BROADCOM®

Data Sheet

HSMQ-C1xx and HSMR-C1xx

High-Performance Chip LED

Description

These Broadcom® small chip-type LEDs use 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 that provide color differentiation to a product.

These chipLEDs come in either top-emitting packages (HSMx-C130, C150, C170, C177, C190, C191, C197), in side-emitting packages (HSMx-C110, C120) or in a reverse-mount package (HSMx-C265). 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.

To facilitate pick-and-place operation, these chipLEDs are shipped in tape and reel with 4000 units per reel for HSMx-C120, C130, C170, C177, C190, C191, and C197 packages, and 3000 units per reel for HSMx-C110, C150, and C265 packages. All packages are compatible with IR soldering and binned by both color and intensity.

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-in. diameter reels
- Reel sealed in zip-locked moisture barrier bags

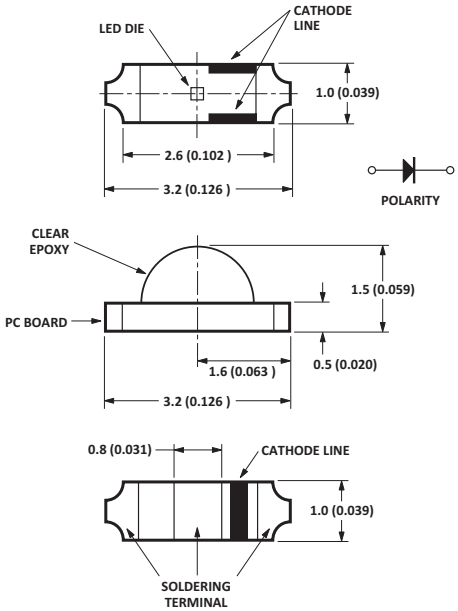
Applications

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

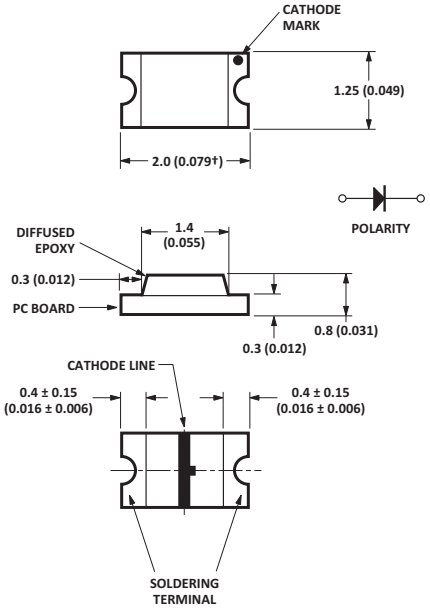
CAUTION! HSMQ-Cxxx and HSMR-Cxxx LEDs are Class 1A ESD sensitive per JESD22-A114C.01. Observe appropriate precautions during handling and processing. Refer to Broadcom Application Note AN-1142 for additional details.

