589.0 – 592.5 |
| E | 591.5 – 595.0 |
| F | 594.0 – 597.5 |
| 0 | Bins B through F |
| 1 | Bins B and C |
| 2 | Bins C and D |
| 3 | Bins D and E |
| 4 | Bins E and F |
| 5 | Bins B, C, and D |
| 6 | Bins C, D, and E |
| 7 | Bins D, E, and F |

## Orange Color Bin Definitions, HSMB-HD00 only

| Bin ID | Dominant Wavelength (nm) |
|---|---|
| B | 599.0 – 602.5 |
| C | 601.5 – 605.0 |
| D | 603.8 – 608.2 |
| E | 606.8 – 611.2 |
| F | 609.8 – 614.2 |
| 0 | Bins B through F |
| 1 | Bins B and C |
| 2 | Bins C and D |
| 3 | Bins D and E |
| 4 | Bins E and F |
| 5 | Bins B, C, and D |
| 6 | Bins C, D, and E |
| 7 | Bins D, E, and F |

## Color and Intensity Option Codes

(Check with LumiLeds Sales Engineer for availability of bin selections)

HSMB-HX00 XXXXX

Last digit identifies the color bin option
(use 0 for red as there are no red color bins)

First four digits identify the min. and max. of
the intensity bins

Examples: HSMB-HA00-Q1T20 designates HSMB-HA00 with a 178 mm reel, no intensity or color bin selection

HSMB-HA00-R1S23 designates HSMB-HA00 with 178 mm reel, intensity bins R1 through S2, and color bin D and E

