

# Surface Mount Flip Chip LEDs

## Technical Data

### HSMX-H670 Series HSMX-H690 Series

#### Features

- **Improved Reliability Through Elimination of Internal Wire Bond**
- **-40 to 85°C Operating Temperature Range**
- **Small Size**
- **Industry Standard Footprint**
- **Diffused Optics**
- **Compatible with IR Solder Process**
- **Four Colors Available**
- **Available in 8 mm Tape on 7" (178 mm) Diameter Reels**

#### Applications

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

#### Description

The HSMX-H670 and HSMX-H690 introduce a revolutionary concept to the world of LEDs. The internal flip chip construction eliminates the wire bond between the chip and printed circuit board. Consequently as a result of the robust construction, product reliability is greatly improved.

The HSMX-H670 and HSMX-H690 are available in four colors. The HSMX-H670 adheres to the industry standard 2.0 x 1.25 mm footprint and is intended for designs where space is limited. The small size, low 1.1 mm profile and wide viewing angle make these LEDs excellent for backlighting applications and front panel illumination. The HSMX-H690 adheres to the 1.6 x 0.8 mm



industry standard footprint. The low 0.6 mm profile make this excellent for designs where space is limited.

Both packages are compatible with IR and convective reflow soldering processes.

#### Device Selection Guide

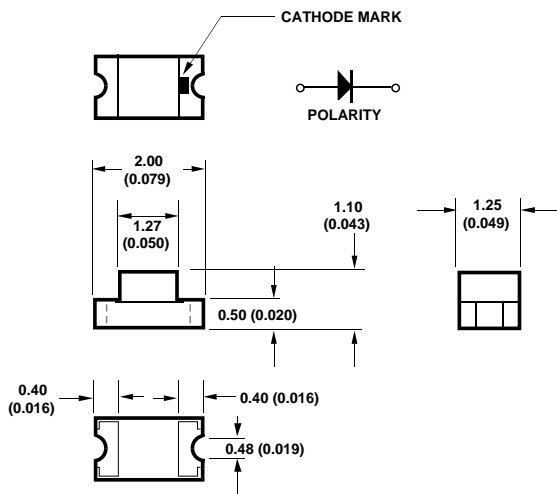
Footprint (mm) <sup>[1][2]</sup>	High Efficiency Red	Orange	Yellow	Green
1.6 x 0.8 x 0.6	HSMS-H690	HSMD-H690	HSMY-H690	HSMG-H690
2.0 x 1.25 x 1.1	HSMS-H670	HSMD-H670	HSMY-H670	HSMG-H670

#### Notes:

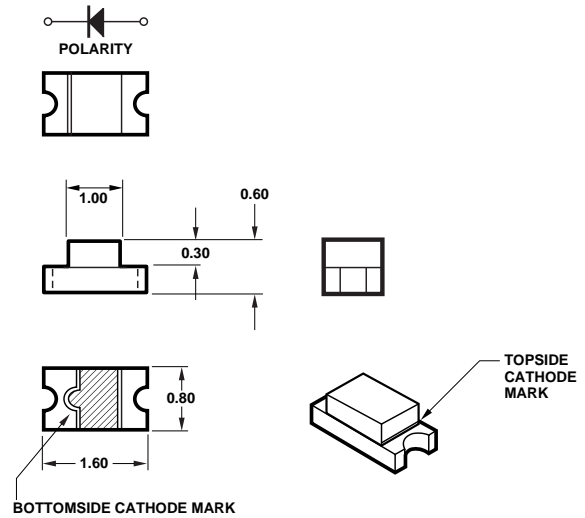
1. Dimensions in mm.
2. Tolerance ± 0.1 mm unless otherwise noted.

## Package Dimensions

### HSMX-H670 Series



### HSMX-H690 Series



**NOTES:**

1. DIMENSIONS ARE IN MILLIMETERS (INCHES).
2. TOLERANCE, UNLESS OTHERWISE SPECIFIED,  $\pm 0.1$  mm ( $\pm 0.004$  INCH).
3. THE LEADS ARE GOLD PLATED; PLATING THICKNESS IS: GOLD - 0.05 MICRONS, NICKEL - 3 MICRONS, COPPER - 18 MICRONS.

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

Parameter	HSMX-H670	HSMX-H690	Units
DC Forward Current <sup>[1]</sup>	20	20	mA
Power Dissipation	50	50	mW
Reverse Voltage ( $I_R = 100 \mu\text{A}$ )	5	5	V
Operating Temperature Range	-40 to +85	-40 to +85	$^\circ\text{C}$
Storage Temperature Range <sup>[2]</sup>	-40 to +85	-40 to +85	$^\circ\text{C}$

**Notes:**

1. Derate linearly as shown in Figure 4 for temperatures above  $25^\circ\text{C}$ .
2. Maximum temperature for tape and reel packaging is  $60^\circ\text{C}$ .