Package Dimensions

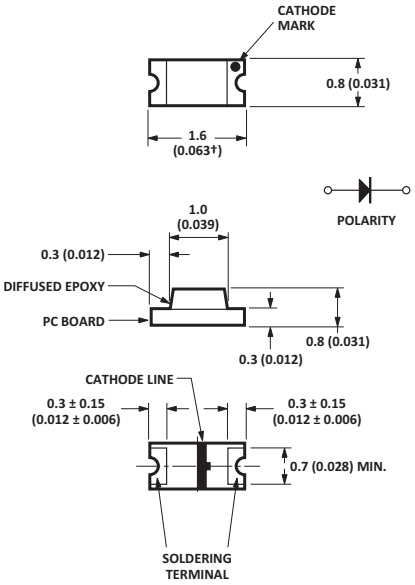
HSMx-C110



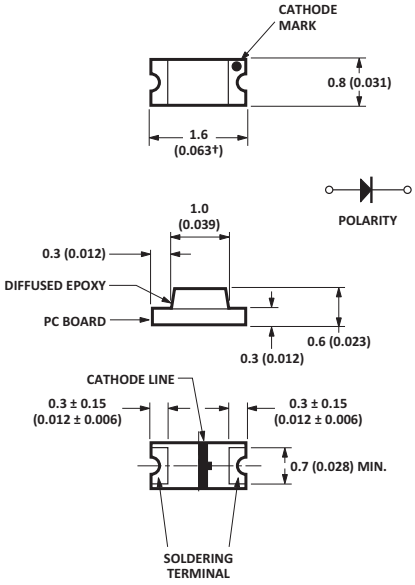
HSMx-C170



HSMx-C190



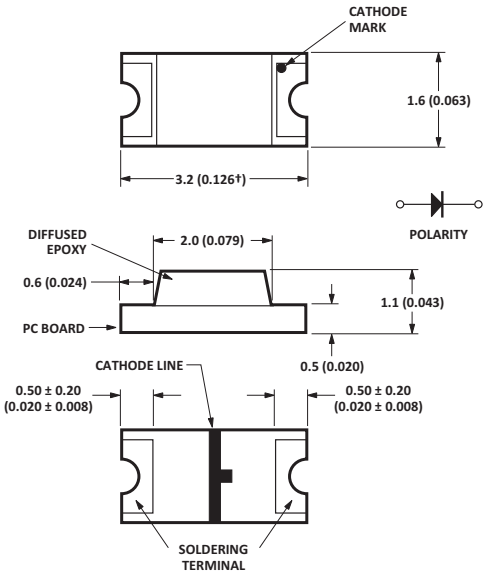
HSMx-C191



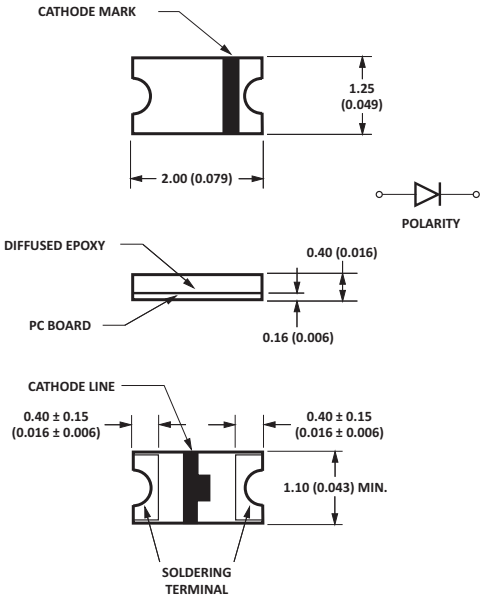
NOTE:

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.1 mm (± 0.004 in.) unless otherwise noted.

