
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**

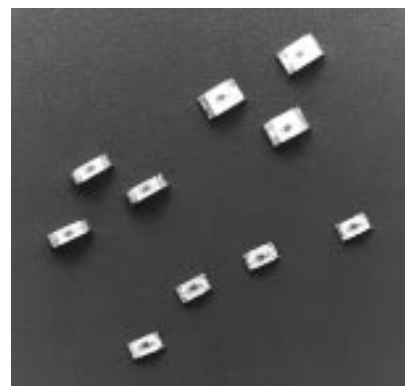
Applications

- **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

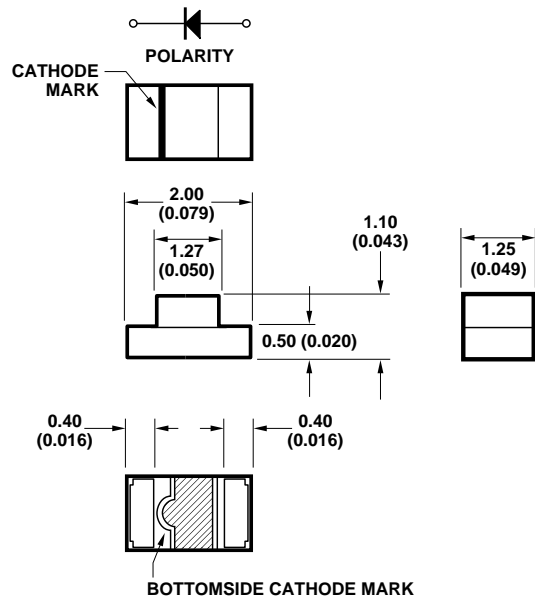
Footprint (mm) ^{[1][2]}	Amber 590 nm		Orange 605 nm		Red 626 nm	
	7" Reel	13" Reel	7" Reel	13" Reel	7" Reel	13" Reel
1.6 x 0.8 x 0.6	HSMA-H690	-H790	HSML-H690	-H790	HSMC-H690	-H790
2.0 x 1.25 x 1.1	HSMA-H670	-H770	HSML-H670	-H770	HSMC-H670	-H770
2.1 x 1.3 x 0.7 ^[3]	HSMA-R661	-R761	HSML-R661	-R761	HSMC-R661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

Notes:

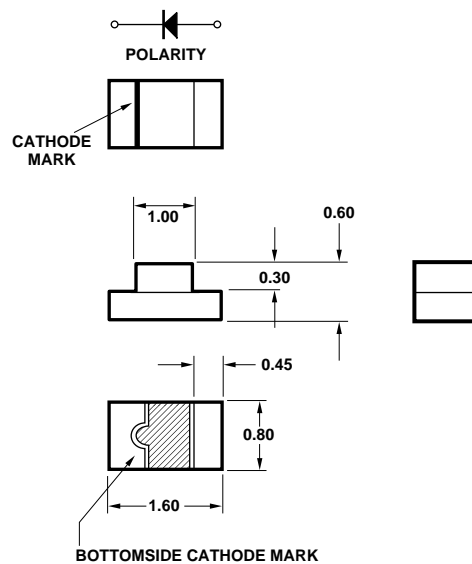
1. Dimensions in mm.
2. Tolerances ± 0.1 mm unless otherwise noted.
3. Right angle package.

