

# Surface Mount Chip LEDs

## Technical Data

### HSMx-C190/C170/ C150/C110

#### Features

- Small Size
- Industry Standard Footprint
- Compatible with IR Solder
- Diffused Optics
- Operating Temperature Range of -30°C to +85°C
- Right Angle Package Available
- Five Colors Available
- Available in 8 mm Tape on 7 in. (178 mm) Diameter Reels

#### Applications

- Keypad Backlighting
- Push-Button Backlighting
- LCD Backlighting
- Symbol Backlighting
- Front Panel Indicator

#### Description

These chip LEDs are designed in an industry standard package for ease of handling and use. Five different LED colors are available in four compact, single color packages.

The HSMx-C150 has the industry standard 3.2 x 1.6 mm footprint that is excellent for all around use. The HSMx-C170 has the widely used 2.0 x 1.25 mm footprint. The HSMx-C190 has the industry standard 1.6 x 0.8 mm footprint, its low 0.8 mm profile and wide viewing angle make this LED exceptional for backlighting applications.

The HSMx-C110 is a right-angle package with the universally accepted dimensions of



3.2 x 1.0 x 1.5 mm. This part is ideal for LCD backlighting and sidelighting applications.

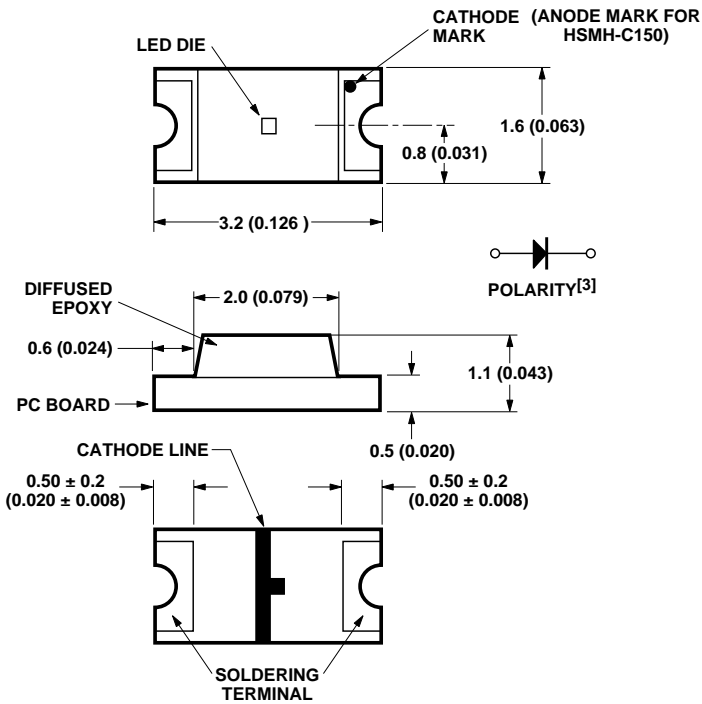
All packages are compatible with IR reflow solder processes. The small size and wide viewing angle make these LEDs prime choices for backlighting applications and front panel illumination especially where space is a premium.

#### Device Selection Guide

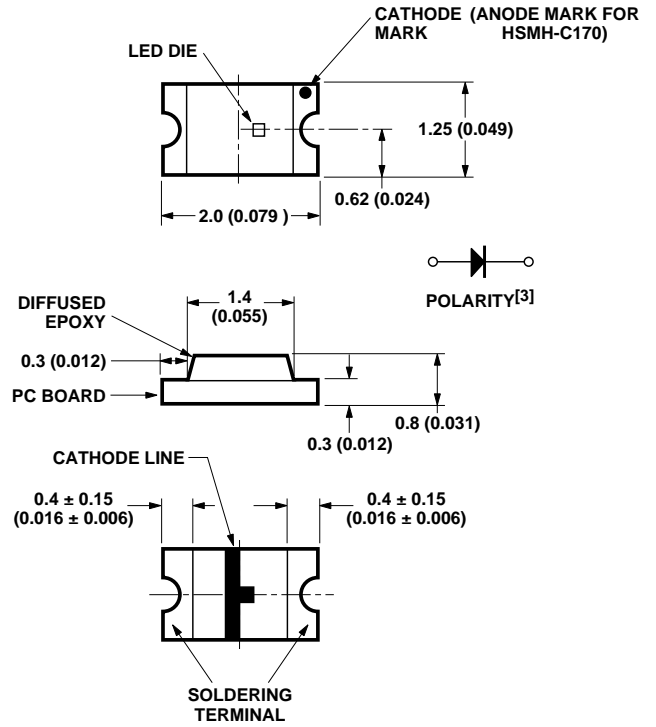
Footprint (mm)	HER	Orange	Yellow	Green	AS AlGaAs Red	Part per Reel
3.20 x 1.60	HSMS-C150	HSMD-C150	HSMY-C150	HSMG-C150	HSMH-C150	3000
2.00 x 1.25	HSMS-C170	HSMD-C170	HSMY-C170	HSMG-C170	HSMH-C170	4000
1.60 x 0.80	HSMS-C190	HSMD-C190	HSMY-C190	HSMG-C190	HSMH-C190	4000
3.20 x 1.00 <sup>[1]</sup>	HSMS-C110	HSMD-C110	HSMY-C110	HSMG-C110	HSMH-C110	3000