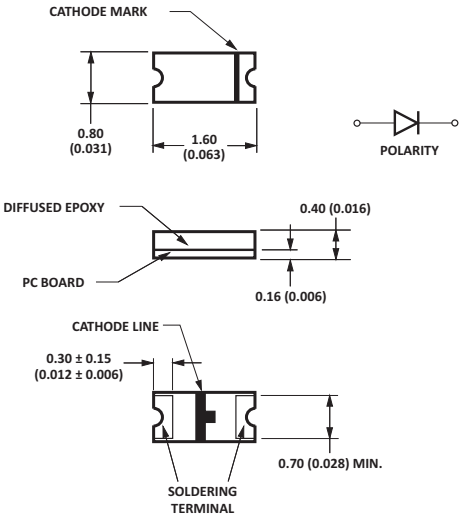
HSMx-C150



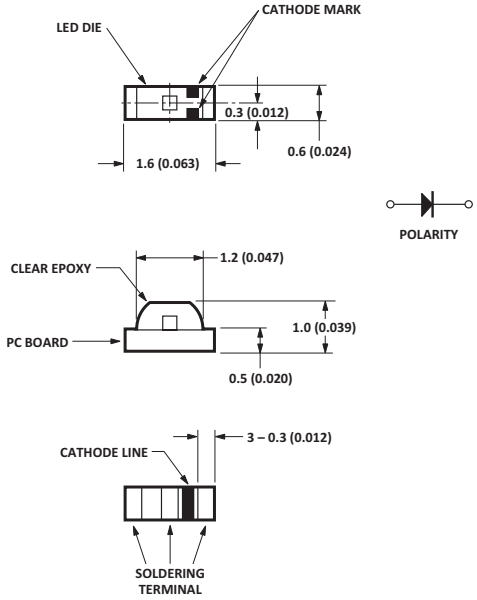
HSMx-C177



HSMx-C197



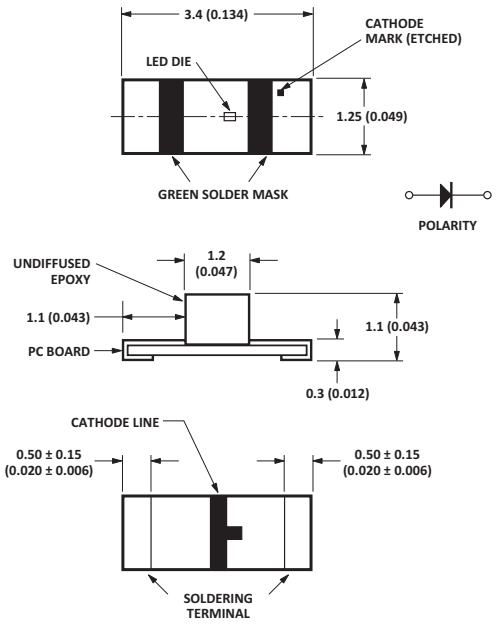
HSMx-C120



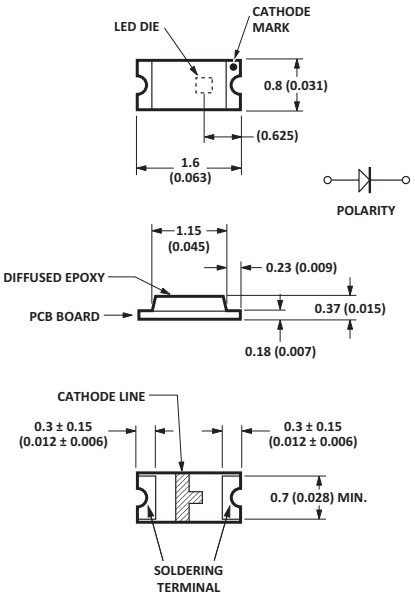
NOTE:

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.1 mm (± 0.004 in.) unless otherwise noted.

HSMx-C265



HSMx-C130



NOTE:

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.1 mm (± 0.004 in.) unless otherwise noted.

Device Selection Guide

Package Dimension (mm)[a], [b]	InGaN Green	InGaN Blue	Package Description
3.2 (L) × 1.5 (W) × 1.0 (H)	HSMQ-C110	HSMR-C110	Untinted, Non-diffused
1.6 (L) × 1.0 (W) × 0.6 (H)	HSMQ-C120	HSMR-C120	Untinted, Non-diffused
1.6 (L) × 0.8 (W) × 0.37 (H)	—	HSMR-C130	Untinted, Diffused
3.2 (L) × 1.6 (W) × 1.1 (H)	HSMQ-C150	HSMR-C150	Untinted, Diffused
2.0 (L) × 1.25 (W) × 0.8 (H)	HSMQ-C170	HSMR-C170	Untinted, Diffused
2.0 (L) × 1.25 (W) × 0.4 (H)	HSMQ-C177	HSMR-C177	Untinted, Diffused
1.6 (L) × 0.8 (W) × 0.8 (H)	HSMQ-C190	HSMR-C190	Untinted, Diffused
1.6 (L) × 0.8 (W) × 0.6 (H)	HSMQ-C191	HSMR-C191	Untinted, Diffused
1.6 (L) × 0.8 (W) × 0.4 (H)	HSMQ-C197	HSMR-C197	Untinted, Diffused
3.4 (L) × 1.25 (W) × 1.1(H)	HSMQ-C265	HSMR-C265	Untinted, Non-diffused

a. Dimensions are in mm.

b. Tolerance is ± 0.1 mm unless otherwise noted.

Absolute Maximum Ratings at T_A = 25°C

Parameter	HSMQ-Cxxx, HSMR-Cxxx	Units
DC Forward Current[a]	20	mA
Power Dissipation	78	mW
Reverse Voltage (IR = 100 µA)	5	V
LED Junction Temperature	95	°C
Operating Temperature Range	–40 to +85	°C
Storage Temperature Range	–40 to +85	°C
Soldering Temperature	See reflow soldering profile (Figure 11 and Figure 12)	

a. Derate linearly as shown in Figure 4.

Electrical Characteristics at T_A = 25°C

Part Number	Forward Voltage V_F (V) at I_F = 20 mA at I_R = 100 µA		Reverse Breakdown V_R (V), f = 1 MHz	Capacitance C (pF), V_F = 0, $R\theta_{J\text{-}PIN}$ (°C/W)	Thermal Resistance
	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-C120	3.4	3.9	5	100	450
HSMR-C120/C130	3.4	3.9	5	100	450
HSMQ-C170/C190/C191	3.4	3.9	5	110	300
HSMR-C170/C190/C191	3.4	3.9	5	110	300
HSMQ-C177/C197	3.4	3.9	5	110	350
HSMR-C177/C197	3.4	3.9	5	110	350
HSMQ-C265	3.4	3.9	5	65	300
HSMR-C265	3.4	3.9	5	65	300

V_F tolerance: ± 0.1V.

