

## Data Sheet

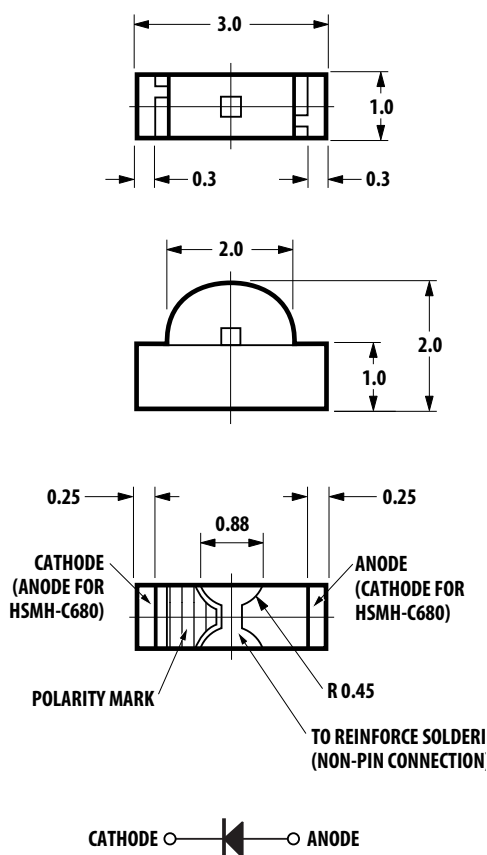
### Description

The HSMx-C680 series of chip-type LEDs are designed to illuminate at a right angle to the direction of mounting. When mounted on a PC board, these devices will emit light in a direction parallel to the board.

The small 3.0 x 1.0 x 2.0mm footprint of the HSMx-C680 is designed for applications where space is limited. These devices are available in four colors and use untinted, non-diffused optics.

The HSMx-C680 series of parts are compatible with IR reflow soldering process only.

### Package Dimensions



### Features

- Right Angle Mounting
- Compatible with IR Reflow Soldering Process
- Available in a Wide Variety of Colors
- Available in 8 mm Tape on 178mm (7") Diameter Reels

### Applications

- LCD backlighting
- Keypad Side/Backlighting
- Light Piping
- Right Angle Indicator

### Device Selection Guide

Part Number	Parts per Reel	Color
HSM-A-C680	3000	AllnGaP Amber
HSM-C-C680	3000	AllnGaP Red
HSM-G-C680	3000	GaP Green
HSM-H-C680	3000	AS AlGaAs Red
HSM-L-C680	3000	AllnGaP Orange
HSM-S-C680	3000	GaP High Efficiency Red, HER
HSM-Y-C680	3000	GaP Yellow

**CAUTION:** HSMx-C680 LEDs are Class 1A ESD sensitive per JESD22-A114C.01 standard. Please observe appropriate precautions during handling and processing. Refer to Application Note AN-1142 for additional details.

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

Parameter	AllnGaP	GaP	AS AlGaAs	Units
DC Forward Current	30	25	25	mA
Power Dissipation	72	65	65	mW
Reverse Voltage ( $I_R = 100\mu\text{A}$ )	5	5	5	V
LED Junction Temperature	95	95	95	$^\circ\text{C}$
Operating Temperature Range	-30 to $85^\circ\text{C}$			
Storage Temperature Range	-40 to $85^\circ\text{C}$			
Soldering Temperature	See reflow soldering profile (Figure 6 & 7)			

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

Part Number	Forward Voltage $V_F$ (Volts) <sup>[1]</sup> @ $I_F = 20\text{mA}$		Reverse Breakdown $V_R$ (Volts) @ $I_R = 100\mu\text{A}$	Thermal Resistance $R_{\theta\text{J-P}}$ ( $^\circ\text{C}/\text{W}$ )
	Typ.	Max.	Typ.	Typ.
AllnGaP Amber	2.0	2.4	5	500
AllnGaP Red	2.0	2.4	5	500
GaP Green	2.2	2.6	5	300
AS AlGaAs Red	1.8	2.6	5	300
AllnGaP Orange	2.0	2.4	5	500
GaP HER	2.0	2.6	5	300
GaP Yellow	2.1	2.6	5	300