Package Dimensions

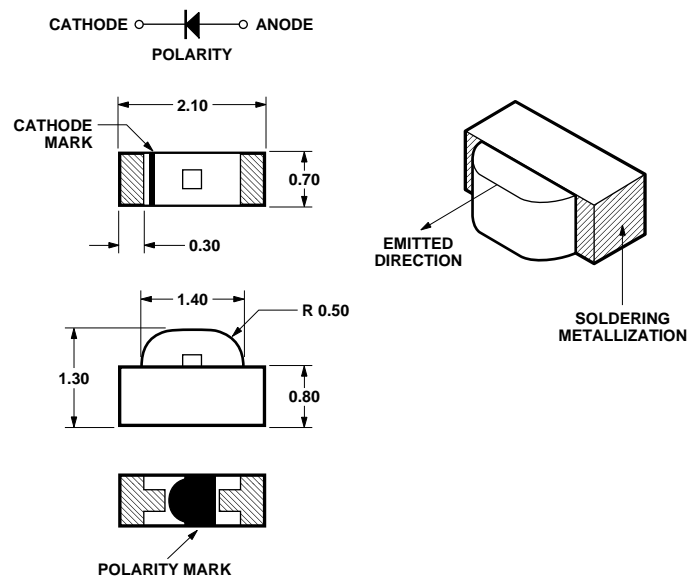
HSMx-H670 Series



HSMx-H690 Series



HSMx-R661 Series



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

Parameter	Max. Rating	Units
DC Forward Current ^[1]	20	mA
Power Dissipation	50	mW
Reverse Voltage ($I_R = 100\ \mu\text{A}$)	5	V
Operating Temperature Range	-40 to 85	$^\circ\text{C}$
Storage Temperature Range ^[2]	-40 to 85	$^\circ\text{C}$

Notes:

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

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

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 $T_A = 25^\circ\text{C}$ (Cont'd)

Part No.	Color	Luminous Intensity I_v (mcd) @ $I_F = 5\ \text{mA}$		Luminous Intensity I_v (mcd) @ $I_F = 20\ \text{mA}$	Luminous Intensity I_v (mcd) @ $I_F = 2\ \text{mA}$
		Min.	Typ.	Typ.	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:

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

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

Part No.	Color	Forward Voltage V_F (Volts) @ $I_F = 5 \text{ mA}$		Forward Voltage V_F (Volts) @ $I_F = 20 \text{ mA}$		Reverse Breakdown V_R (Volts) @ $I_R = 100 \mu\text{A}$	Capacitance C (pF) $V_F = 0$, $f = 1 \text{ Mhz}$
		Typ.	Max.	Typ.	Max.	Min.	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 $T_A = 25^\circ\text{C}$ (Cont'd)

Part No.	Color	Thermal Resistance R θ_{J-PIN} ($^\circ\text{C/W}$)	Thermal Resistance R θ_{J-A} ($^\circ\text{C/W}$)
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

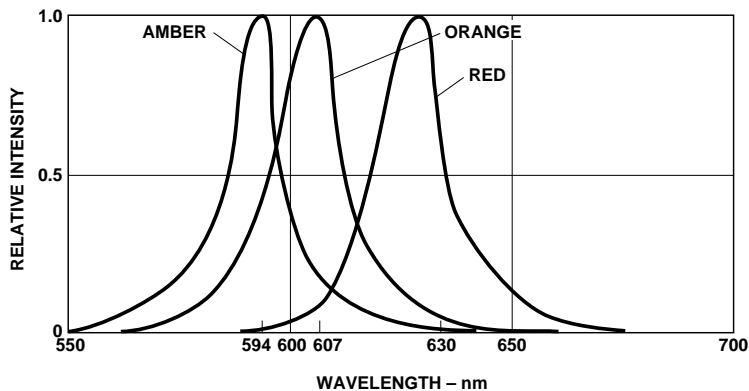


Figure 1. Relative Intensity vs. Wavelength.

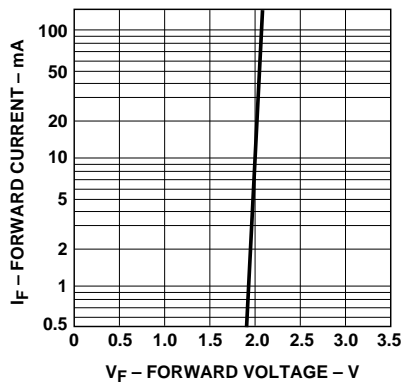


Figure 2. Forward Current vs. Forward Voltage.

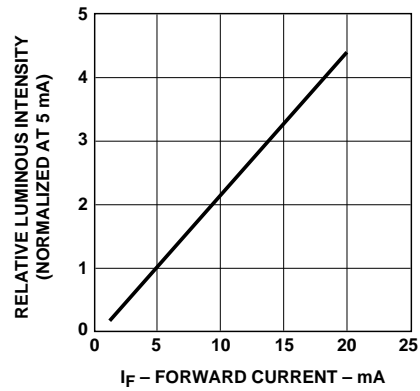


Figure 3. Relative Intensity vs. DC Forward Current (operation below 1 mA not recommended).