Optical Characteristics at T_A = 25°C

Part Number	Color	Luminous Intensity, I_V (mcd) at 20 mA[a]		Color Peak Wavelength, λ_{PEAK} (nm)	Viewing Dominant Wavelength, λ_D[b] (nm)	Luminous Angle, $2\theta_{½}$, Degrees[c]	Efficacy, η_V, (lm/w)
		Min.	Typ.	Typ.	Typ.	Typ.	Typ.
HSMQ-C110	Green	45	150	520	527	130	500
HSMQ-C120	Green	45	145	520	527	155	500
HSMQ-C150/170/190/191	Green	45	145	520	527	140	500
HSMQ-C177/197	Green	45	145	520	527	130	500
HSMQ-C265	Green	45	140	520	527	150	500
HSMR-C110	Blue	18	60	469	473	130	88
HSMR-C120	Blue	18	55	469	473	155	88
HSMR-C130	Blue	18	55	469	473	145	88
HSMR-C150/170/190/191	Blue	18	55	469	473	140	88
HSMR-C177/197	Blue	18	55	469	473	130	88
HSMR-C265	Blue	18	45	469	473	150	88

a. 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.

b. The dominant wavelength, λd, is derived from the CIE Chromaticity Diagram and represents the perceived color of the device.

c. $\theta_{½}$ is the off-axis angle where the luminous intensity is ½ the peak intensity.

Color Bin Limits[1]

Blue Color Bins[1]

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: ± 1 nm.

InGaN Green Color Bins[1]

Bin ID	Dominant 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: ± 1 nm.

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

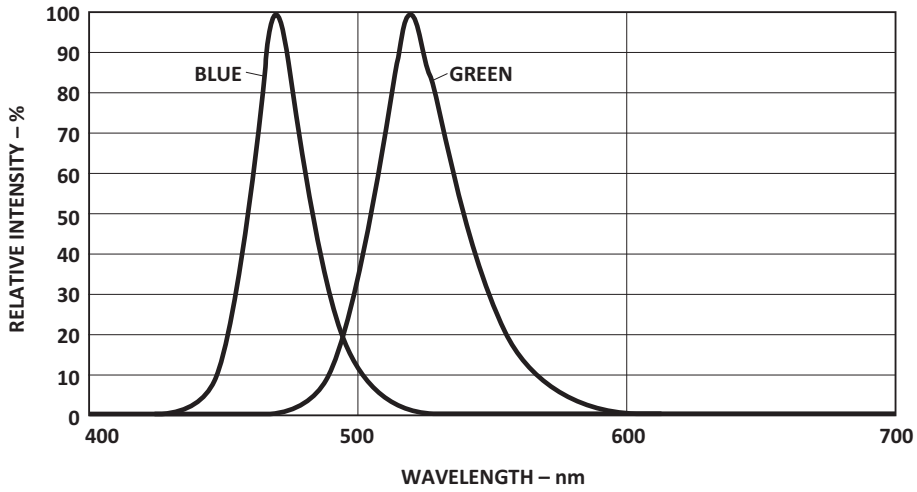
Light Intensity (Iv) Bin Limits[2, 3]

Bin ID	Intensity (mcd)	
	Min.	Max.
A	0.11	0.18
B	0.18	0.29
C	0.29	0.45
D	0.45	0.72
E	0.72	1.10
F	1.10	1.80
G	1.80	2.80
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

Bin ID	Intensity (mcd)	
	Min.	Max.
N	28.50	45.00
P	45.00	71.50
Q	71.50	112.50
R	112.50	180.00
S	180.00	285.00
T	285.00	450.00
U	450.00	715.00
V	715.00	1125.00
W	1125.00	1800.00
X	1800.00	2850.00
Y	2850.00	4500.00

Tolerance: ±15%

Figure 1: Relative Intensity vs. Wavelength



2. Bin categories are established for classification of products. Products may not be available in all categories. Contact your Broadcom representative for information on currently available bins.
3. The Iv binning specification setup is for lowest allowable Iv binning only. There are no upper Iv bin limits.

