

Surface Mount Flip Chip LEDs

Technical Data

HSMx-H670/H770 Series HSMx-H690/H790 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) or 13" (330 mm) Diameter Reels**

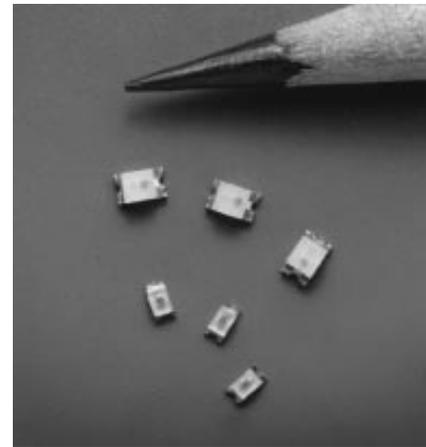
Applications

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

Description

The HSMX-H670/H770 and HSMX-H690/H790 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/H770 and HSMX-H690/H790 are available in four colors. The HSMX-H670/H770 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/



H790 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/convective reflow as well as through the wave reflow soldering processes.

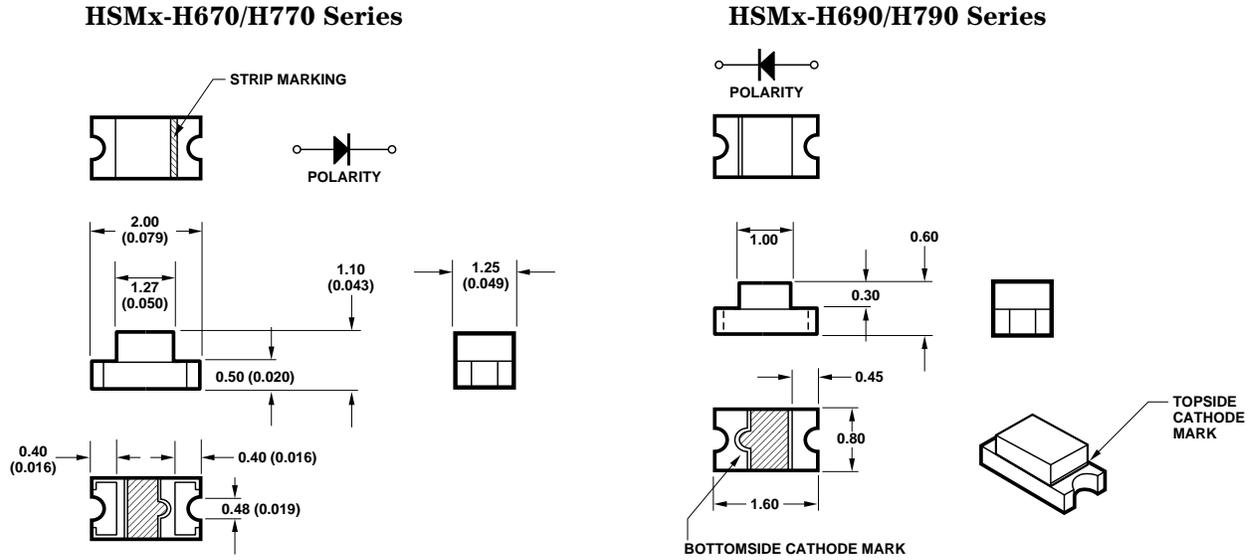
Device Selection Guide

Footprint (mm) ^{[1][2]}	High Efficiency Red	Orange	Yellow	Green
1.6 x 0.8 x 0.6	HSMS-H690/H790	HSMD-H690/H790	HSMY-H690/H790	HSMG-H690/H790
2.0 x 1.25 x 1.1	HSMS-H670/H770	HSMD-H670/H770	HSMY-H670/H770	HSMG-H670/H770

Notes:

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

Package Dimensions



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS (INCHES).
2. TOLERANCE, UNLESS OTHERWISE SPECIFIED, ± 0.1 mm (± 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/H770	HSMx-H690/H790	Units
DC Forward Current ^[1]	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 ^[2]	-40 to +85	-40 to +85	$^\circ\text{C}$