Note: Right-angle package

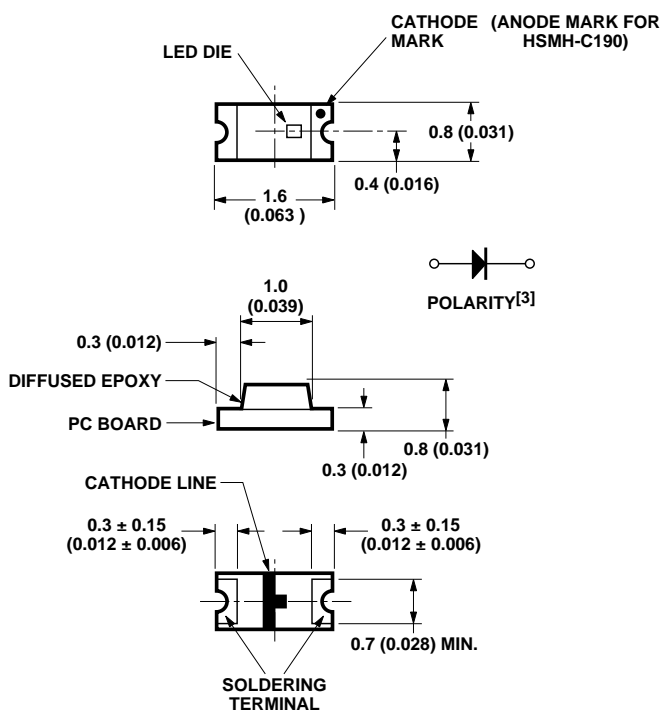
### Package Dimensions



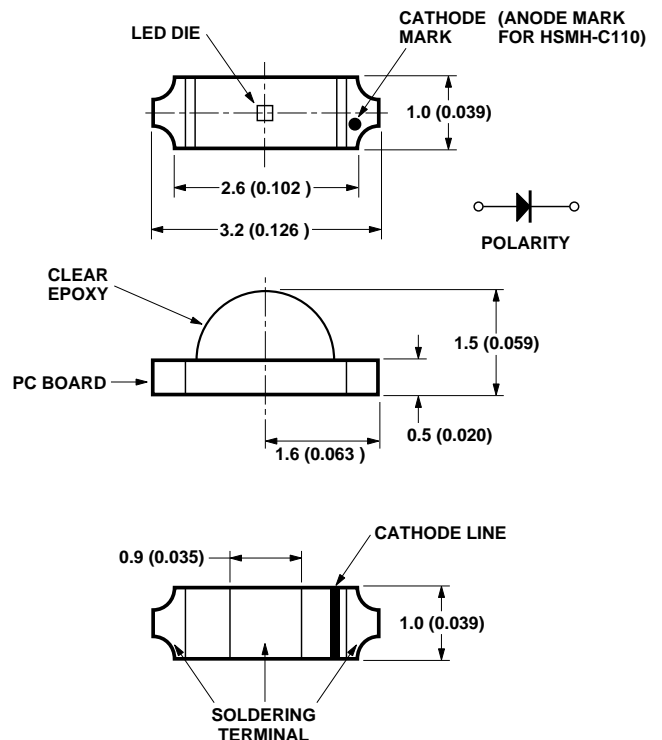
**HSMx-C150**



**HSMx-C170**



**HSMx-C190**



**HSMx-C110**

**Notes:**

1. All dimensions in millimeters (inches).

± 0.004 in.) unless otherwise specified.