Figure 2: Forward Current vs. Forward Voltage

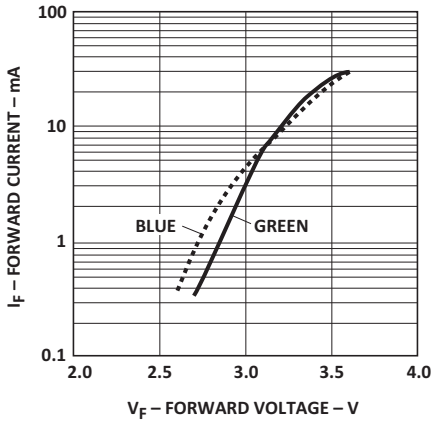


Figure 3: Luminous Intensity vs. Forward Current

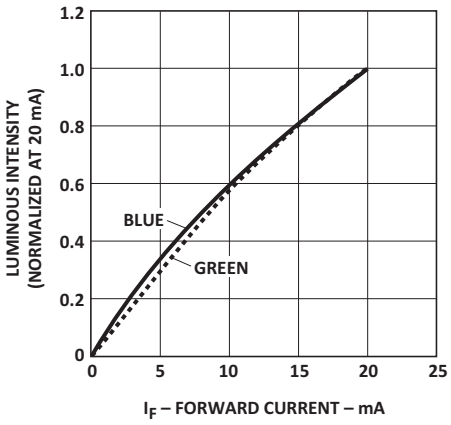


Figure 4: Maximum Forward Current vs. Ambient Temperature

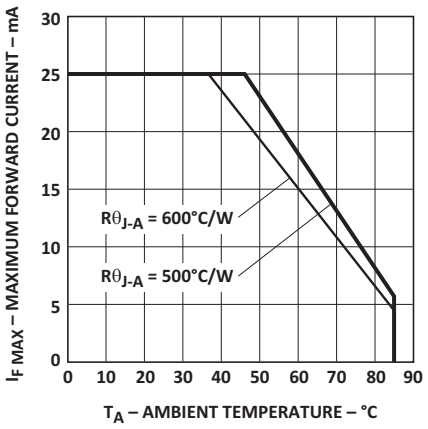


Figure 5: Relative Intensity vs. Angle for HSMx-C110

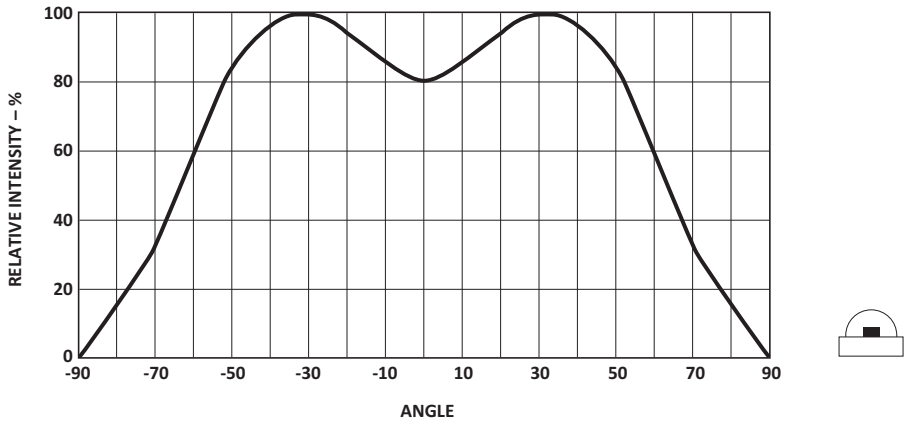


Figure 6: Relative Intensity vs. Angle for HSMx-C110

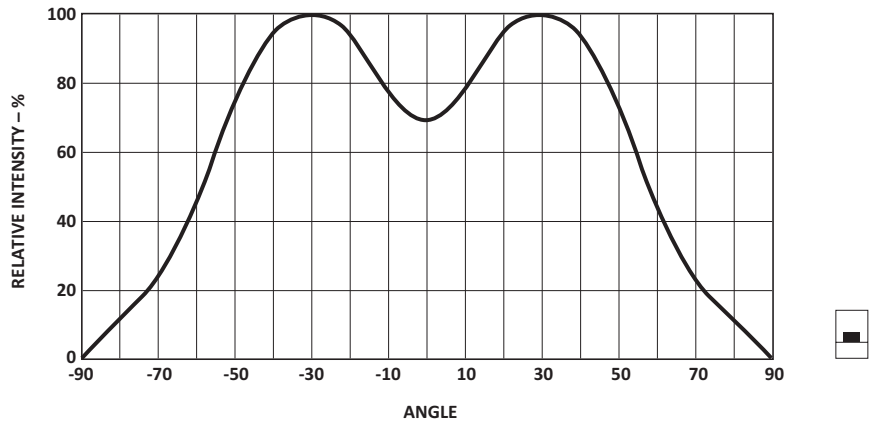


Figure 7: Relative Intensity vs. Angle for HSMx-C120