Notes:

1.  $V_F$  tolerance :  $\pm 0.1\text{V}$

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

Part Number	Luminous Intensity $I_V$ <sup>[1]</sup> (mcd) @ 20mA		Color, Dominant Wavelength $\lambda_d$ <sup>[2]</sup> (nm) Typical	Color, Peak Wavelength $\lambda_{\text{Peak}}$ [(nm) Typical	Viewing Angle $2\theta_{1/2}$ <sup>[3]</sup> (Degrees) Typical
	Min.	Typ.			
AllnGaP Amber	28.5	76.9	591	594	115
AllnGaP Red	28.5	62.3	630	643	115
GaP Green	4.5	13.3	573	568	125
AS AlGaAs Red	7.2	30.7	642	657	125
AllnGaP Orange	28.5	108.6	604	611	115
GaP HER	2.8	5.1	621	636	125
GaP Yellow	2.8	9.3	589	588	125

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 LED 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.

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

### Alln GaP Amber

Bin ID	Dominant Wavelength (nm)	
	Minimum	Maximum
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 : ±1nm

### AllnGaP Red

Bin ID	Dominant Wavelength (nm)	
	Minimum	Maximum
-	620.0	635.0

Tolerance : ±1nm

### GaP Green

Bin ID	Dominant Wavelength (nm)	
	Minimum	Maximum
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 : ± 1nm

### AS AlGaAs HER

Bin ID	Dominant Wavelength (nm)	
	Minimum	Maximum
-	630.0	650.0

Tolerance : ±1nm

### AllnGaP Orange

Bin ID	Dominant Wavelength (nm)	
	Minimum	Maximum
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 : ± 1nm

### GaP HER

Bin ID	Dominant Wavelength (nm)	
	Minimum	Maximum
-	620.0	635.0

Tolerance : ± 1 nm

### GaP Yellow

Bin ID	Dominant Wavelength (nm)	
	Minimum	Maximum
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 : ±1nm Notes:

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

### Light Intensity (I<sub>v</sub>) Bin Limits <sup>[1]</sup>

Bin ID	Intensity (mcd)	
	Minimum	Maximum
H	2.80	4.50
J	4.50	7.20
K	7.20	11.20
L	11.20	18.00
M	18.00	28.50
N	28.50	45.00
P	45.00	71.50
Q	71.50	112.50

Tolerance : ±15%

Notes:

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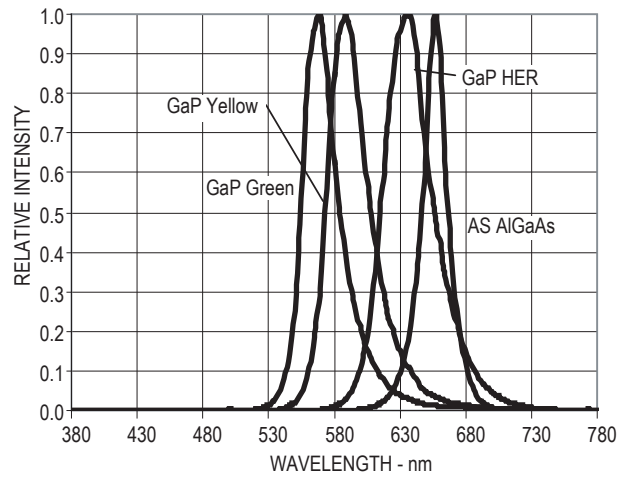
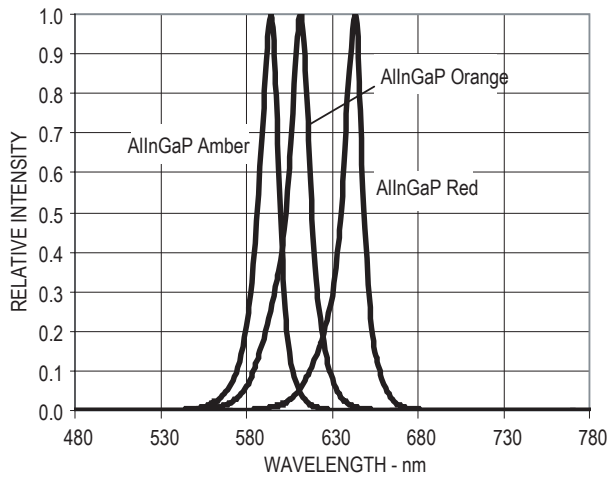