0 will be the opposite of what is shown on above drawings

### Absolute Maximum Ratings at $T_A=25^\circ\text{C}$ for HER, Orange, Yellow and Green

Parameter	HSMx-C150	HSMx-C170	HSMx-C190	HSMx-C110	Units
DC Forward Current <sup>[1]</sup>	25	20	20	25	mA
Peak Pulsing Current <sup>[2]</sup>	100	100	100	100	mA
Power Dissipation	65	52	52	65	mW
Reverse Voltage ( $I_R=100\ \mu\text{A}$ )	5	5	5	5	V
LED Junction Temperature	95	95	95	95	$^\circ\text{C}$
Operating Temperature Range	-30 to +85	-30 to +85	-30 to +85	-30 to +85	$^\circ\text{C}$
Storage Temperature Range	-40 to +85	-40 to +85	-40 to +85	-40 to +85	$^\circ\text{C}$
Soldering Temperature	See IR soldering profile (Figure 7)				

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

Parameter	HSMx-C150	HSMx-C170	HSMx-C190	HSMx-C110	Units
DC Forward Current <sup>[1]</sup>	30	25	25	30	mA
Peak Pulsing Current <sup>[2]</sup>	100	100	100	100	mA
Power Dissipation	78	65	65	78	mW
Reverse Voltage ( $I_R=100\ \mu\text{A}$ )	5	5	5	5	V
LED Junction Temperature	95	95	95	95	$^\circ\text{C}$
Operating Temperature Range	-30 to +85	-30 to +85	-30 to +85	-30 to +85	$^\circ\text{C}$
Storage Temperature Range	-40 to +85	-40 to +85	-40 to +85	-40 to +85	$^\circ\text{C}$
Soldering Temperature	See IR soldering profile (Figure 7)				

#### Notes:

- Derate linearly as shown in Figure 4 for temperature above  $25^\circ\text{C}$ .
- Pulse condition of 1/10 duty and 0.1 msec. width.

### 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) @ $I_R = 100\ \mu\text{A}$	Capacitance $C$ (pF), @ $V_F = 0\ \text{V}$ , $f = 1\ \text{MHz}$	Thermal Resistance $R_{\theta_{J-P}}$ ( $^\circ\text{C}/\text{W}$ )
		Typ.	Max.	Min.	Typ.	Typ.
HSMS-C150/110 HSMS-C170/190	HER	2.1	2.6	5	5	400 250
HSMD-C150/110 HSMD-C170/190	Orange	2.2	2.6	5	7	400 250
HSMY-C150/110 HSMY-C170/190	Yellow	2.1	2.6	5	6	400 250
HSMG-C150/110 HSMG-C170/190	Green	2.2	2.6	5	9	400 250
HSMH-C150/110 HSMH-C170/190	AlGaAs	1.8	2.6	5	18	460 300



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

Part Number	Color	Luminous Intensity <sup>[1]</sup> Iv(mcd)@20mA		Peak Wavelength $\lambda_{\text{peak}}$ (nm)	Dominant Wavelength $\lambda_d$ (nm)	Viewing Angle $2\theta_{1/2}$ (°) <sup>[2]</sup>
		Min.	Typ.	Typ.	Typ.	Typ.
HSMS-C150/170/190	HER	2.50	10.0	630	626	170
HSMD-C150/170/190	Orange	2.50	8.0	605	604	170
HSMY-C150/170/190	Yellow	2.50	8.0	589	586	170
HSMG-C150/170/190	Green	4.00	15.0	570	572	170
HSMH-C150/170/190	AlGaAs	6.30	17.0	660	639	170
HSMS-C110	HER	2.50	11.0	630	626	130
HSMD-C110	Orange	2.50	9.0	605	604	130
HSMY-C110	Yellow	2.50	9.0	589	586	130
HSMG-C110	Green	4.00	16.0	570	572	130
HSMH-C110	AlGaAs	6.30	19.0	660	639	130

### Notes:

1. The luminous intensity, Iv, is measured at the peak of the spatial radiation pattern, which may not be aligned with the mechanical axis of the lamp package.
2.  $\theta_{1/2}$  is the off-axis angle where the luminous intensity is 1/2 the peak intensity.