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

Part Number	Color	Luminous Intensity $I_V$ (mcd) @ $I_F = 20\text{ mA}$ <sup>[1]</sup>		Peak Wavelength $\lambda_{\text{peak}}$ (nm) Typ.	Color, Dominant Wavelength $\lambda_d$ <sup>[2]</sup> (nm) Typ.	Viewing Angle $2\theta_{1/2}$ Degrees <sup>[3]</sup> Typ.	Luminous Efficacy $\eta_v$ (lm/W)
		Min.	Typ.				
HSMS-H6X0	High Efficiency Red	1.6	5.0	639	626	165	145
HSMD-H6X0	Orange	1.6	4.0	606	604	165	380
HSMY-H6X0	Yellow	1.6	5.0	584	586	165	500
HSMG-H6X0	Green	4.0	9.0	566	571	165	595

**Notes:**

1. The luminous intensity  $I_V$  is measured at the peak of the spatial radiation pattern which may not be aligned with the mechanical axis of the lamp package.
2. The dominant wavelength  $\lambda_d$  is derived from the CIE Chromaticity Diagram and represents the perceived color of the device.
3.  $\theta_{1/2}$  is the off-axis angle where the luminous intensity is 1/2 the peak intensity.

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

Part Number	Color	Forward Voltage $V_F$ (Volts) @ $I_F = 20\text{ mA}$		Reverse Breakdown $V_R$ (Volts) @ $I_R = 100\ \mu\text{A}$ Min.	Capacitance $C$ (pF), $V_F = 0$ , $f = 1\text{ MHz}$ Typ.	Thermal Resistance $R_{\theta_{J-PIN}}$ ( $^\circ\text{C}/\text{W}$ )
		Typ.	Max.			
HSMS-H670 HSMS-H690	High Efficiency Red	2.0	2.6	5	6	250
HSMD-H670 HSMD-H690	Orange	2.0	2.6	5	5	250
HSMY-H670 HSMY-H690	Yellow	2.1	2.6	5	5	250
HSMG-H670 HSMG-H690	Green	2.3	2.6	5	5	250

### Green Color Bins<sup>[1]</sup>

Bin ID	Minimum (nm)	Maximum (nm)	Notes
A	561.0	565.0	
B	564.0	568.0	
C	567.0	571.0	
D	570.0	574.0	
E	573.0	577.0	
F	561.0	568.0	Bin A & Bin B
G	564.0	571.0	Bin B & Bin C
H	567.0	574.0	Bin C & Bin D
J	570.0	577.0	Bin D & Bin E

### Yellow Color Bins<sup>[1]</sup>

Bin ID	Minimum (nm)	Maximum (nm)	Notes
A	581.5	585.0	
B	584.0	587.5	
C	586.5	590.0	
D	589.0	592.5	
E	581.5	587.5	Bin A & Bin B
F	584.0	590.0	Bin B & Bin C
G	586.5	592.5	Bin C & Bin D
H	591.5	595.0	
J	594.0	597.5	

### Luminous Intensity Bin Limits<sup>[1]</sup>

Bin ID	Minimum (med)	Maximum (med)
A	0.10	0.20
B	0.16	0.32
C	0.25	0.50
D	0.40	0.80
E	0.63	1.25
F	1.00	2.00
G	1.60	3.20
H	2.50	5.00
J	4.00	8.00
K	6.30	12.50
L	10.00	20.00
M	16.00	32.00
N	25.00	50.00
P	40.00	80.00
Q	63.00	125.00
R	100.00	200.00
S	160.00	320.00
T	250.00	500.00
U	400.00	800.00
V	630.00	1250.00
W	1000.00	2000.00
X	1600.00	3200.00
Y	2500.00	5000.00

**Note:**

- Bin categories are established for classification of products. Products may not be available in all bin categories. Please contact your Hewlett-Packard representative for information on currently available bins.

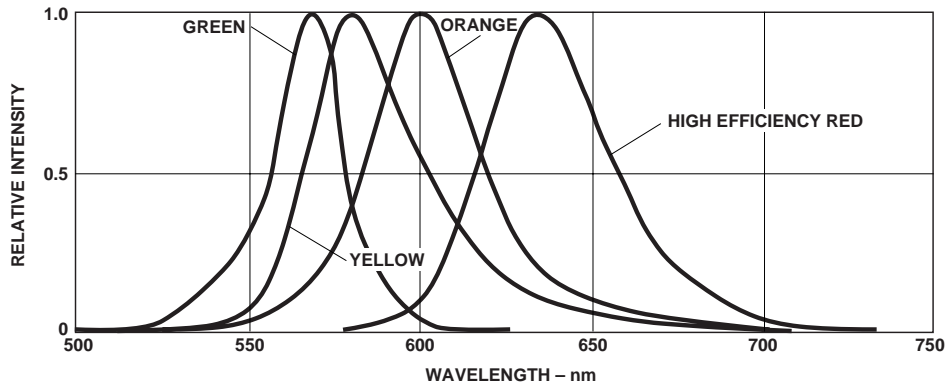


Figure 1. Relative Intensity vs. Wavelength.