Figure 1. Relative intensity vs. wavelength..

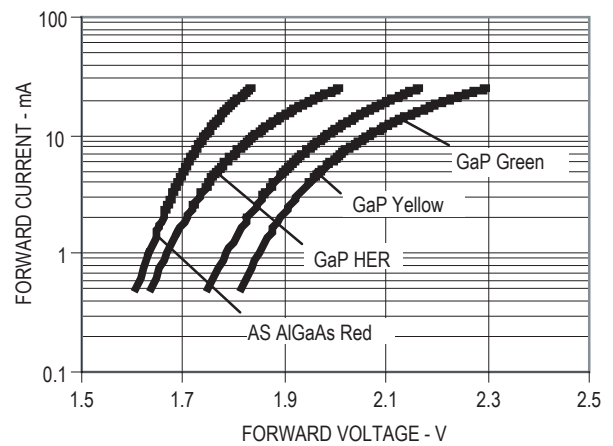
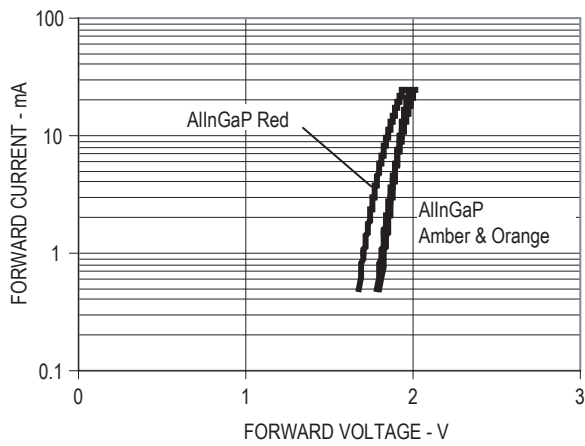


Figure 2. Forward current vs. forward voltage.

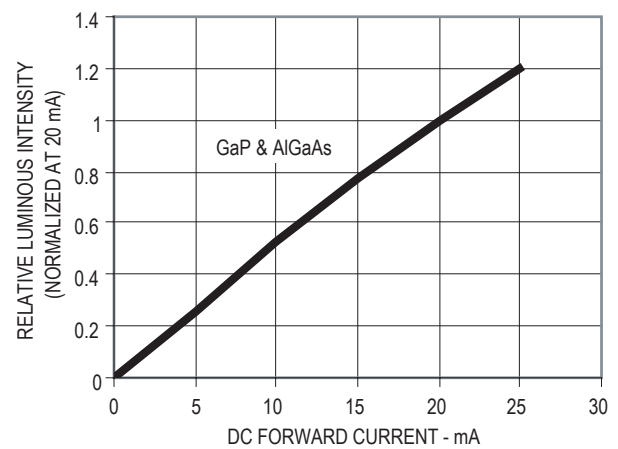
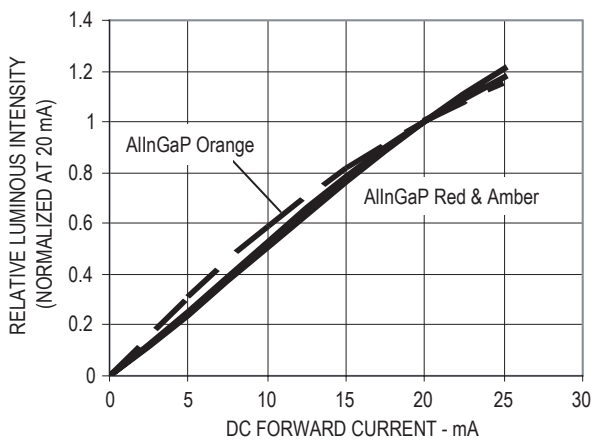