## Color Bin Limits<sup>[1]</sup>

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

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	561.5	564.5
B	564.5	567.5
C	567.5	570.5
D	570.5	573.5
E	573.5	576.5

Tolerance:  $\pm 0.5$  nm

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

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	582.0	584.5
B	584.5	587.0
C	587.0	589.5
D	589.5	592.0
E	592.0	594.5
F	594.5	597.0

Tolerance:  $\pm 0.5$  nm

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

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	597.0	600.0
B	600.0	603.0
C	603.0	606.0
D	606.0	609.0
E	609.0	612.0
F	612.0	615.0

Tolerance:  $\pm 1$  nm



### Light Intensity (Iv) Bin Limits<sup>[1]</sup>

Bin ID	Intensity (mcd)		Bin ID	Intensity (mcd)	
	Min.	Max.		Min.	Max.
A	0.11	0.18	N	28.50	45.00
B	0.18	0.29	P	45.00	71.50
C	0.29	0.45	Q	71.50	112.50
D	0.45	0.72	R	112.50	180.00
E	0.72	1.10	S	180.00	285.00
F	1.10	1.80	T	285.00	450.00
G	1.80	2.80	U	450.00	715.00
H	2.80	4.50	V	715.00	1125.00
J	4.50	7.20	W	1125.00	1800.00
K	7.20	11.20	X	1800.00	2850.00
L	11.20	18.00	Y	2850.00	4500.00
M	18.00	28.50			

Tolerance: ± 15%

Note:

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

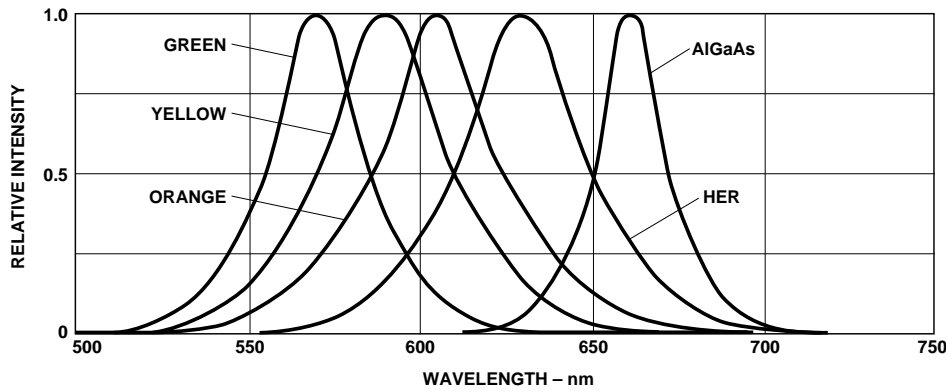


Figure 1. Relative Intensity vs. Wavelength.

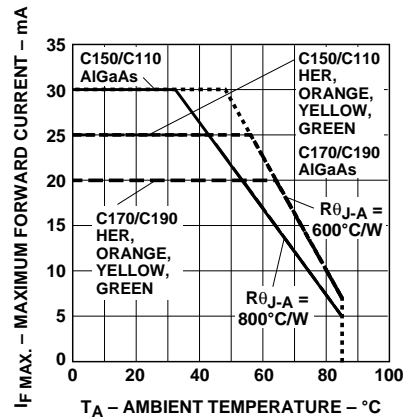
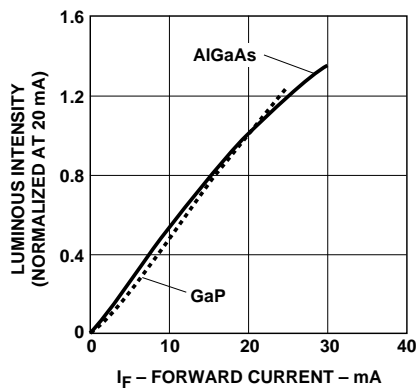
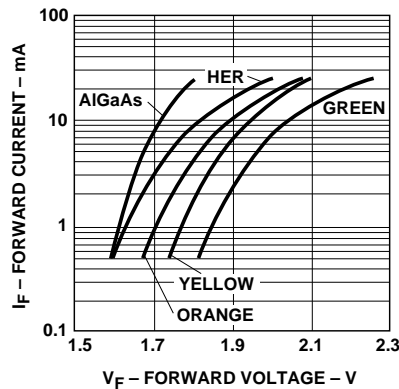