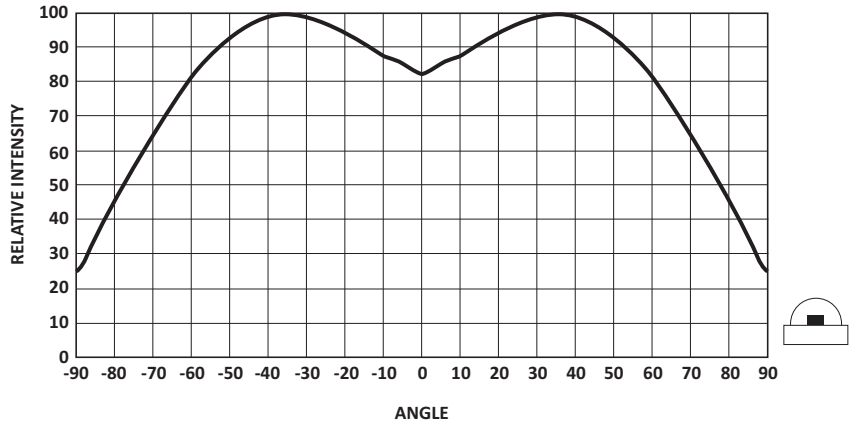


Figure 8: Relative Intensity vs. Angle for HSMx-C120

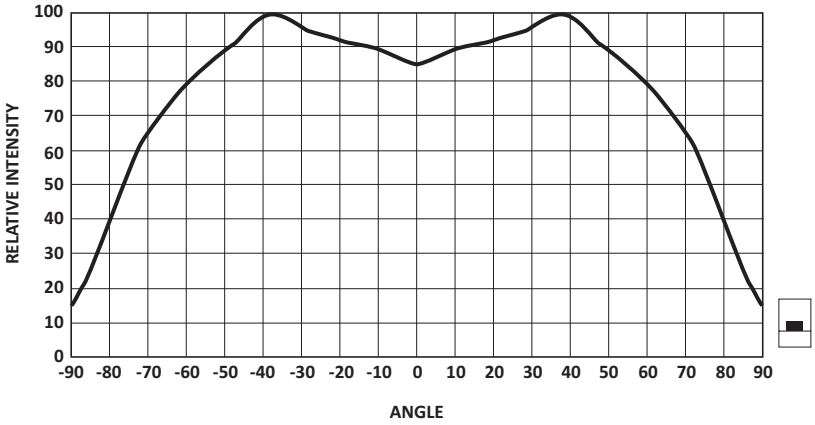


Figure 9: Relative Intensity vs. Angle for HSMx-C177 and C197

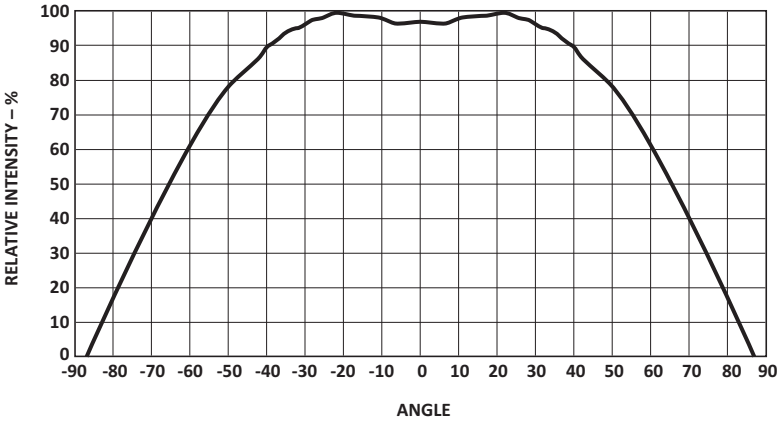


Figure 10: Relative Intensity vs. Angle for HSMx-C130

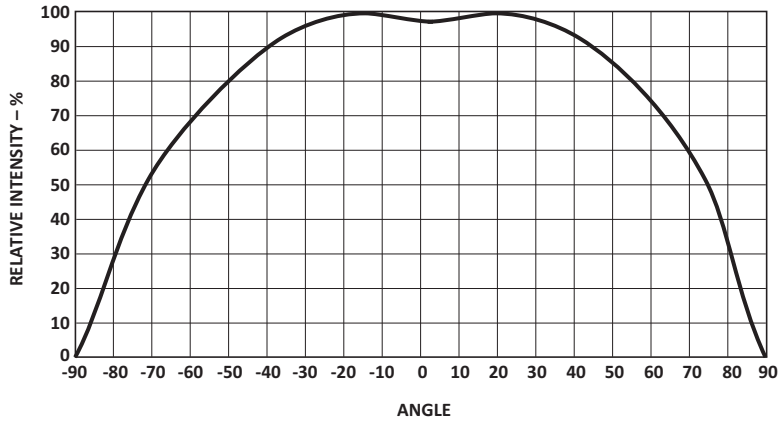


Figure 11: Relative Intensity vs. Angle for HSMx-C170, C190, C191, and C150

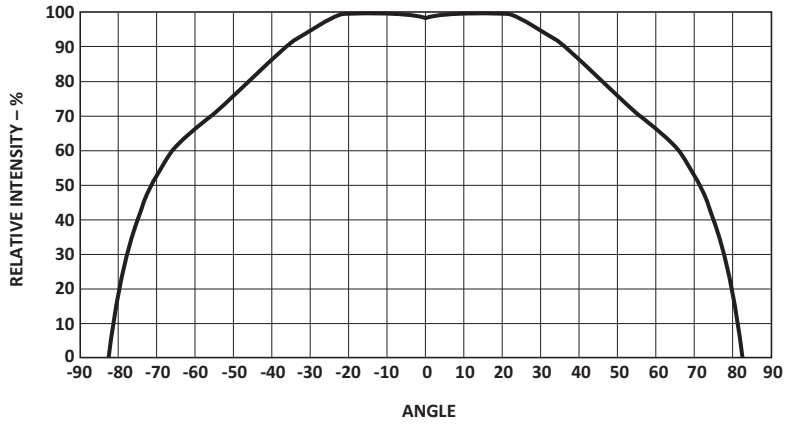


