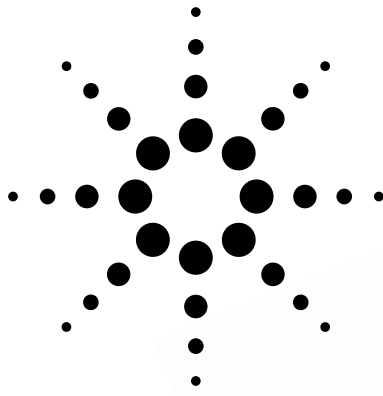


# Agilent HSMx-C1xx High Performance Chip LED Data Sheet



**HSMQ-C110, HSMQ-C150, HSMQ-C170, HSMQ-C190,  
HSMQ-C191, HSMR-C110, HSMR-C150, HSMR-C170,  
HSMR-C190, HSMR-C191**

## Features

- High brightness
- Small size
- Industrial standard footprint
- Diffused optics
- Top emitting or right angle emitting
- Compatible with IR soldering
- Compatible for use with light piping
- Available in 8 mm tape on 7" diameter reel
- Reel sealed in zip locked moisture barrier bags

## Description

These small chip-type LEDs utilize high efficient and high brightness InGaN material to deliver competitively priced high performance blue and green. These 520 nm green and 470 nm blue are unique hues which provide color differentiation to a product.

These ChipLEDs come in either top emitting packages (HSMx-C170, C190, C191, and C150) or in a side emitting package (HSMx-C110).

The side emitting package is especially suitable for LCD backlighting application. The top emitting packages, with their wide viewing angle, are suitable for direct backlighting application or being used with light pipes. In order to facilitate pick and place operation, these ChipLEDs are shipped in tape and reel with 4000 units per reel for HSMx-C170, C190, and C191 packages, and 3000 units per reel for HSMx-C110 and C150 packages. All packages are compatible with IR soldering and binned by both color and intensity.

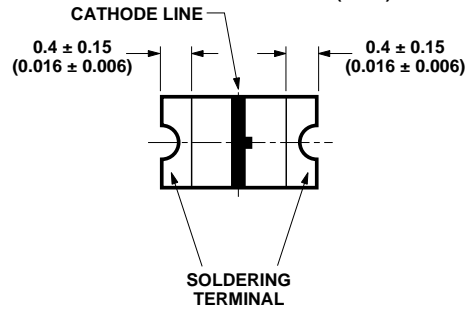
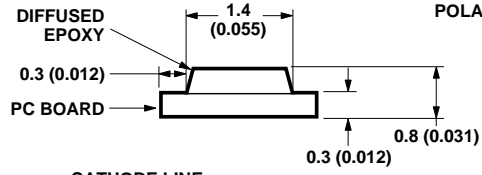
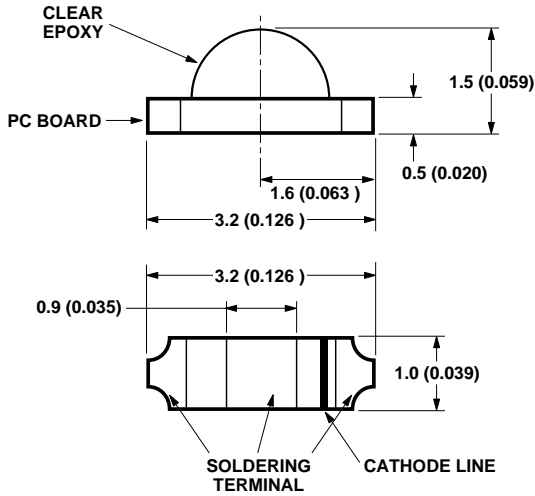
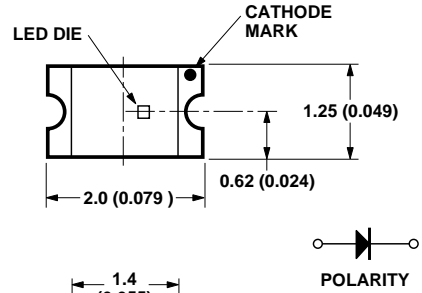
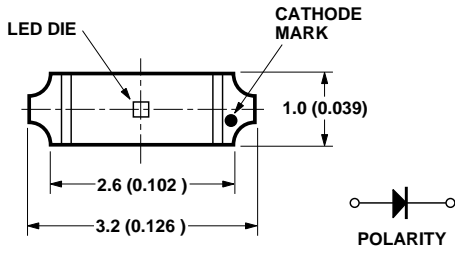
## Applications