Figure 3. Luminous Intensity vs. Forward Current

Figure 4. Maximum Forward Current vs. Ambient Temperature

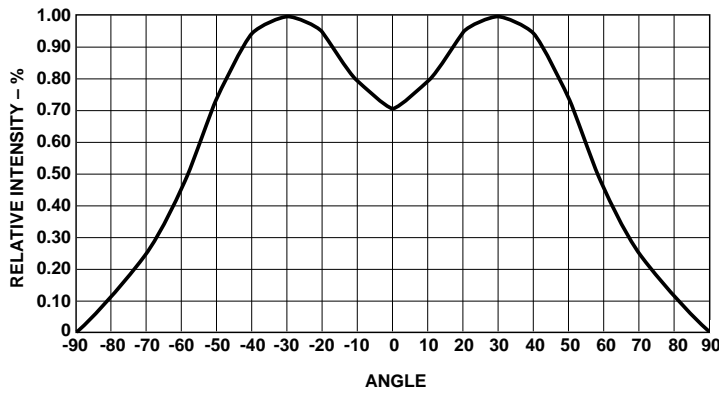
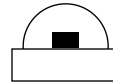
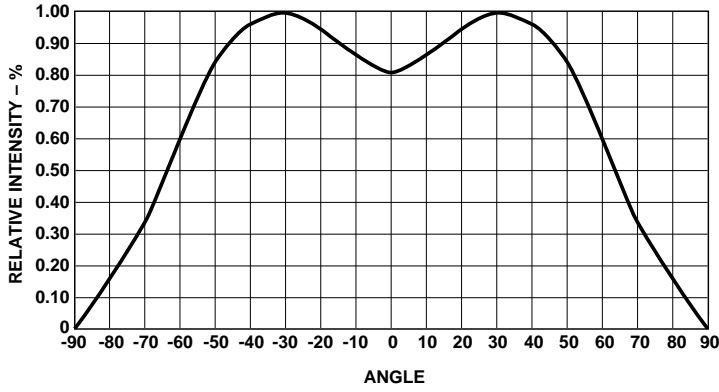


Figure 5. Relative Intensity vs. Angle for HSMx-C110.

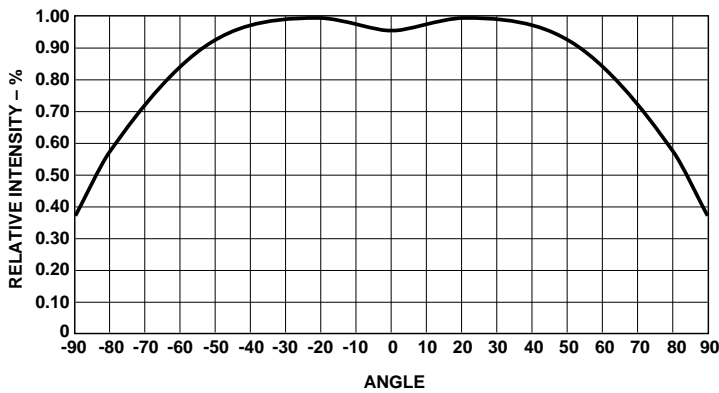


Figure 6. Relative Intensity vs. Angle for HSMx-C150, C170 and C190.

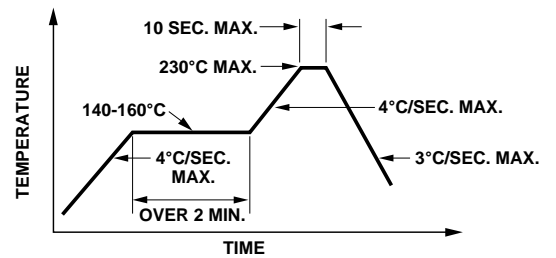


Figure 7. Recommended Reflow Soldering Profile.



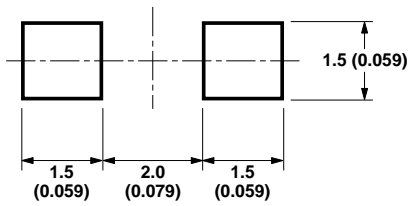


Figure 8. Recommended Soldering Pattern for HSMx-C150.

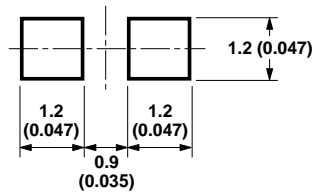


Figure 9. Recommended Soldering Pattern for HSMx-C170.