Figure 12: Relative Intensity vs. Angle for HSMx-C265

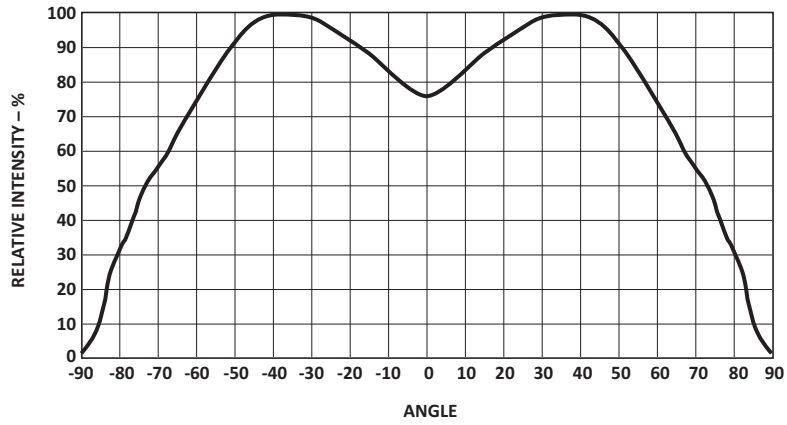


Figure 13: Recommended Reflow Soldering Profile

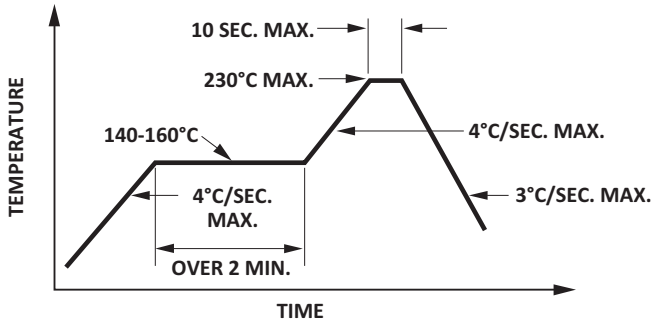


Figure 14: Recommended Pb-free Reflow Soldering Profile

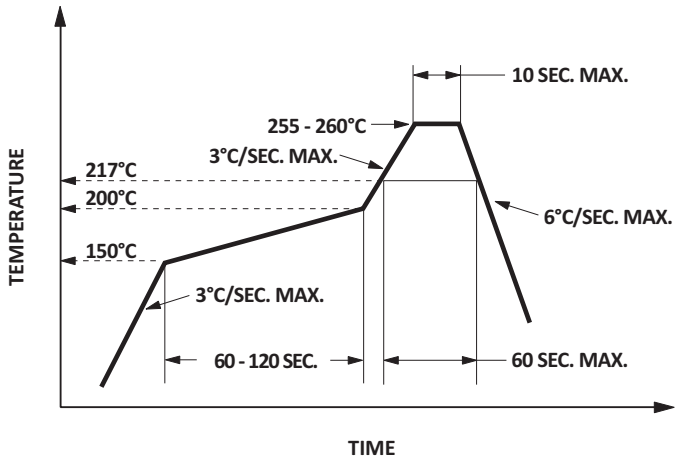


Figure 15: Recommended Soldering Pattern for HSMx-C110

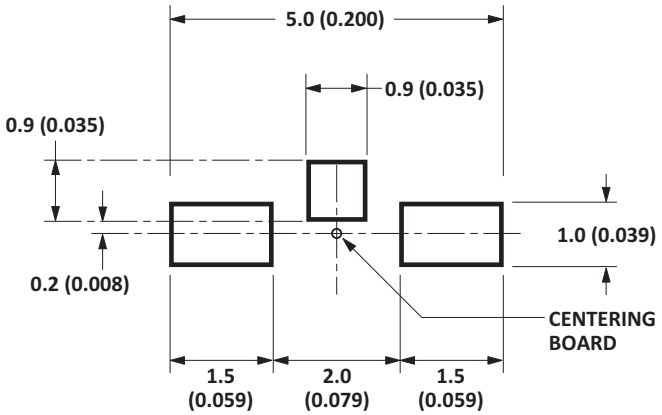


Figure 16: Recommended Soldering Pattern for HSMx-C170/177

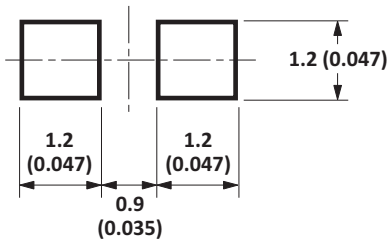


Figure 17: Recommended Soldering Pattern for HSMx-C130/190/191/197