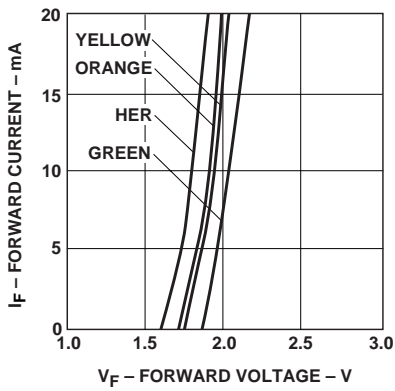


Figure 2. Forward Current vs. Forward Voltage.

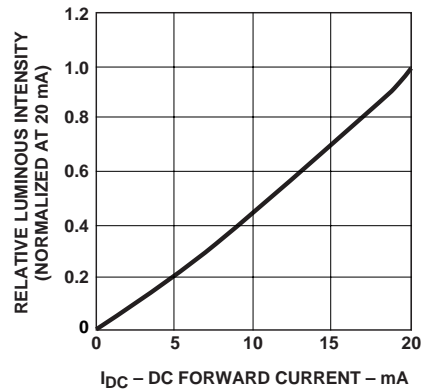


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

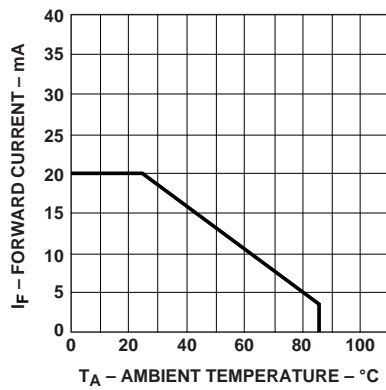


Figure 4. Maximum DC Current vs. Ambient Temperature.

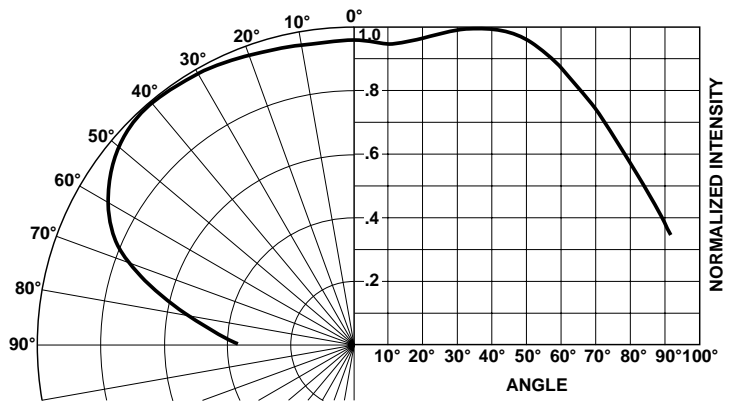


Figure 5. Intensity vs. Angle.

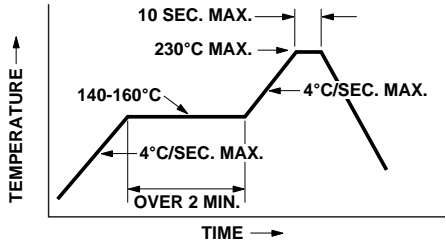
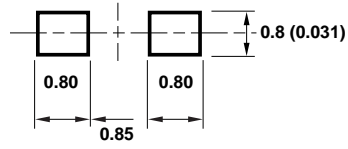
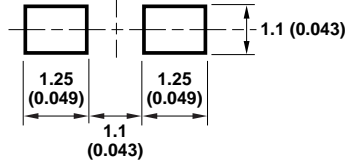


Figure 6. Recommended Reflow Soldering Profile.



HSMX-H690 SERIES



HSMX-H670 SERIES

Figure 7. Recommended Solder Patterns.

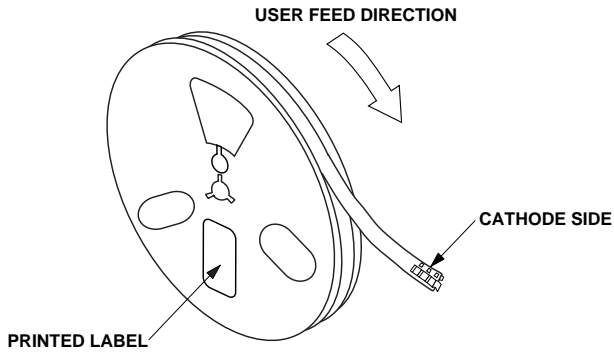


Figure 8. Reeling Orientation.