Figure 3. Luminous intensity vs. forward current.

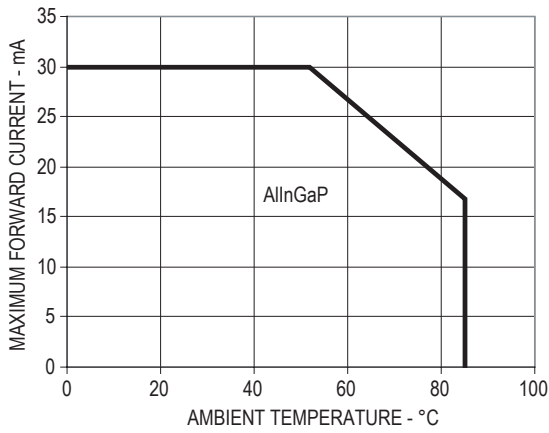


Figure 4. Maximum forward current vs. ambient temperature.

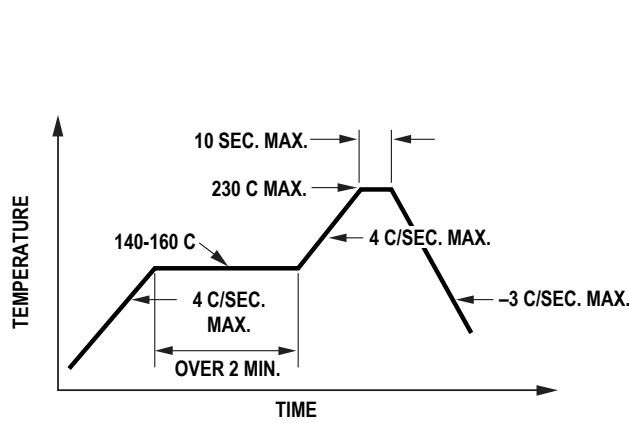
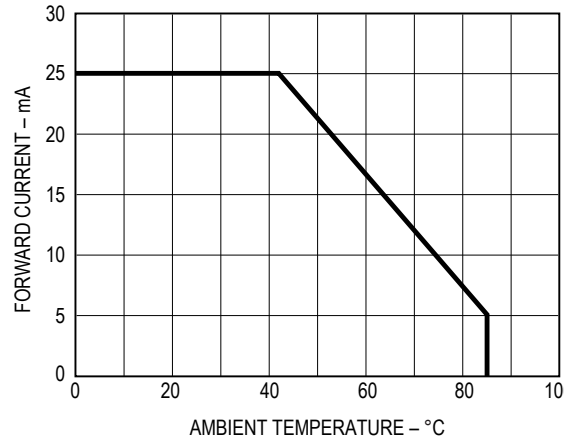


Figure 5.. Recommended reflow soldering profile.