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 $T_A = 25^\circ\text{C}$

Part Number	Color	Luminous Intensity I_V (mcd) @ $I_F = 20 \text{ mA}^{[1]}$		Peak Wavelength λ_{peak} (nm) Typ.	Color, Dominant Wavelength $\lambda_d^{[2]}$ (nm) Typ.	Viewing Angle $2\theta_{1/2}$ Degrees ^[3] Typ.	Luminous Efficacy η_V (lm/W)
		Min.	Typ.				
HSMS-H6X0 HSMS-H7X0	High Efficiency Red	1.6	5.0	639	626	165	145
HSMD-H6X0 HSMD-H7X0	Orange	1.6	4.0	606	604	165	380
HSMY-H6X0 HSMY-H7X0	Yellow	1.6	5.0	584	586	165	500
HSMG-H6X0 HSMG-H7X0	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 λ_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-H770 HSMS-H690 HSMS-H790	High Efficiency Red	2.0	2.6	5	6	250
HSMD-H670 HSMD-H770 HSMD-H690 HSMD-H790	Orange	2.0	2.6	5	5	250
HSMY-H670 HSMY-H770 HSMY-H690 HSMY-H790	Yellow	2.1	2.6	5	5	250
HSMG-H670 HSMG-H770 HSMG-H690 HSMG-H790	Green	2.3	2.6	5	5	250

Green Color Bins^[1]

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^[1]

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^[1]

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 Agilent representative for information on currently available bins.

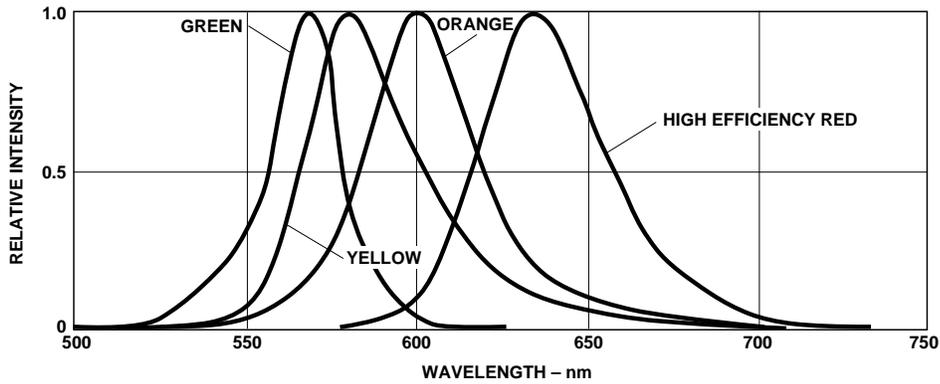


Figure 1. Relative Intensity vs. Wavelength.

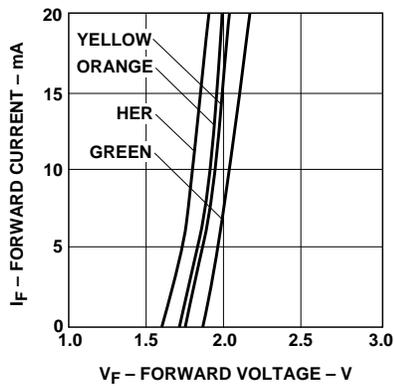


Figure 2. Forward Current vs. Forward Voltage.

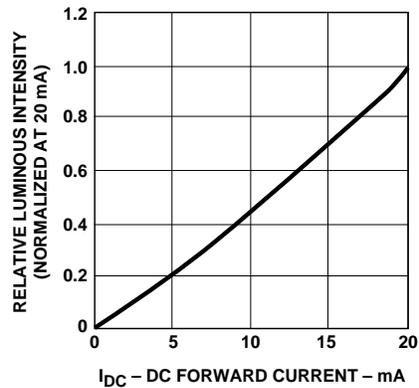


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

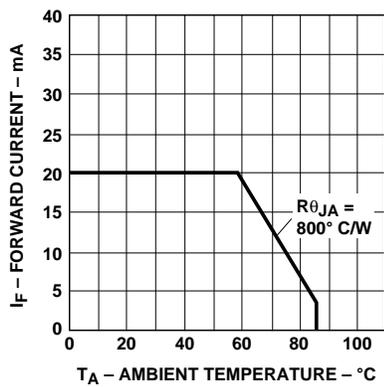


Figure 4. Maximum DC Current vs. Ambient Temperature.

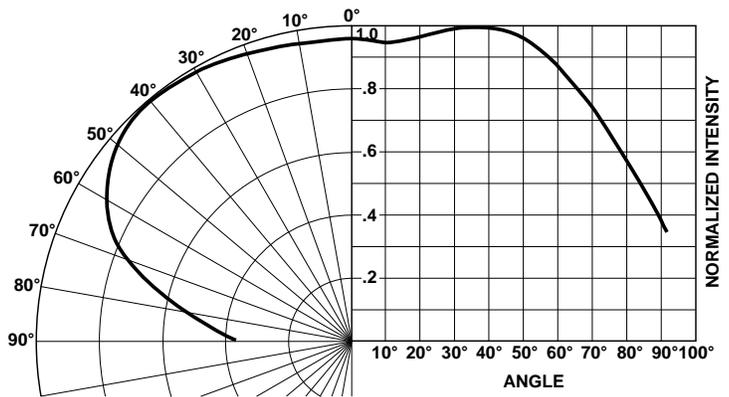


Figure 5. Intensity vs. Angle.