- LCD backlighting
- Push button backlighting
- Front panel indicator
- Symbol indicator
- Microdisplays
- Small message panel signage

**CAUTION:** HSMQ-C1xx and HSMR-C1xx are Class 1 ESD sensitive per MIL-STD-1686. Please observe appropriate precautions during handling and processing. Refer to Agilent Technologies Application Note AN-1142 for additional details.

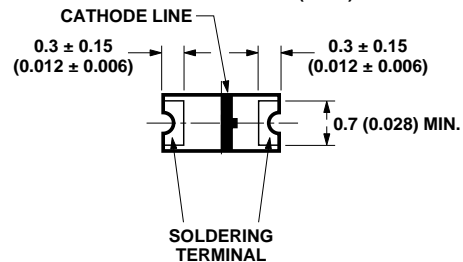
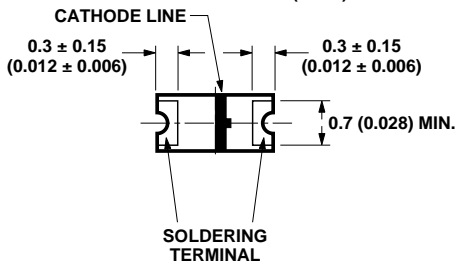
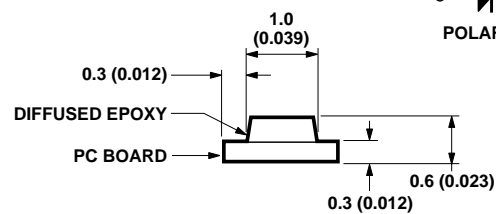
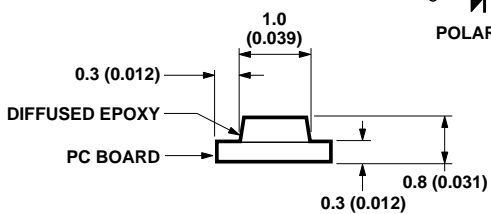
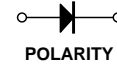
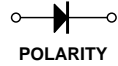
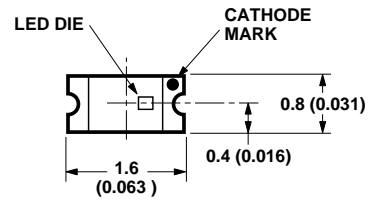
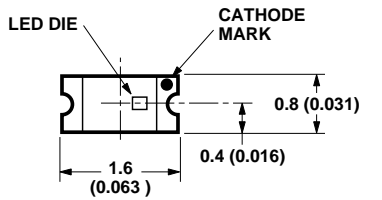