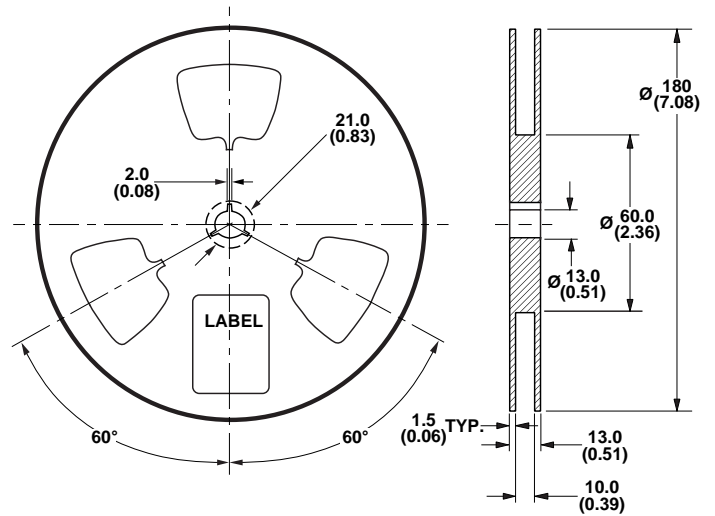


Figure 9. Reel Dimensions.

NOTE:  
ALL DIMENSIONS IN MILLIMETERS (INCHES).

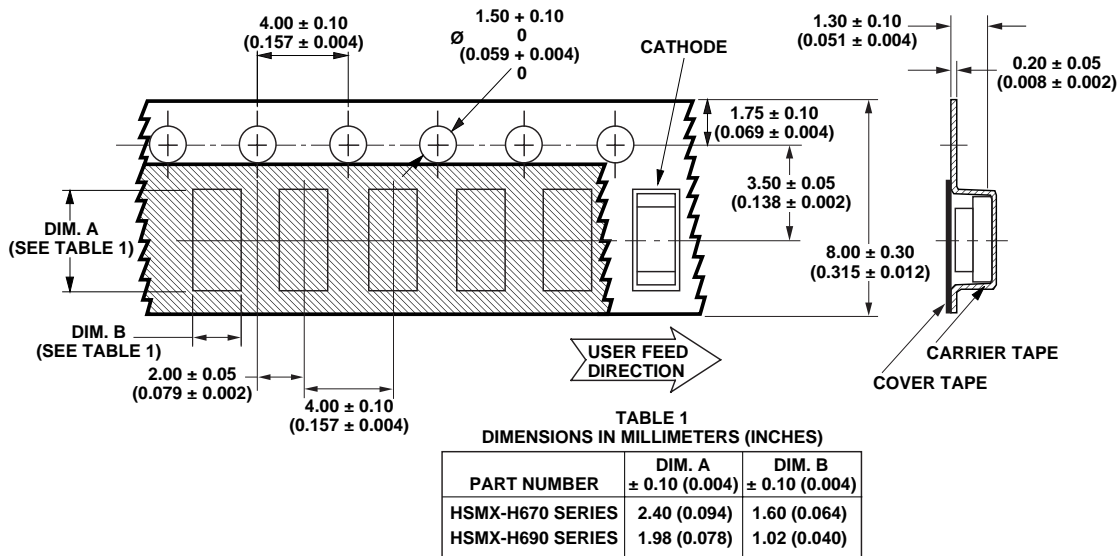


Figure 10. Tape Dimensions.

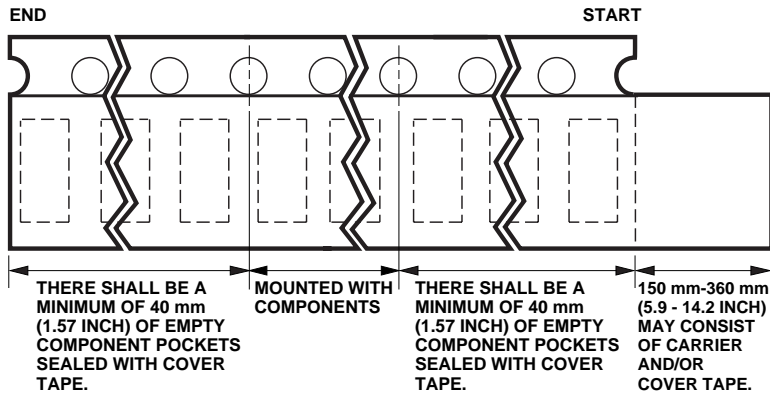


Figure 11. Tape Leader and Trailer Dimensions.

## Convective IR Reflow Soldering

For information on IR reflow soldering, refer to Application Note 1060, *Surface Mounting SMI LED Indicator Components*.



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

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