HEWLETT PACKARD

High Performance Surface Mount Flip Chip LEDs

Technical Data

HP SunPower Series
HSMA-H670/H690/H770/ H790/R661/R761
HSMC-H670/H690/H770/ H790/R661/R761
HSML-H670/H690/H770/ H790/R661/R761

Features

- **High Brightness AlInGaP Material**
- **Improved Reliability through Elimination of Internal Wire Bond**
- **-40 to 85°C Operating Temperature Range**
- **Three Small Package Sizes**
- **Industry Standard 2.0 x 1.25 mm and 1.6 x 0.8 mm Footprints**
- **Right Angle Package**
- **Three Colors Available**
- **Diffused Optics**
- **Compatible with IR and Through-the-wave Solder Processes**
- **Available in 8 mm Tape on 178 mm (7") and 330 mm (13") Diameter Reels**

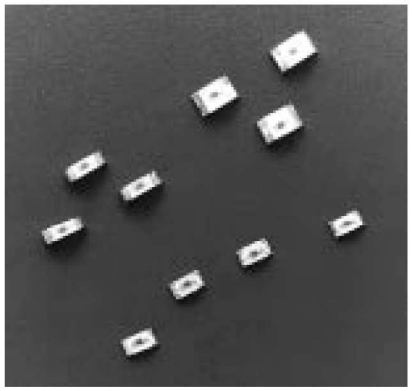
Applications

- **Keypad Backlighting**
- **LCD Backlighting**
- **Symbol Backlighting**
- **Front Panel Indicator**

Description

The HSMx-H670/H770, -H690/ H790, and -R661/R761 combine high reliability surface mount flip chip LED construction with HP's bright AlInGaP material. These very small, bright LEDs have a high luminous efficiency capable of producing high light output over a wide range of drive currents. The 590 nm amber, 605 nm orange, and 626 nm red colors are available in three compact, low profile packages.

The HSMx-H670/H770 has the industry standard 2.0 x 1.25 mm footprint that is excellent for all around use. The HSMx-H690/



H790 has the industry standard 1.6 x 0.8 mm footprint, and its low 0.6 mm profile and wide viewing angle make this LED excellent for backlighting applications.

The HSMx-R661/R761 has a small 2.1 x 1.3 mm footprint and a low profile 0.7 mm height that makes this part ideal for LCD backlighting and sidelighting applications where space is at a premium. All packages are compatible with IR and convective reflow soldering processes. In addition, these parts are also compatible with through-the-wave soldering processes.

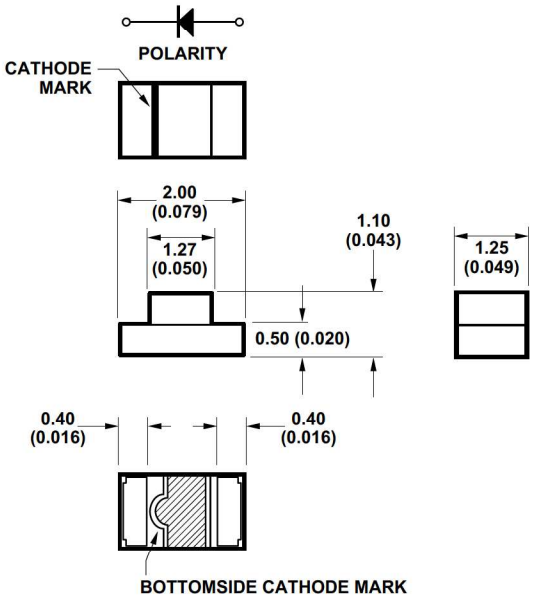
Device Selection Guide

Footprint (mm)[1][2]	Amber 590 nm		Orange 605 nm		Red 626 nm	
	7" Reel	13" Reel	7" Reel	13" Reel	7" Reel	13" Reel
1.6 x 0.8 x 0.6	HSMA-H690	-H790	HSML-H690	-H790	HSMC-H690	-H790
2.0 x 1.25 x 1.1	HSMA-H670	-H770	HSML-H670	-H770	HSMC-H670	-H770
2.1 x 1.3 x 0.7[3]	HSMA-R661	-R761	HSML-R661	-R761	HSMC-R661	-R761

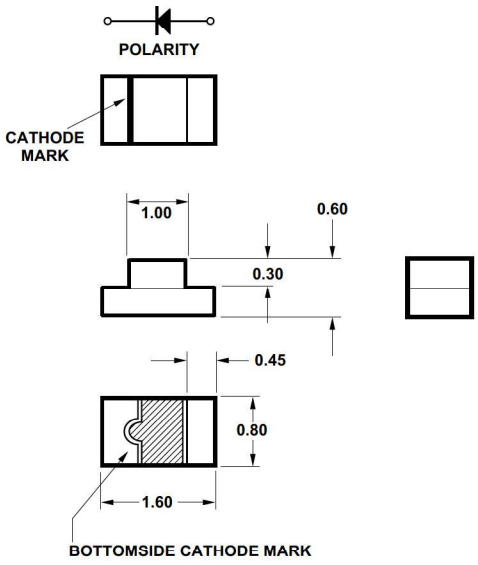
Notes:
1. Dimensions in mm.
2. Tolerances ± 0.1 mm unless otherwise noted.
3. Right angle package.