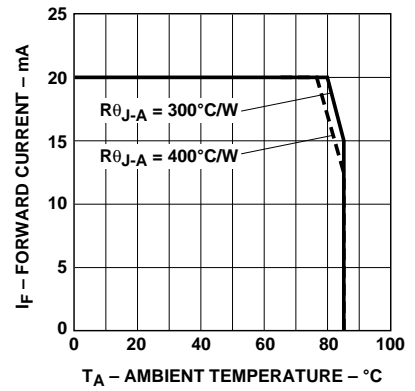


Figure 4. Maximum DC Current vs. Ambient Temperature.

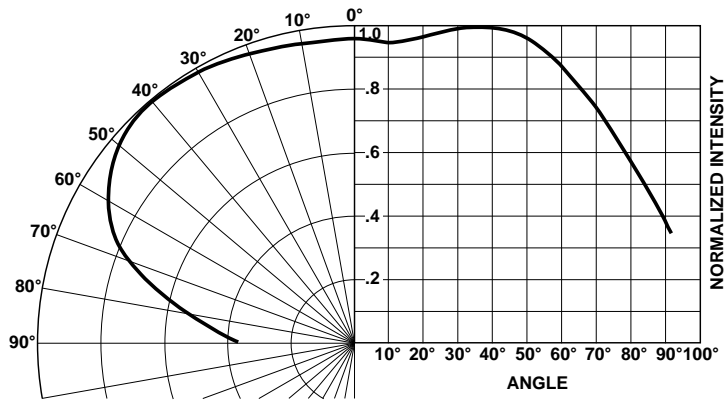


Figure 5. Intensity vs. Angle for HSMx-H670/H770 and HSMx-H690/H790.

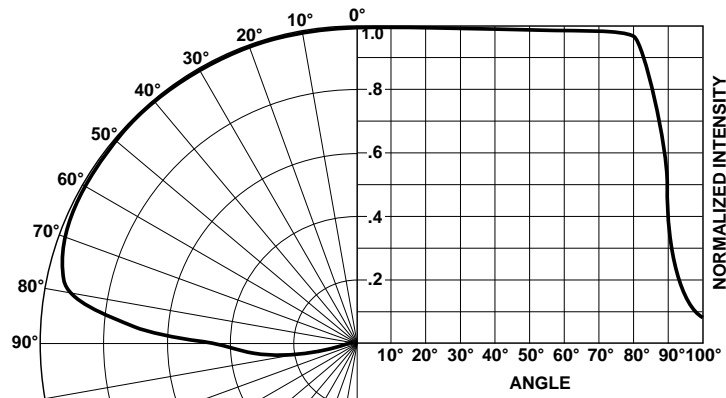


Figure 6. Intensity vs. Angle (Horizontal) for HSMx-R661/R761.

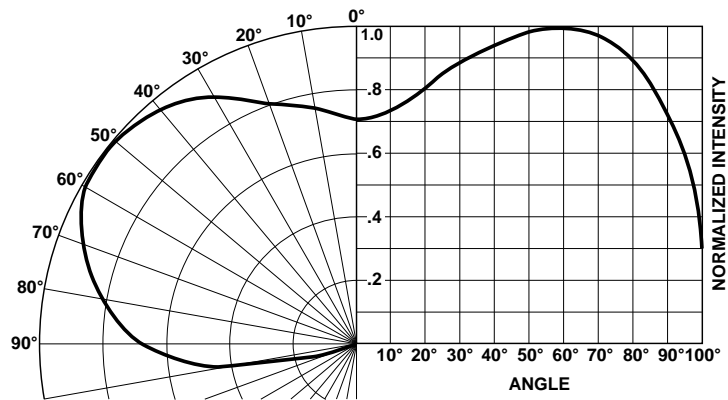
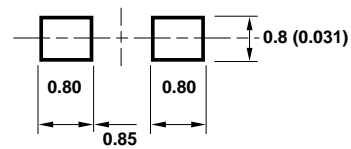
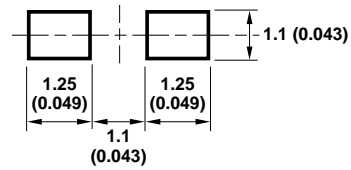


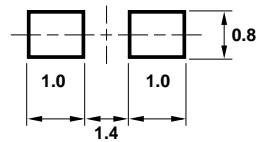
Figure 7. Intensity vs. Angle (Vertical) for HSMx-R661/R761.