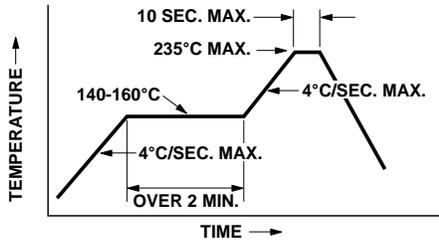


Figure 6. Recommended Reflow Soldering Profile.

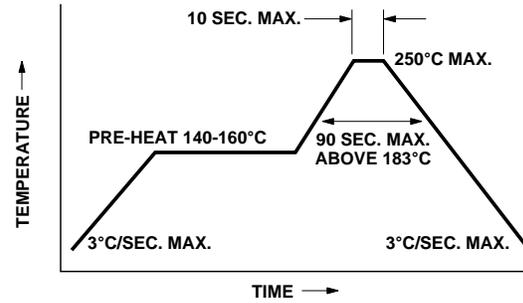
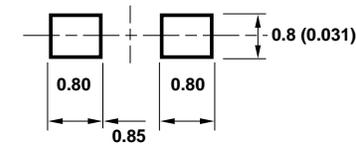
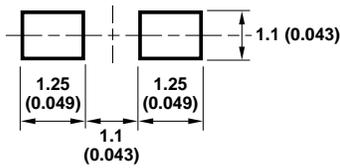


Figure 7. Recommended Wave Solder Profile.



HSMX-H690/H790 SERIES



HSMX-H670/H770 SERIES

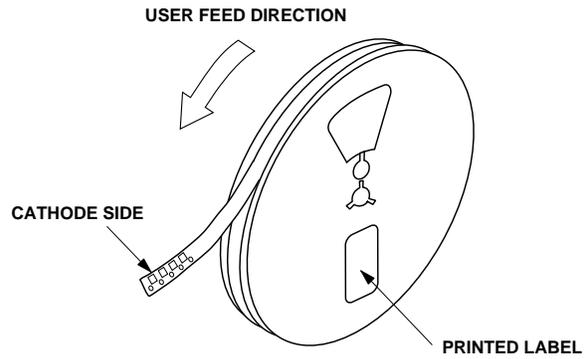


Figure 9. Reeling Orientation.

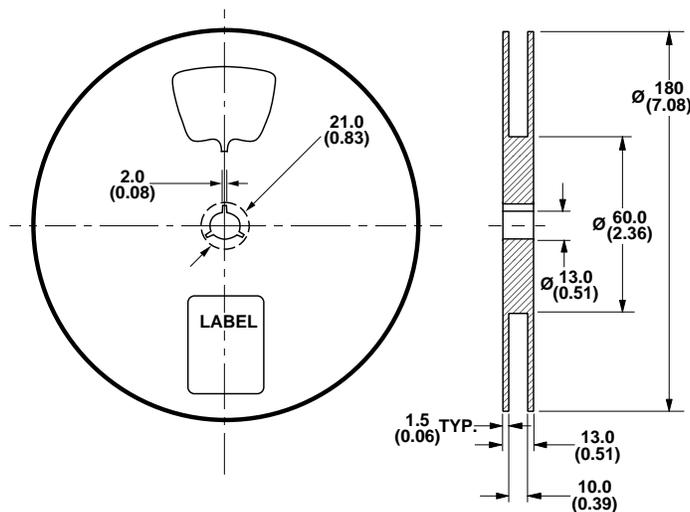


Figure 10. Reel Dimensions.

NOTE:
ALL DIMENSIONS IN MILLIMETERS (INCHES).