Package Dimensions

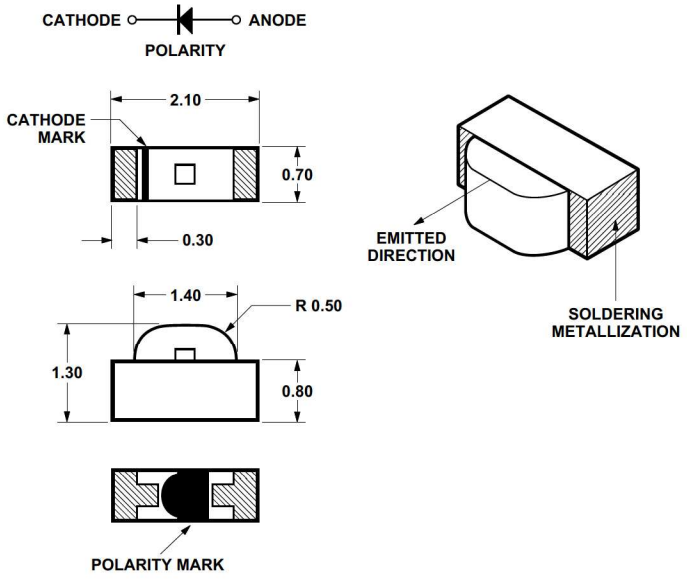
HSMx-H670 Series



HSMx-H690 Series



HSMx-R661 Series



Absolute Maximum Ratings at T_A = 25°C

Parameter	Max. Rating	Units
DC Forward Current[1]	20	mA
Power Dissipation	50	mW
Reverse Voltage (I_R = 100 µA)	5	V
Operating Temperature Range	-40 to 85	°C
Storage Temperature Range[2]	-40 to 85	°C

Notes:
1. Derate linearly as shown in Figure 4 for temperatures above 25°C.
2. Maximum temperature for tape and reel packaging is 60°C.

Optical Characteristics at T_A = 25°C

Part No.	Color	Peak Wavelength λ_{peak} (nm) Typ.	Color, Dominant Wavelength λ_d[2] (nm) Typ.	Viewing Angle $2\theta_{1/2}$ Degrees[3] Typ.	Luminous Efficacy η_v (lm/W)
HSMA-H6X0 HSMA-R661	Amber	592	590	165	480
HSML-H6X0 HSML-R661	Orange	607	605	165	370
HSMC-H6X0 HSMC-R661	Red	638	626	165	197

Optical Characteristics at T_A = 25°C (Cont'd)

Part No.	Color	Luminous Intensity Iv (mcd) @ I_F = 5 mA Min.	Luminous Intensity Iv (mcd) @ I_F = 5 mA Typ.	Luminous Intensity Iv (mcd) @ I_F = 20 mA Typ.	Luminous Intensity Iv (mcd) @ I_F = 2 mA Typ.
HSMA-H6X0 HSMA-R661	Amber	2.5	7.5	35	2.5
HSML-H6X0 HSML-R661	Orange	2.5	7.5	35	2.5
HSMC-H6X0 HSMC-R661	Red	2.5	6.5	30	2.5

Notes:
1. The dominant wavelength λ_d is derived from the CIE Chromaticity Diagram and represents the perceived color of the device.
2. $\theta_{1/2}$ is the off-axis angle where the luminous intensity is 1/2 the peak intensity.
3. Operation below I_F = 1 mA is not recommended.