HSMX-H690/H790 SERIES



HSMX-H670/H770 SERIES



HSMX-R661/R761 SERIES

Figure 8. Recommended Solder Pad Patterns.

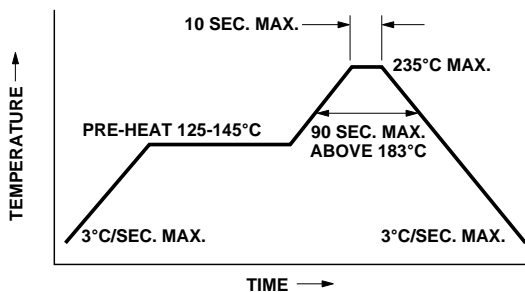


Figure 9. Recommended IR Reflow Soldering Profile.

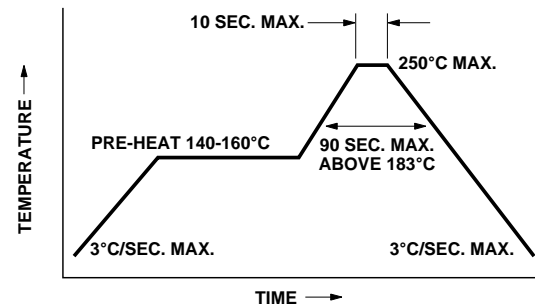


Figure 10. Recommended Wave Solder Profile.

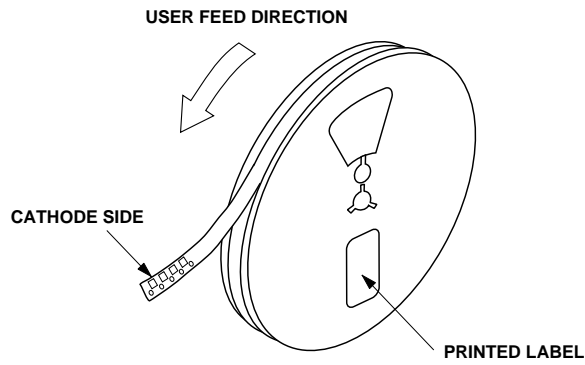


Figure 11. Reeling Orientation.

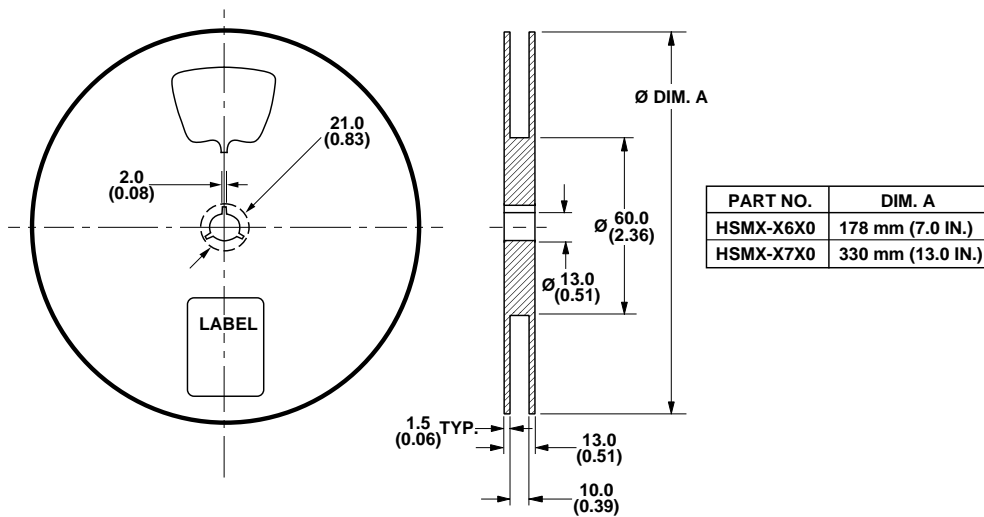


Figure 12. Reel Dimensions.