# Package Dimensions



HSMx-C110

HSMx-C170

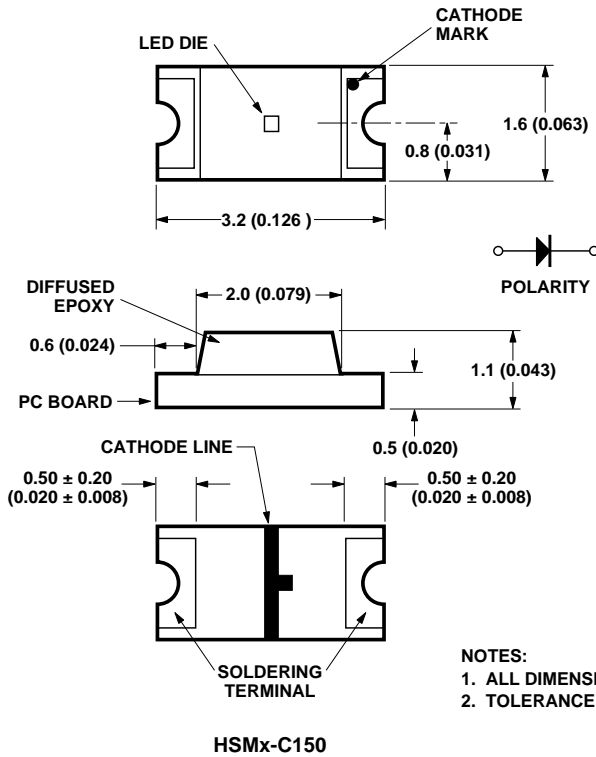


HSMx-C190

HSMx-C191

- NOTES:  
 1. ALL DIMENSIONS IN MILLIMETERS (INCHES).  
 2. TOLERANCE IS ± 0.1 mm (± 0.004 IN.) UNLESS OTHERWISE SPECIFIED.

**Package Dimensions, continued**



**NOTES:**  
 1. ALL DIMENSIONS IN MILLIMETERS (INCHES).  
 2. TOLERANCE IS  $\pm 0.1$  mm ( $\pm 0.004$  IN.) UNLESS OTHERWISE SPECIFIED.

**Device Selection Guide**

Package Dimension (mm) [1], [2]	Ingan Green	Ingan Blue	Package Description
1.6 (L) x 0.8 (W) x 0.6 (H)	HSMQ-C191	HSMR-C191	Untinted, Diffused
1.6 (L) x 0.8 (W) x 0.8 (H)	HSMQ-C190	HSMR-C190	Untinted, Diffused
2.0 (L) x 1.25 (W) x 0.8 (H)	HSMQ-C170	HSMR-C170	Untinted, Diffused
3.2 (L) x 1.0 (W) x 1.5 (H)	HSMQ-C110	HSMR-C110	Untinted, Nondiffused
3.2 (L) x 1.6 (W) x 1.1 (H)	HSMQ-C150	HSMR-C150	Untinted, Diffused

**Notes:**

1. Dimensions in mm.
2. Tolerance  $\pm 0.1$  mm unless otherwise noted.

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

Parameter	HSMQ-C110/C170/C190/C191/C150 HSMR-C110/C170/C190/C191/C150	Units
DC Forward Current [1]	25	mA
Power Dissipation	98	mW
Reverse Voltage ( $I_R = 100 \mu\text{A}$ )	5	V
LED Junction Temperature	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 IR soldering profile (Figure 7)	

**Note:**

1. Derate linearly as shown in Figure 4.

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

Part Number	Forward Voltage $V_F$ (Volts) @ $I_F = 20\text{ mA}$		Reverse Breakdown $V_R$ (Volts) @ $I_R = 100\ \mu\text{A}$	Capacitance $C$ (pF), $V_F = 0$ , $f = 1\text{ MHz}$	Thermal Resistance $R_{\theta_{J-PIN}}$ ( $^\circ\text{C/W}$ )
	Typ.	Max.	Min.	Typ.	Typ.
HSMQ-C110/C150	3.4	3.9	5	140	450
HSMR-C110/C150	3.4	3.9	5	140	450
HSMQ-C170/C190/C191	3.4	3.9	5	110	300
HSMR-C170/C190/C191	3.4	3.9	5	110	300

$V_F$  Tolerance:  $\pm 0.1\text{ V}$

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

Part Number	Color	Luminous Intensity $I_V$ (mcd) @ $20\text{ mA}$ <sup>[1]</sup>		Peak Wavelength $\lambda_{\text{peak}}$ (nm)	Color, Dominant Wavelength $\lambda_d$ <sup>[2]</sup> (nm)	Viewing Angle $2\ \theta_{1/2}$ Degrees <sup>[3]</sup>	Luminous Efficacy $\eta_V$ (lm/w)
		Min.	Typ.	Typ.	Typ.	Typ.	Typ.
HSMQ-C110	Green	40	150	520	527	130	500
HSMQ-C150/C170/ C190/C191	Green	40	145	520	527	140	500
HSMR-C110	Blue	16	60	469	473	130	88
HSMR-C150/C170/ C190/C191	Blue	16	55	469	473	140	88

#### 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.

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

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

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	460.0	465.0
B	465.0	470.0
C	470.0	475.0
D	475.0	480.0

Tolerance:  $\pm 1\text{ nm}$

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

Bin ID	Dom. Wavelength (nm)	
	Min.	Max.
A	515.0	520.0
B	520.0	525.0
C	525.0	530.0
D	530.0	535.0

Tolerance:  $\pm 1\text{ nm}$

#### 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.

### 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:  $\pm 15\%$

**Note:**

- 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.