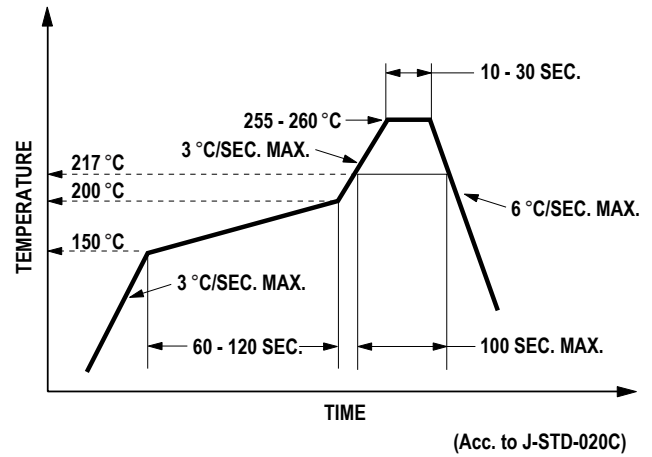


Figure 6. Recommended Pb-free reflow soldering profile.

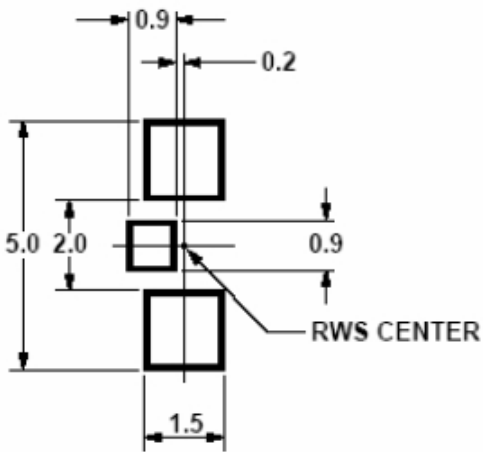
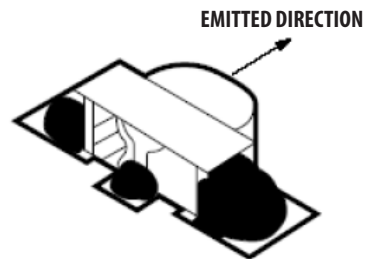


Figure 7. Recommended soldering land pattern.

Notes:

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



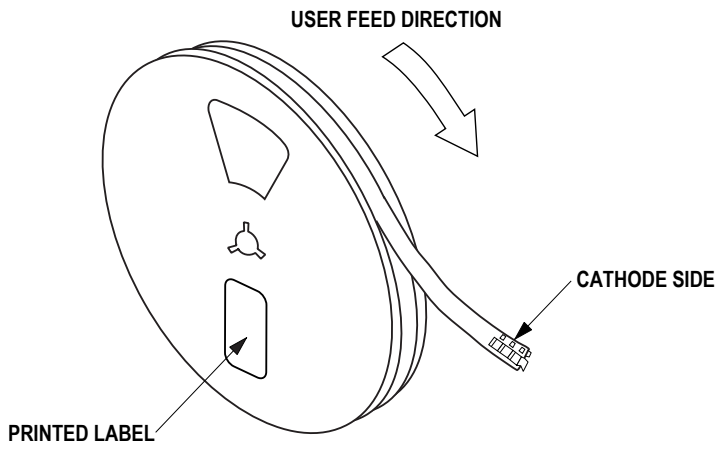


Figure 8. Reeling orientation.