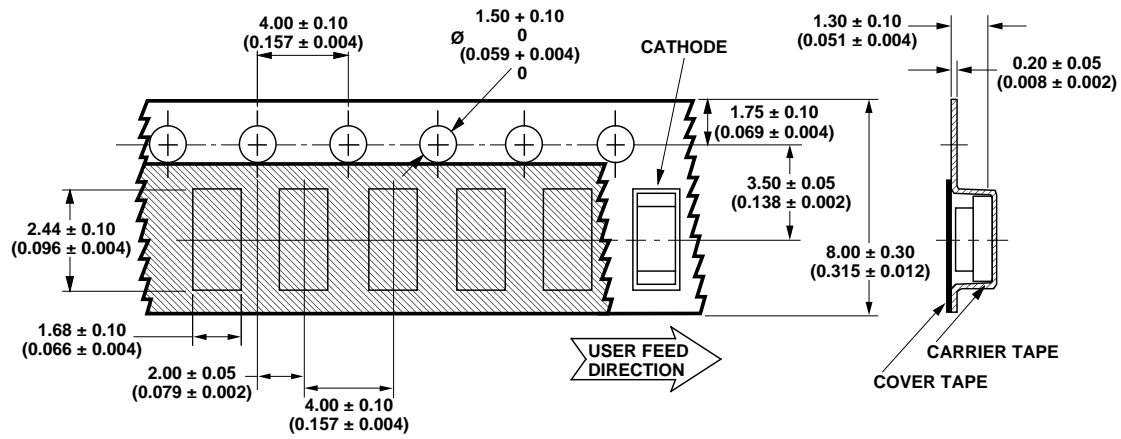


Figure 13. Tape Dimensions, HSMx-H670/H770 Series.

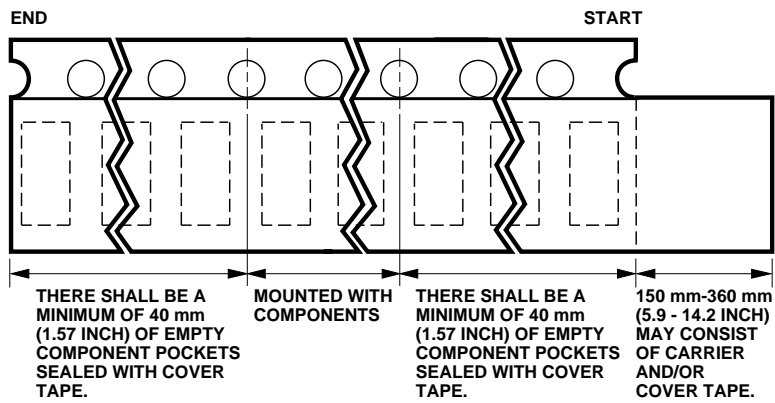


Figure 14. Tape Leader and Trailer Dimensions for HSMx-H670/H770 Series.

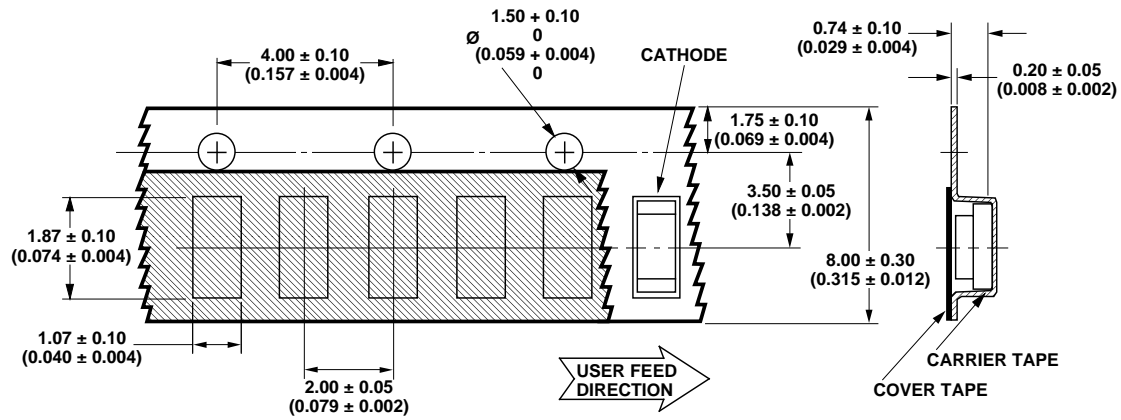


Figure 15. Tape Dimensions, HSMx-H690/H790 Series.