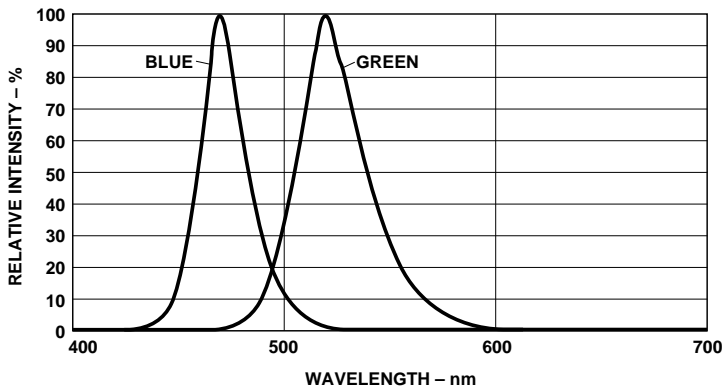


Figure 1. Relative intensity vs. wavelength.

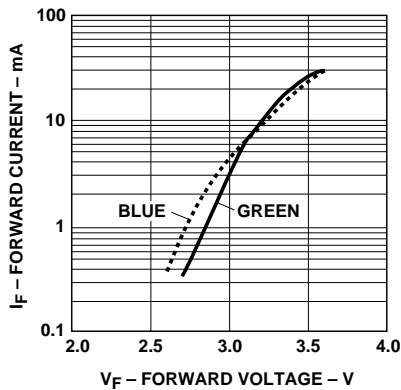


Figure 2. Forward current vs. forward voltage.

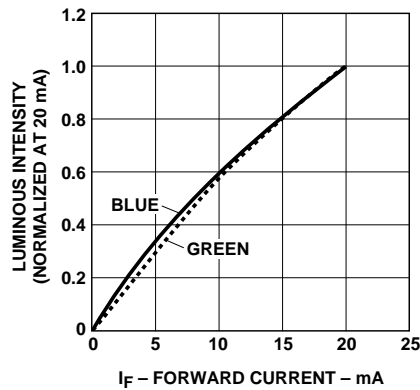


Figure 3. Luminous intensity vs. forward current.

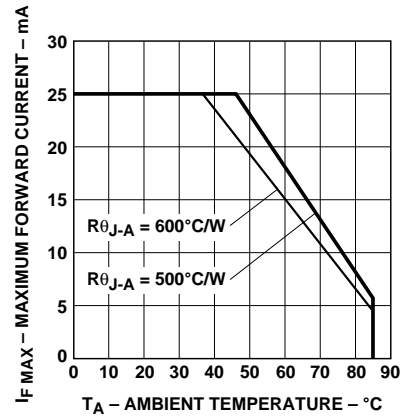


Figure 4. Maximum forward current vs. ambient temperature.

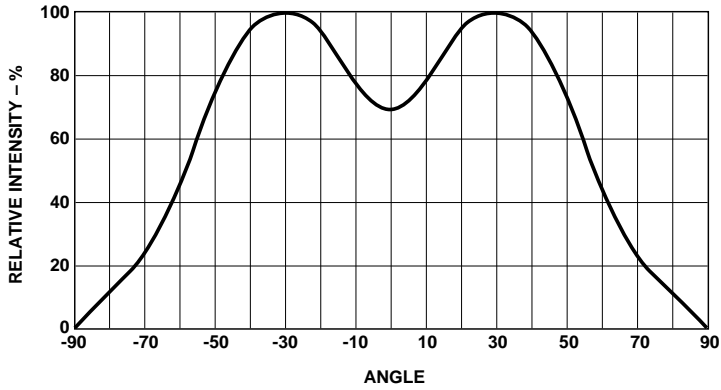
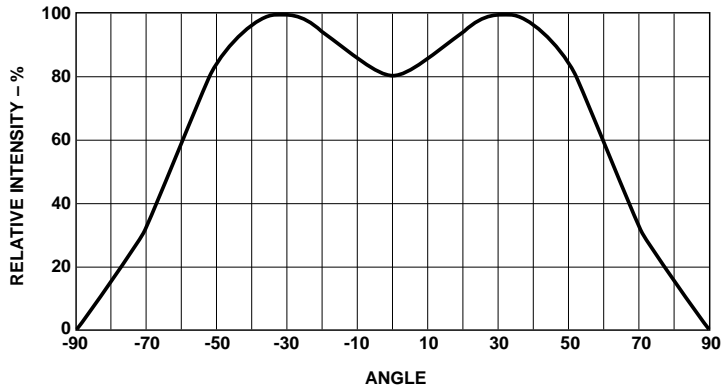