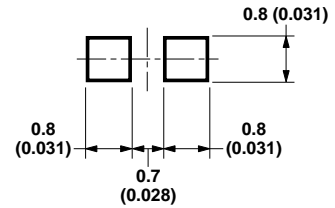


Figure 10. Recommended Soldering Pattern for HSMx-C190.

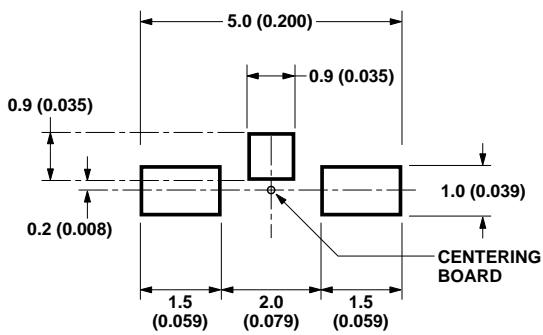


Figure 11. Recommended Soldering Pattern for HSMx-C110.

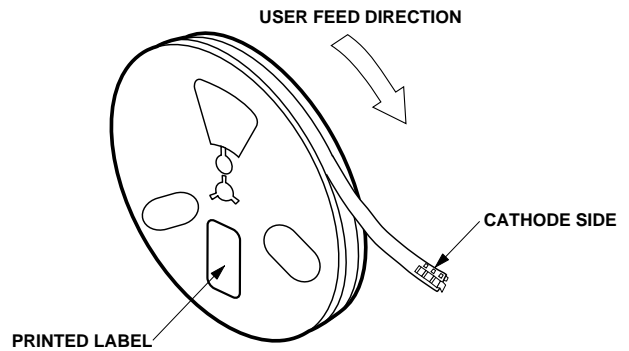


Figure 12. Reeling Orientation.

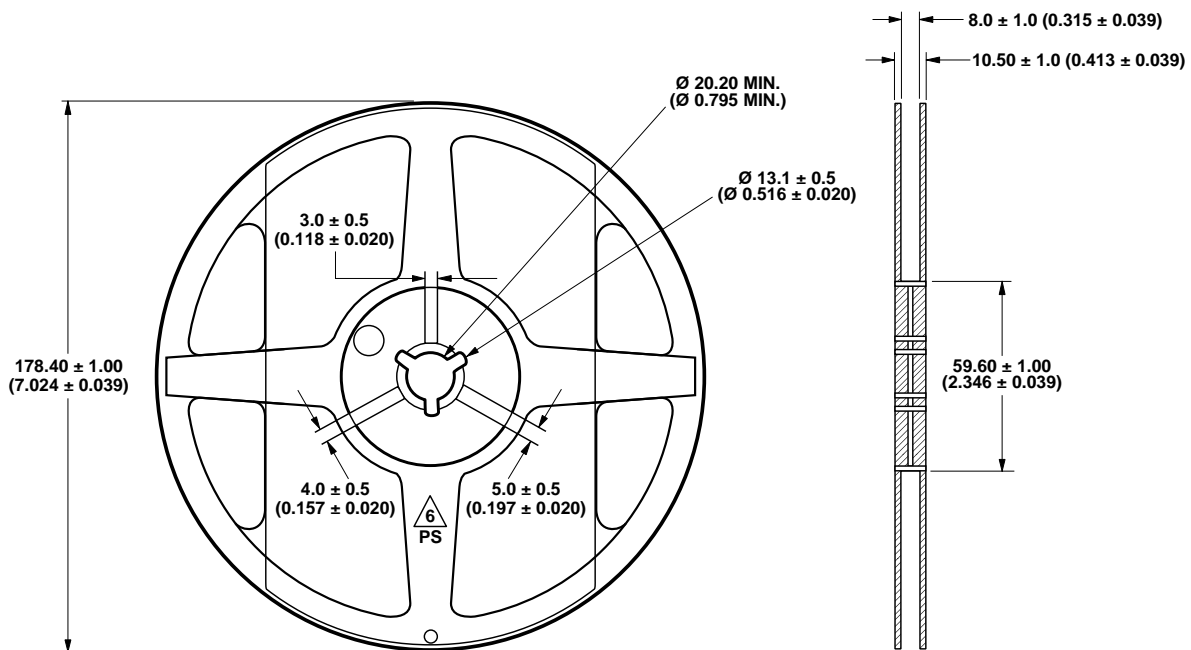


Figure 13. Reel Dimensions.