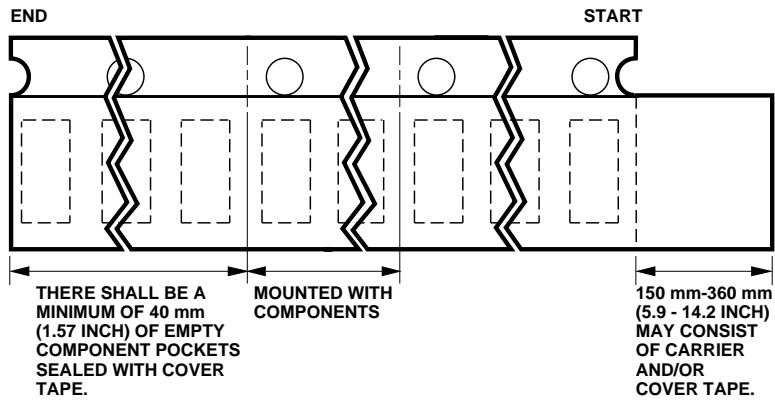


Figure 16. Tape Leader and Trailer Dimensions for HSMx-H690/H790 Series.

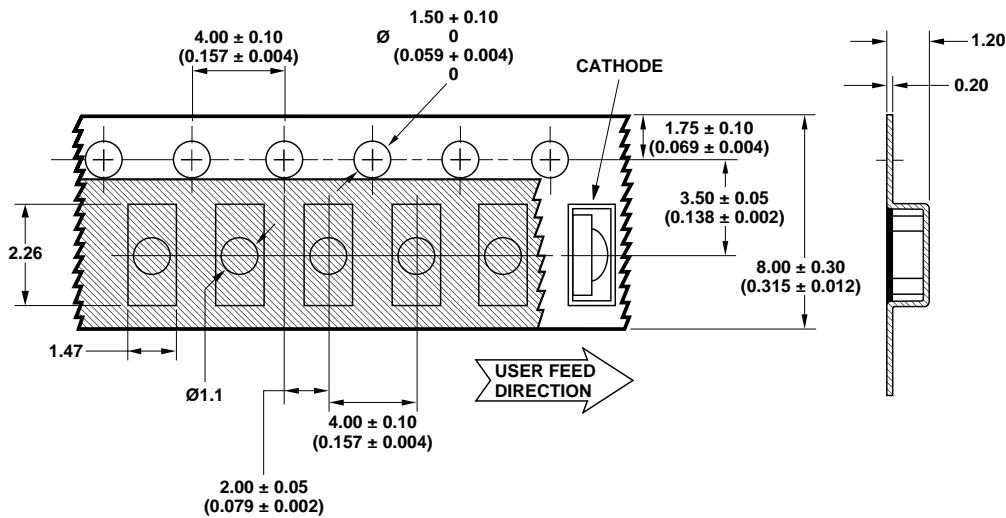


Figure 17. Tape Dimensions for HSMx-RX61.

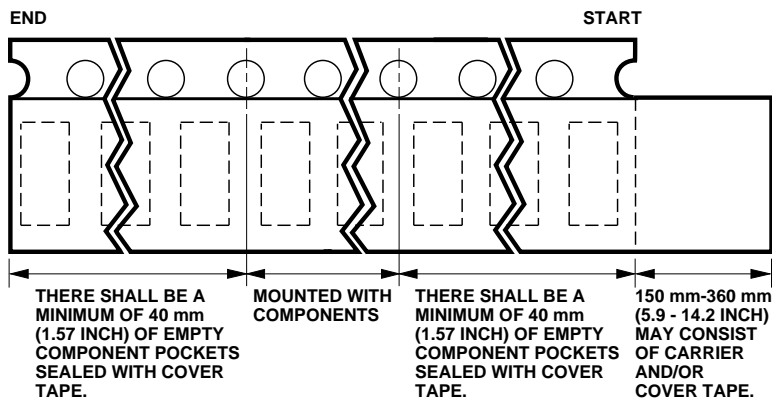


Figure 18. Tape Leader and Trailer Dimensions.

Convective IR Reflow Soldering

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

www.hp.com/go/led

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

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Obsoletes 5968-1097E (8/98)

5968-3197E (2/99)