Figure 5. Relative intensity vs. angle for HSMx-C110.

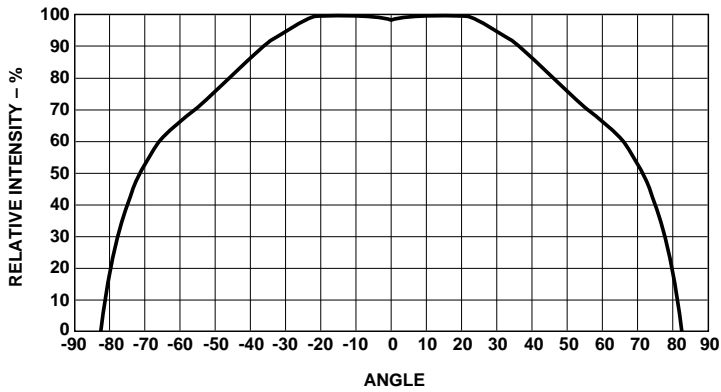


Figure 6. Relative intensity vs. angle for HSMx-C170, C190, C191, and C150.

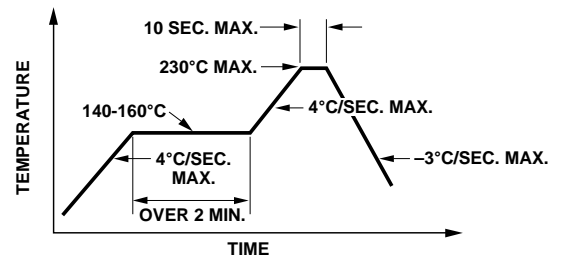
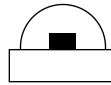


Figure 7. Recommended reflow soldering profile.

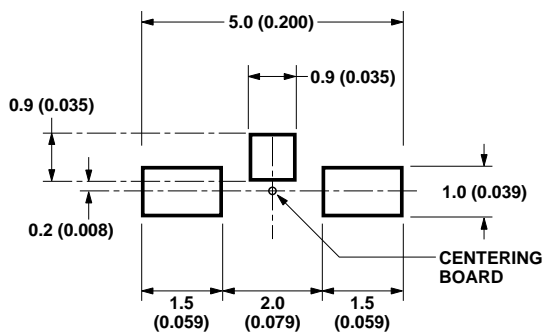


Figure 8. Recommended soldering pattern for HSMx-C110.

NOTE:  
1. ALL DIMENSIONS IN MILLIMETERS (INCHES).

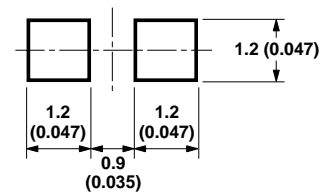


Figure 9. Recommended soldering pattern for HSMx-C170.

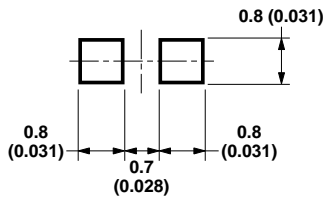


Figure 10. Recommended soldering pattern for HSMx-C190 and HSMx-C191.

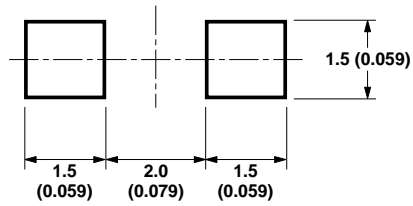


Figure 11. Recommended soldering pattern for HSMx-C150.