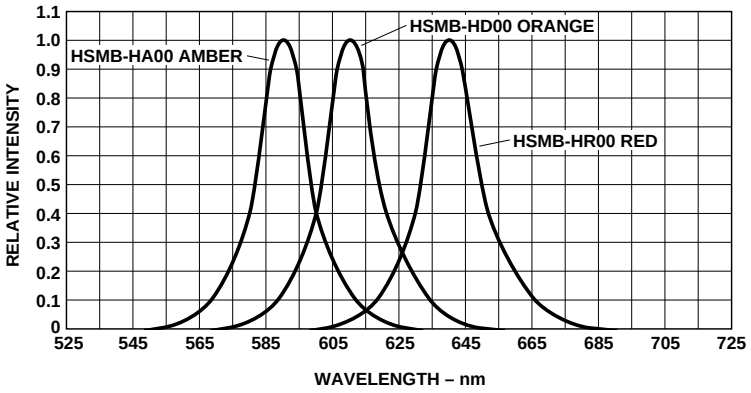



**Figure 1. Relative Intensity vs. Wavelength.**

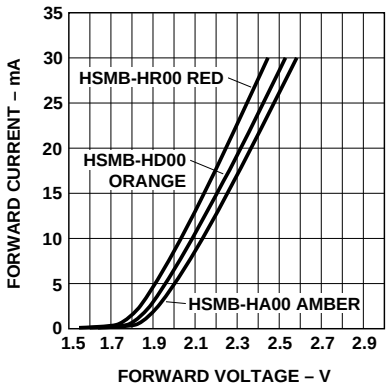



**Figure 2. Forward Current vs. Forward Voltage (0 – 30 mA).**

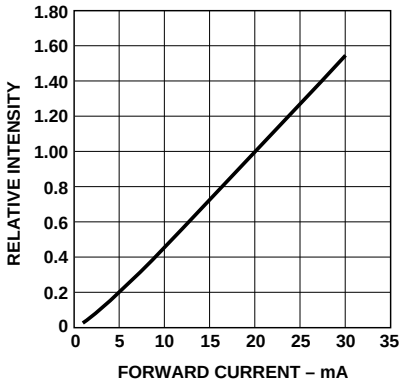



**Figure 3. Relative $I_V$ vs. DC Forward Current (Normalized at 20 mA).**

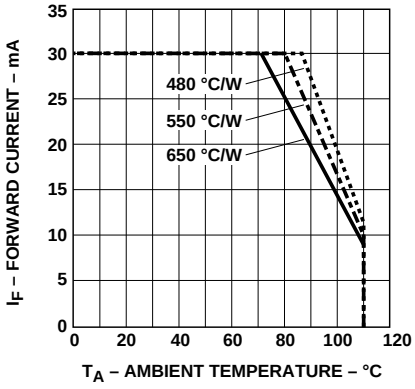



**Figure 4. Maximum DC Current vs. Ambient Temperature. (Based on Typical $V_F$ at Max. Current.)**

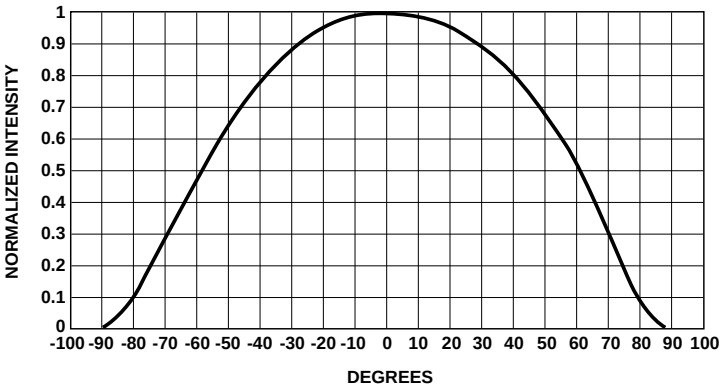



**Figure 5. Relative Intensity vs. Angle.**

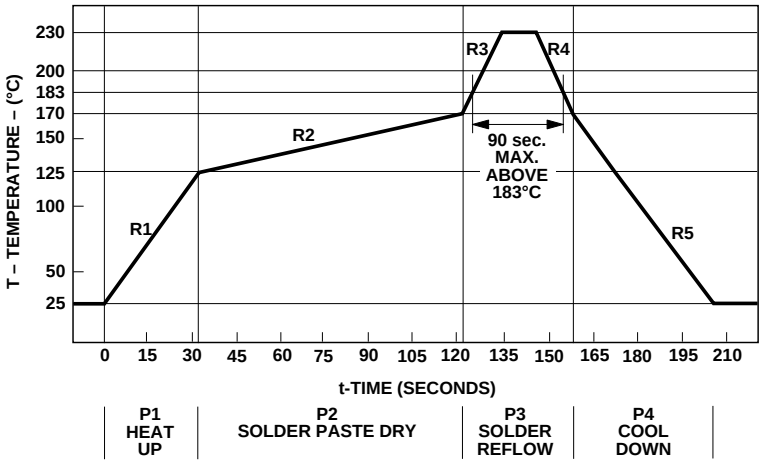
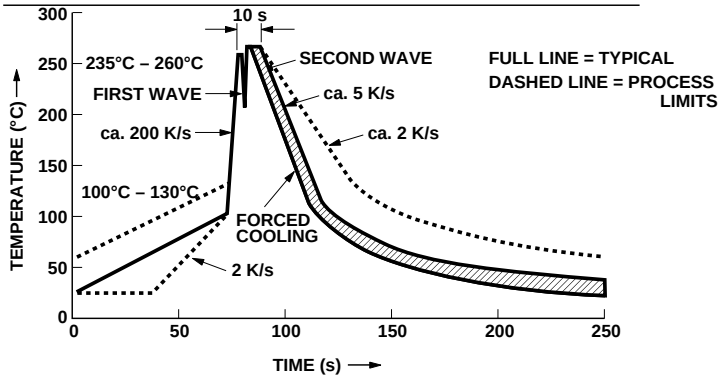



**Figure 6. Recommended InfraRed Reflow Soldering Profile.**




NOTE: ALL TEMPERATURES MEASURED ON BOTTOM OF PC BOARD.