Electrical Characteristics at T_A = 25°C

Part No.	Color	Forward Voltage V_F (Volts) @ I_F = 5 mA Typ.	Forward Voltage V_F (Volts) @ I_F = 5 mA Max.	Forward Voltage V_F (Volts) @ I_F = 20 mA Typ.	Forward Voltage V_F (Volts) @ I_F = 20 mA Max.	Reverse Breakdown V_R (Volts) @ I_R = 100 µA Min.	Capacitance C (pF) V_F = 0, f = 1 Mhz Typ.
HSMA-H670	Amber	1.9	2.2	2.0	2.4	5.0	20
HSMA-H690		1.9	2.2	2.0	2.4	5.0	20
HSMA-R661		1.9	2.2	2.0	2.4	5.0	20
HSML-H670	Orange	1.9	2.2	2.0	2.4	5.0	20
HSML-H690		1.9	2.2	2.0	2.4	5.0	20
HSML-R661		1.9	2.2	2.0	2.4	5.0	20
HSMC-H670	Red	1.8	2.2	1.9	2.4	5.0	20
HSMC-H690		1.8	2.2	1.9	2.4	5.0	20
HSMC-R661		1.8	2.2	1.9	2.4	5.0	20

Electrical Characteristics at T_A = 25°C (Cont'd)

Part No.	Color	Thermal Resistance R $\theta_{J\text{-}PIN}$ (°C/W)	Thermal Resistance R $\theta_{J\text{-}A}$ (°C/W)
HSMA-H670	Amber	275	300
HSMA-H690		350	400
HSMA-R661		350	400
HSML-H670	Orange	275	300
HSML-H690		350	400
HSML-R661		350	400
HSMC-H670	Red	275	300
HSMC-H690		350	400
HSMC-R661		350	400

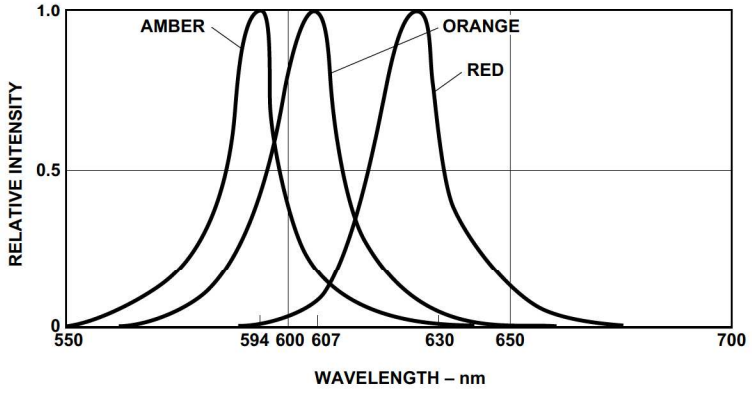


Figure 1. Relative Intensity vs. Wavelength.

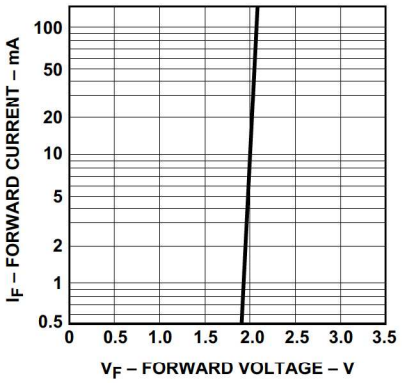


Figure 2. Forward Current vs. Forward Voltage.

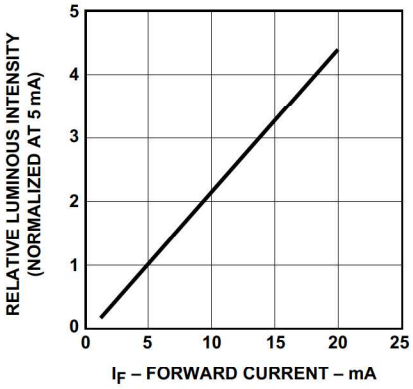


Figure 3. Relative Iv vs. DC Forward Current (operation below 1 mA not recommended).

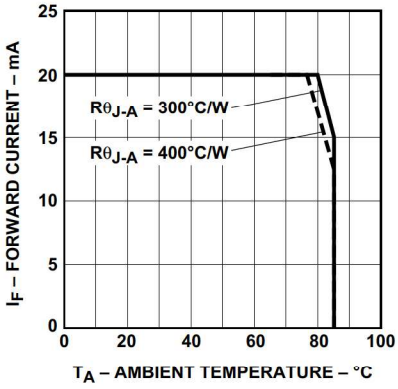


Figure 4. Maximum DC Current vs. Ambient Temperature.

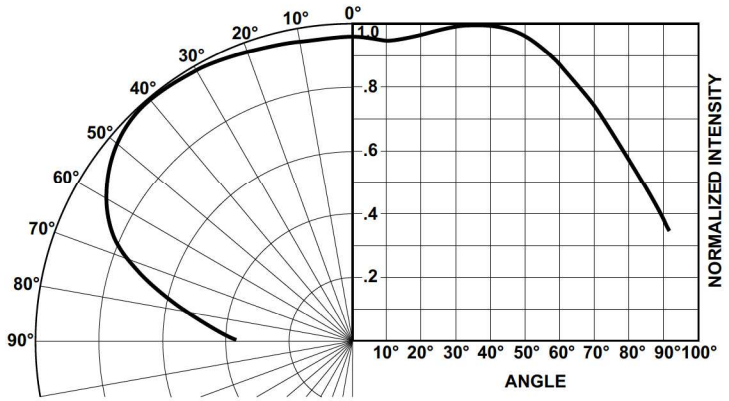


Figure 5. Intensity vs. Angle for HSMx-H670/H770 and HSMx-H690/H790.