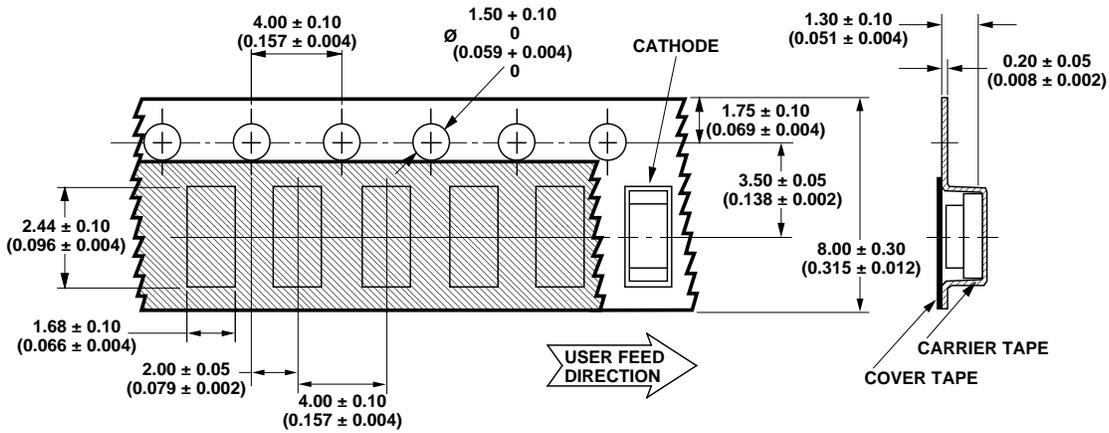


Figure 11. Tape Dimensions, HSMx-H670/H770 Series.

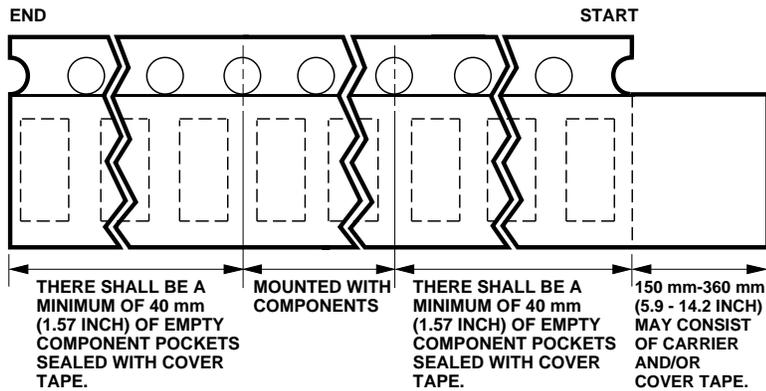


Figure 12. Tape Leader and Trailer Dimensions for HSMx-H670/H770 Series.

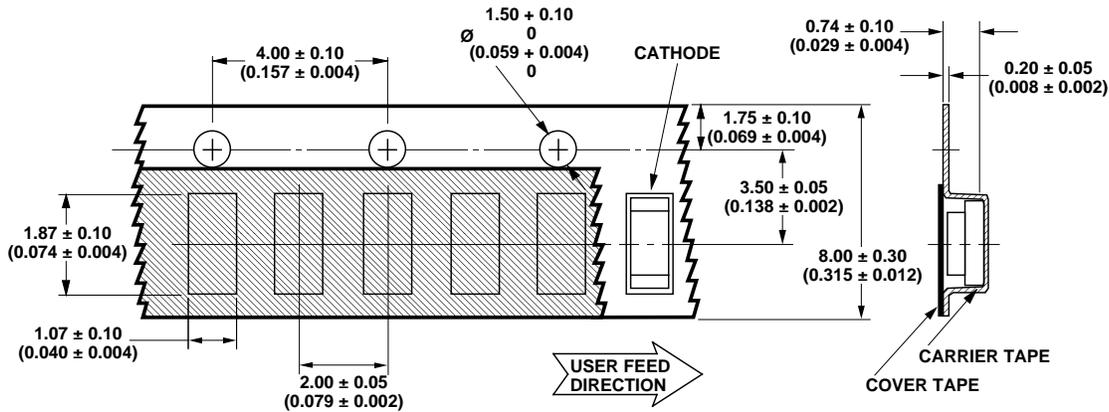
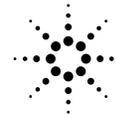


Figure 13. Tape Dimensions, HSMx-H690/H790 Series.

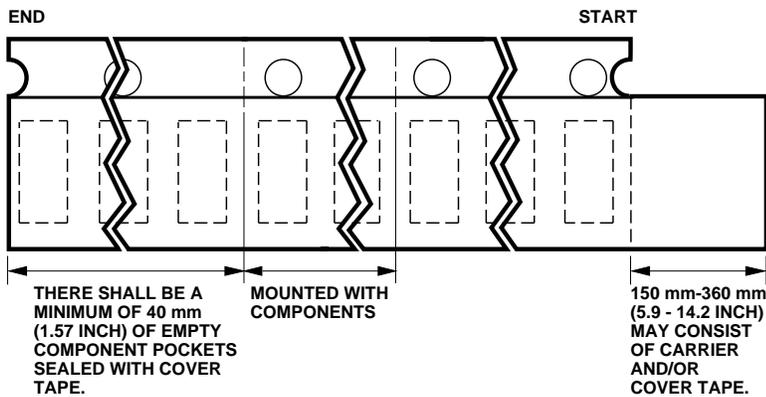


Figure 14. Tape Leader and Trailer Dimensions for HSMx-H690/H790 Series.

Convective IR Reflow Soldering

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