**Figure 7. Recommended Wave-Soldering Profile.**

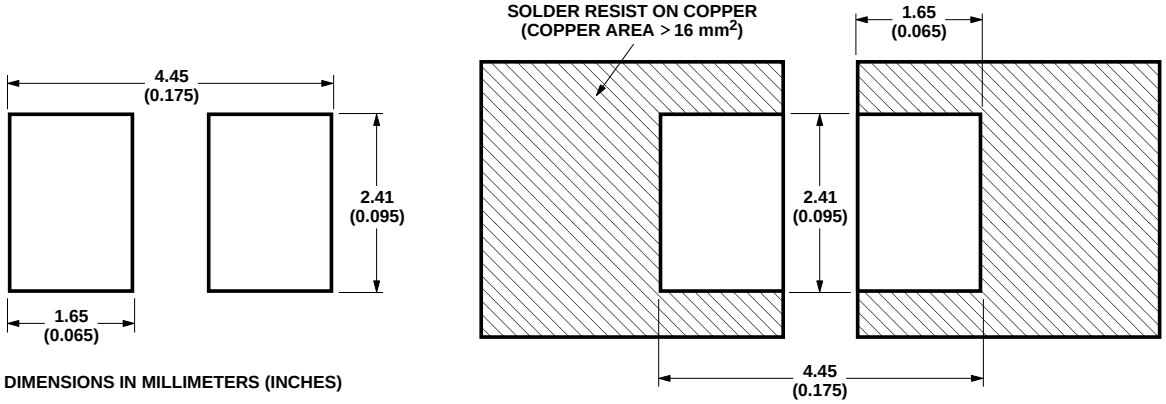



**Figure 8. Recommended Solder Pad Dimensions and Pad Design.**

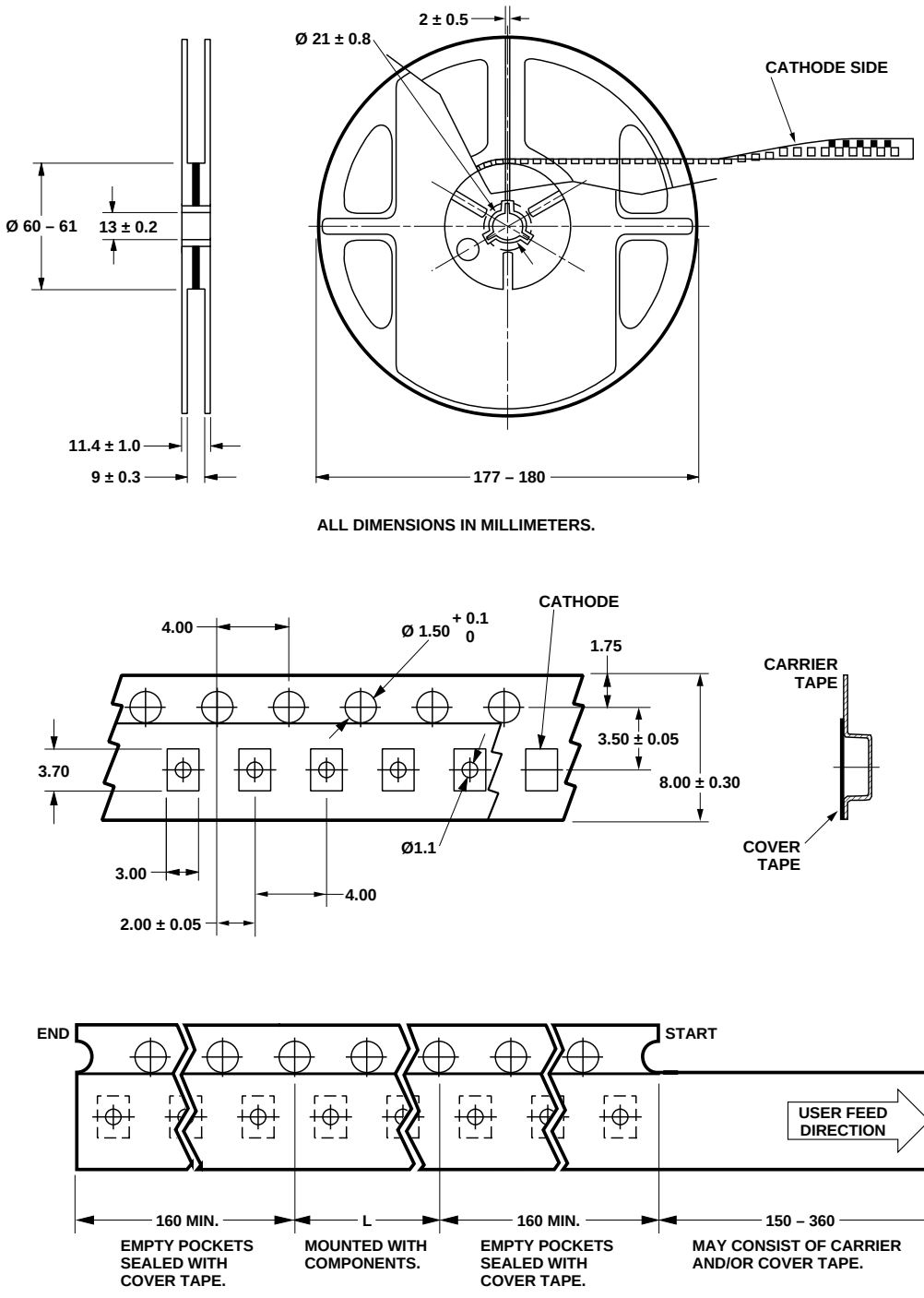



**Figure 9. Tape and Reel Dimensions.**

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**LumiLeds Lighting:**
**The Revolution of Lighting.**

LumiLeds Lighting is a joint venture between Philips Lighting and Agilent Technologies.

Agilent Technologies, an $8 billion startup, is the result of the strategic realignment of Hewlett-Packard, producer of the world's brightest red and amber LEDs, as well as state-of-the-art, high-brightness LEDs in blue, green, white and other colors.

Philips is a global leader in developing, manufacturing and marketing innovative lighting products worldwide.

LumiLeds Lighting is changing the future of lighting. In the next century, LED-based lighting will quickly replace conventional lighting for a wealth of commercial, industrial, institutional and consumer applications. By combining the lighting expertise of Philips and the LED technology strength of Agilent, our products will bring irresistible value to lighting solutions of all kinds. LumiLeds Lighting will reduce waste and power consumption worldwide by developing long-lasting, energy-efficient products.

**Lumileds Lighting**
An Agilent Technologies & Philips Lighting Joint Venture

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For technical assistance or the location of your nearest LumiLeds sales office, call:

**Americas/Canada:**
Toll free: (877) 298-9455
Fax: 408-435-4980

**Europe/Asia:**
TEL +31 499339 439
FAX +31 499339 490


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