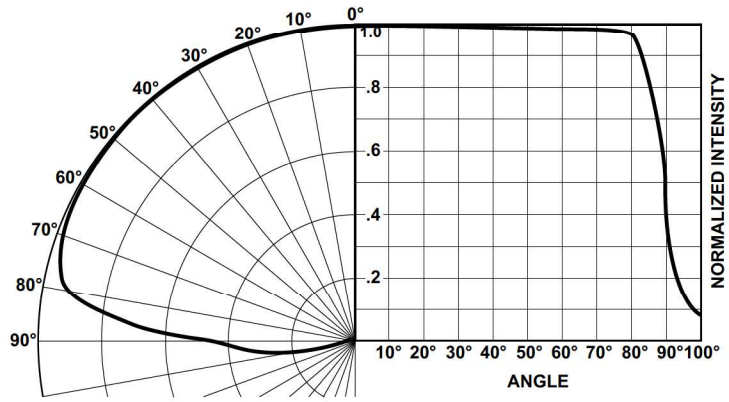


Figure 6. Intensity vs. Angle (Horizontal) for HSMx-R661/R761.

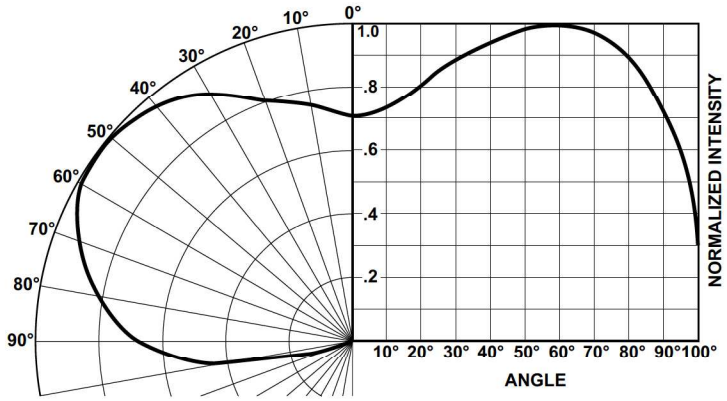
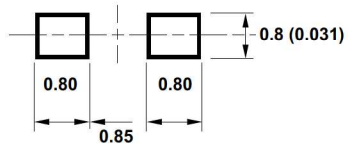
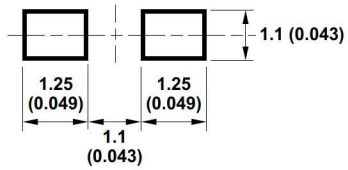


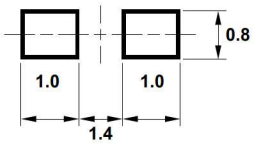
Figure 7. Intensity vs. Angle (Vertical) for HSMx-R661/R761.



HSMX-H690/H790 SERIES



HSMX-H670/H770 SERIES



HSMX-R661/R761 SERIES

Figure 8. Recommended Solder Pad Patterns.

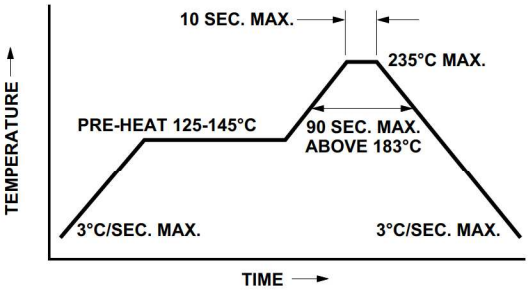


Figure 9. Recommended IR Reflow Soldering Profile.

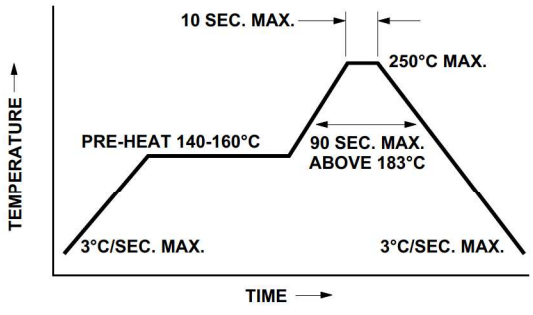


Figure 10. Recommended Wave Solder Profile.