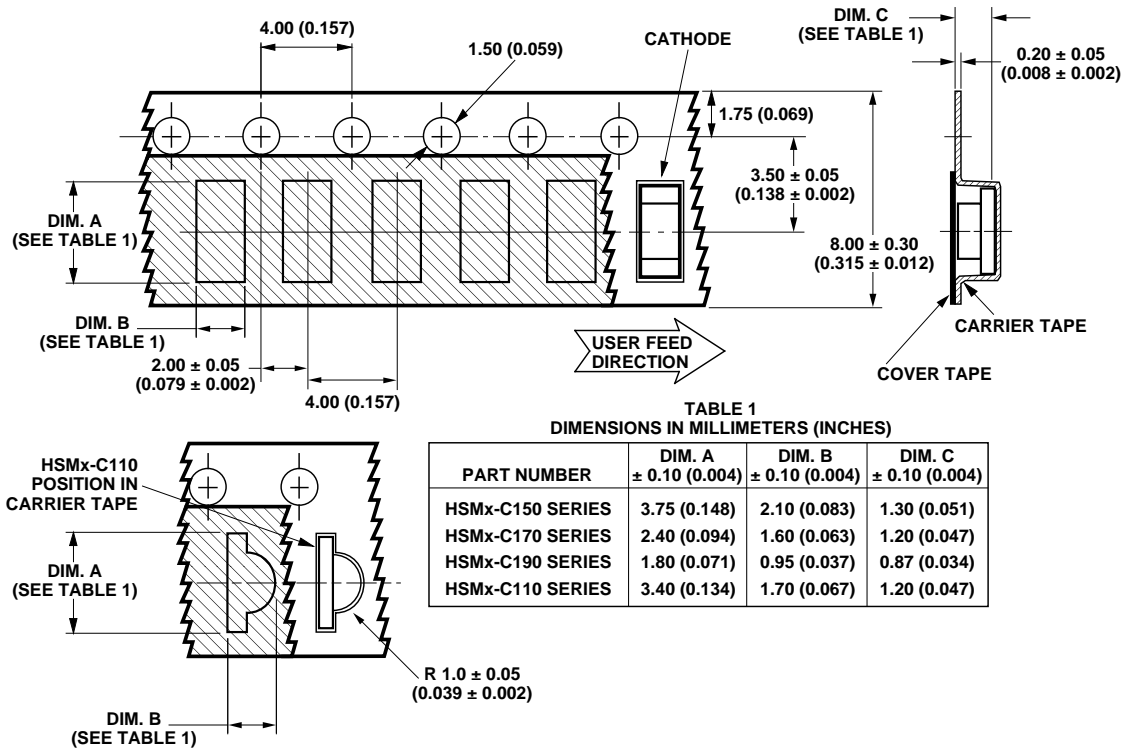


Figure 14. Tape Dimensions.

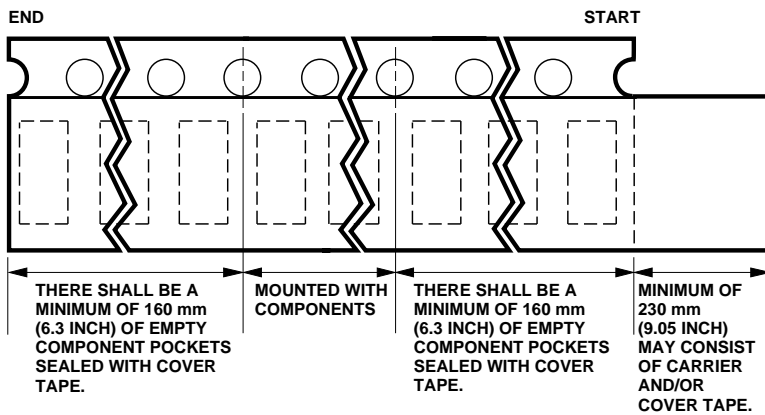


Figure 15. Tape Leader and Trailer Dimensions.

**Notes:**

1. All dimensions in millimeters (inches).
2. Tolerance is  $\pm 0.1$  mm ( $\pm 0.004$  in.) unless otherwise specified.

## Convective IR Reflow Soldering

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

Storage Condition: 5 to 30° C @ 60% RH max.

Baking is required under the condition:

- a) the blue silica gel indicator becoming white/transparent color
- b) the pack has been opened for more than 1 week

Baking recommended condition: 60  $\pm$  5° C for 20 hours.

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Obsoletes 5988-1858EN

April 30, 2002

5988-6271EN