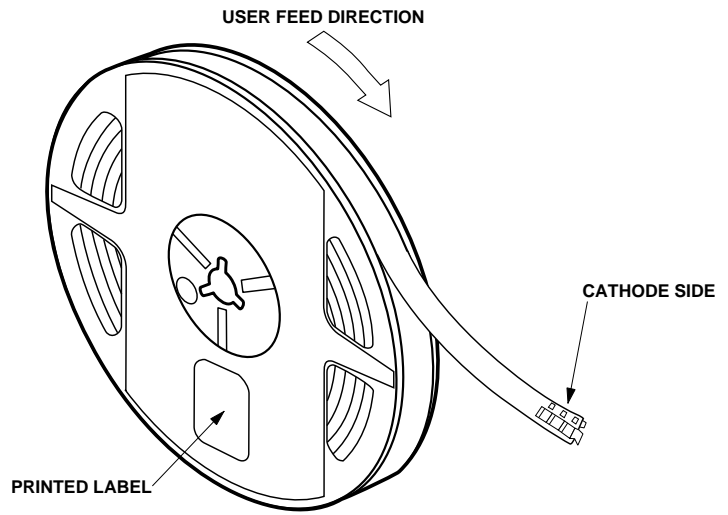


Figure 12. Reeling orientation.

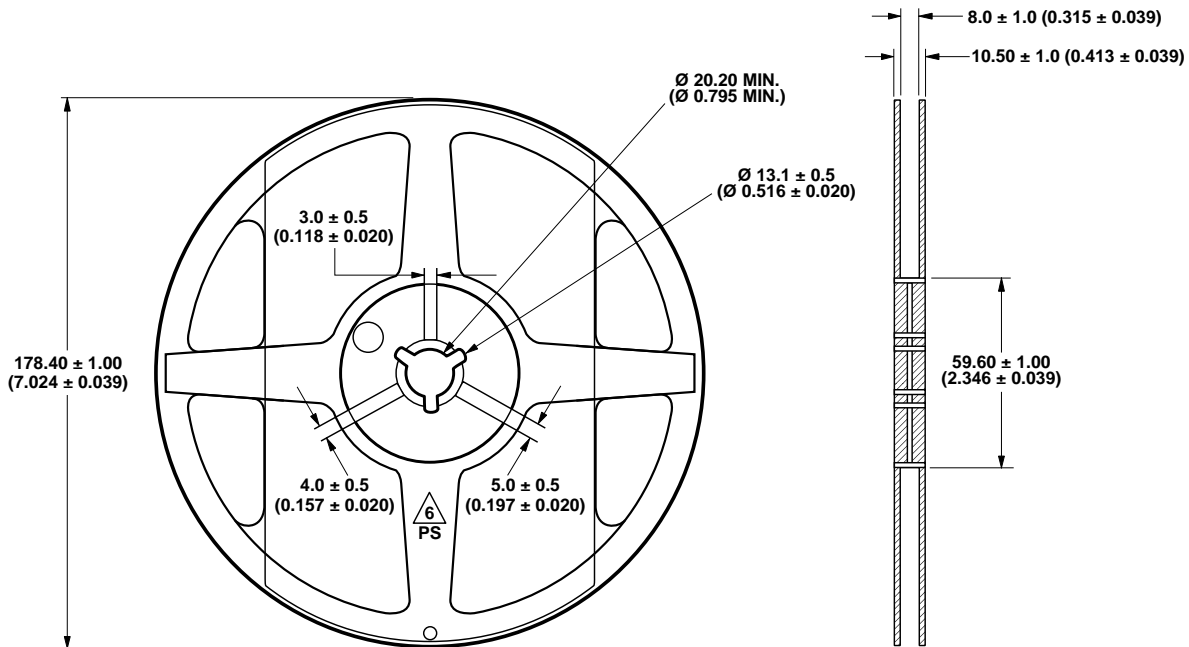


Figure 13. Reel dimensions.