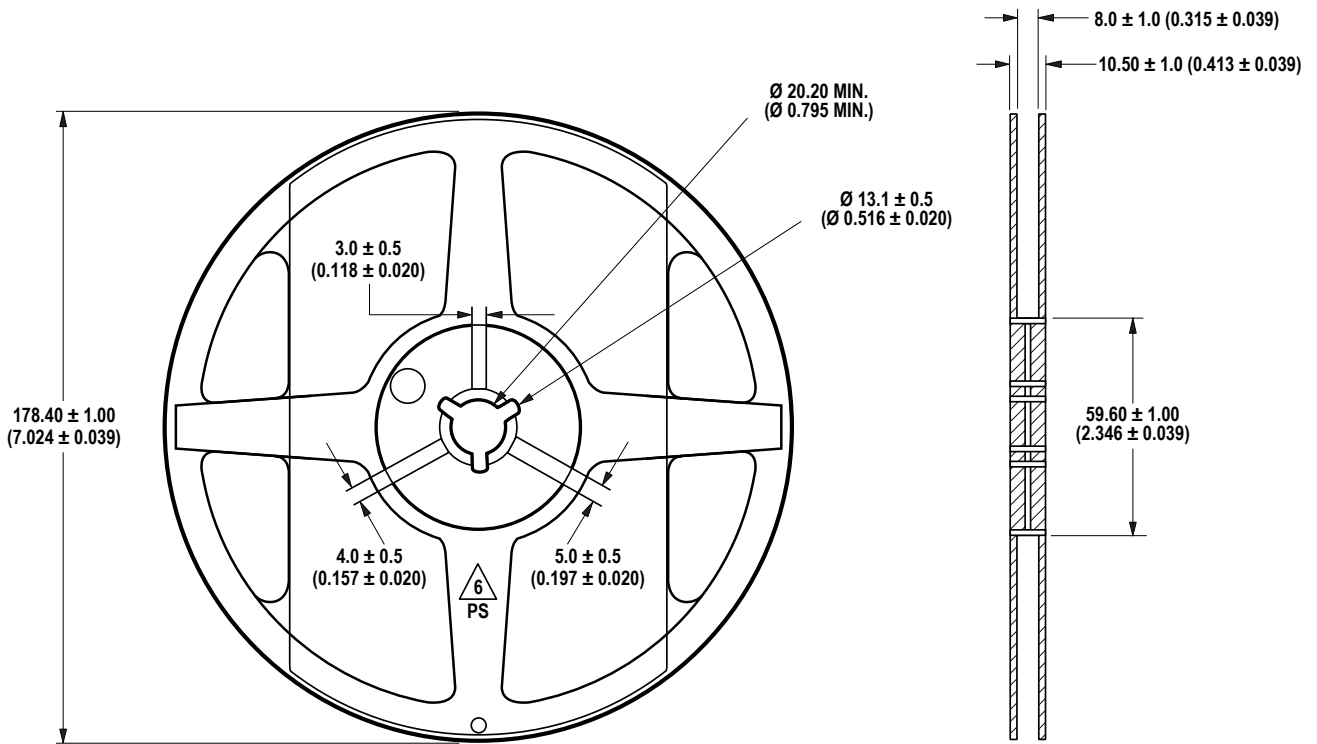


Figure 9. Reel dimensions.