NOTE:

1. ALL DIMENSIONS IN MILLIMETERS (INCHES).

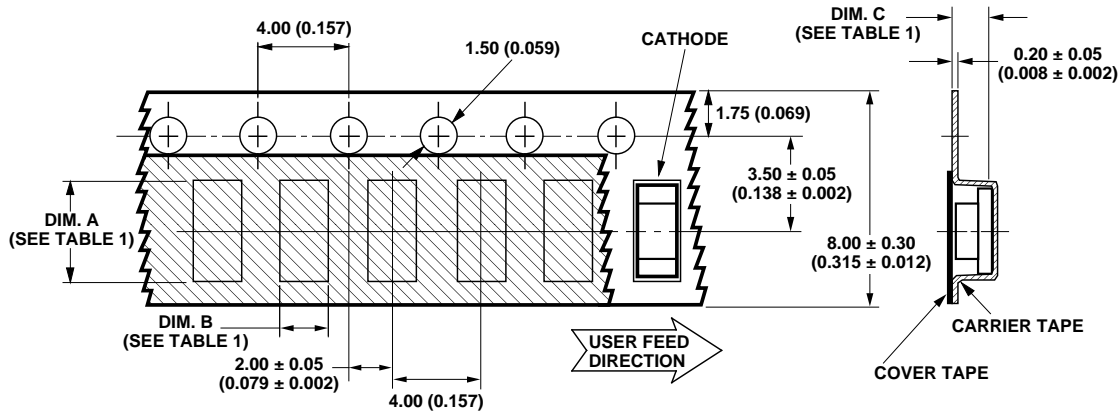


TABLE 1  
DIMENSIONS IN MILLIMETERS (INCHES)

PART NUMBER	DIM. A ± 0.10 (± 0.004)	DIM. B ± 0.10 (± 0.004)	DIM. C ± 0.10 (± 0.004)
HSMx-C191 SERIES	1.80 (0.071)	0.95 (0.037)	0.75 (0.030)
HSMx-C190 SERIES	1.80 (0.071)	0.95 (0.037)	0.87 (0.034)
HSMx-C170 SERIES	2.40 (0.094)	1.60 (0.063)	1.20 (0.047)
HSMx-C110 SERIES	3.40 (0.134)	1.70 (0.067)	1.20 (0.047)
HSMx-C150 SERIES	3.75 (0.148)	2.10 (0.083)	1.30 (0.051)

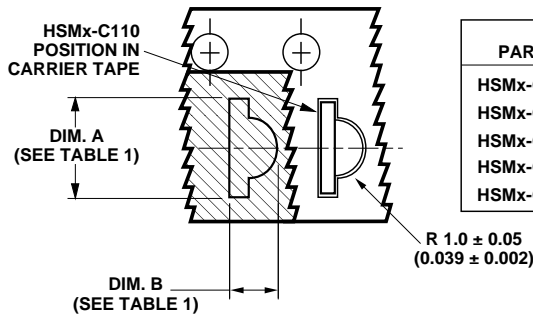


Figure 14. Tape dimensions.

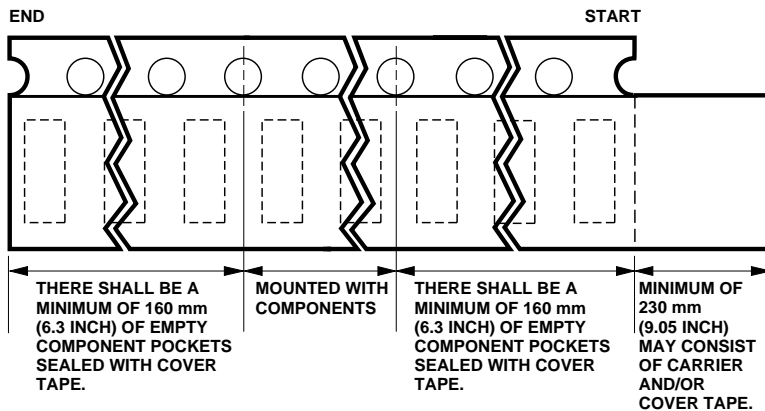


Figure 15. Tape leader and trailer dimensions.

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 Components*.

**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 open for more than 1 week

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

For product information and a complete list of Agilent contacts and distributors, please go to our web site.

[www.agilent.com/semiconductors](http://www.agilent.com/semiconductors)

E-mail: SemiconductorSupport@agilent.com

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