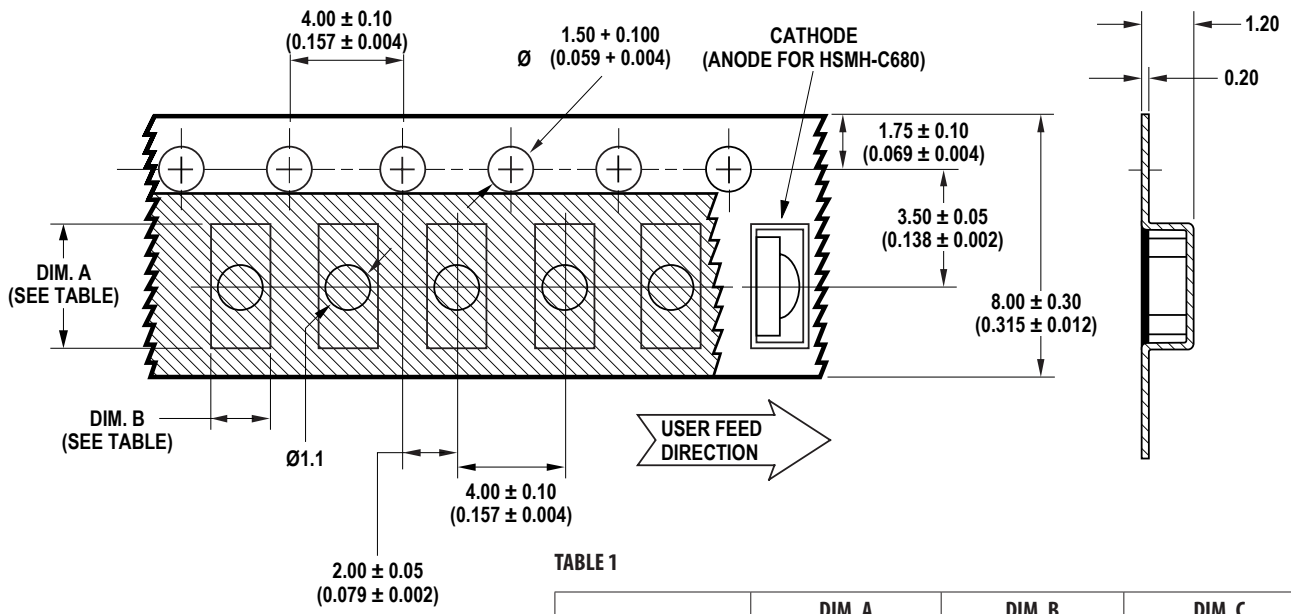


TABLE 1

	DIM. A	DIM. B	DIM. C
<b>PART NUMBER</b>	<b>± 0.10 (0.004)</b>	<b>± 0.10 (0.004)</b>	<b>± 0.10 (0.004)</b>
HSMx-C680	3.35 (0.132)	2.30 (0.091)	1.20 (0.047)

DIMENSIONS IN MILLIMETERS (INCHES)

Figure 10. Carrier Tape Dimensions

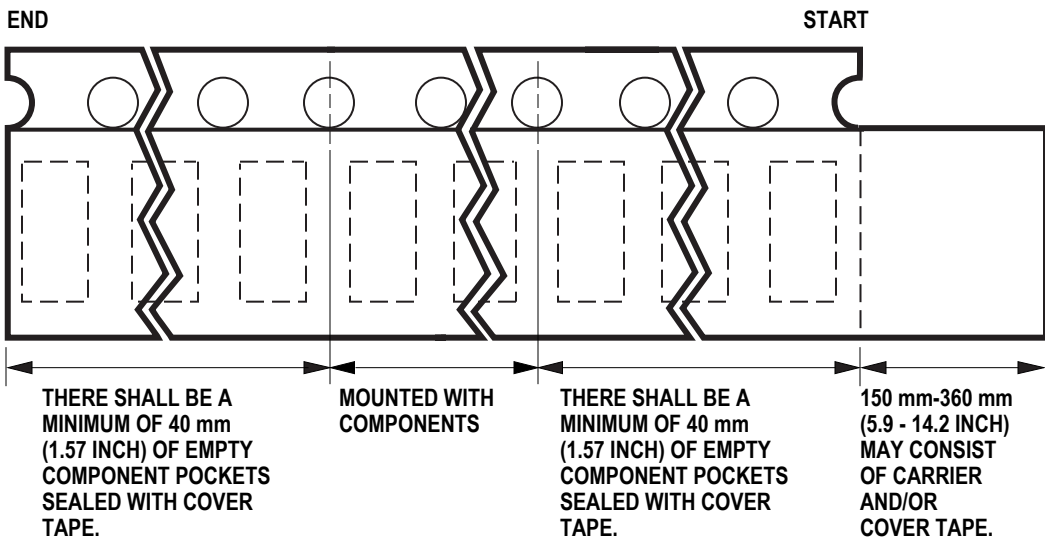


Figure 11. Tape leader and trailer dimensions.

**Reflow Soldering:**

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

**Storage Condition:**

5 to 30°C @ 60%RH max.

Baking is required before mounting, if:

1. Humidity Indicator Card is > 10% when read at 23 ± 5°C.
2. Device expose to factory conditions <30°C/60%RH more than 672 hours

**Recommended baking condition:**

60±5°C for 20 hours.

For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

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