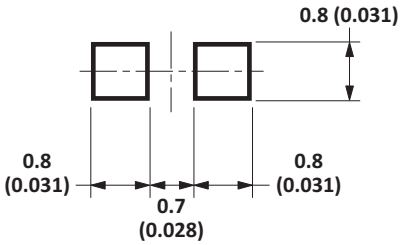
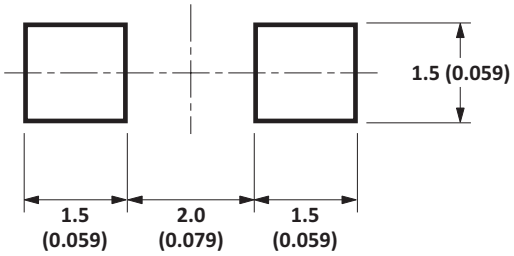


Figure 18: Recommended Soldering Pattern for HSMx-C150



NOTE: All dimensions are in millimeters (inches).

Figure 19: Recommended Soldering Pattern for HSMx-C120

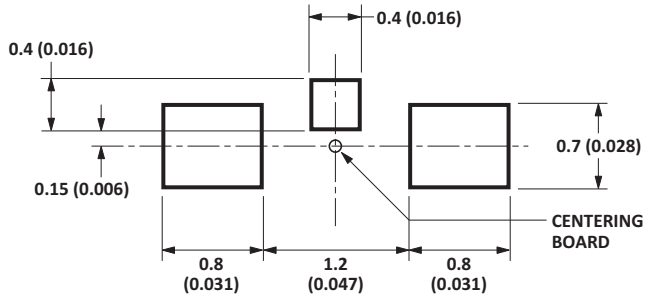
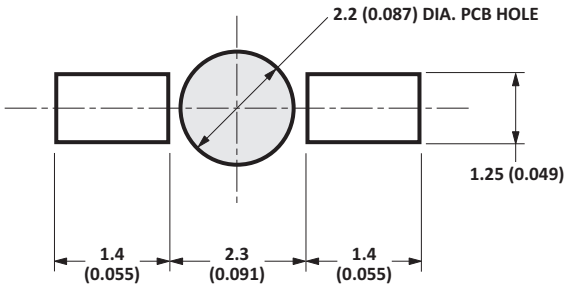


Figure 20: Recommended Soldering Pattern for HSMx-C265



NOTE: All dimensions are in millimeters (inches).

Figure 21: Reeling Orientation

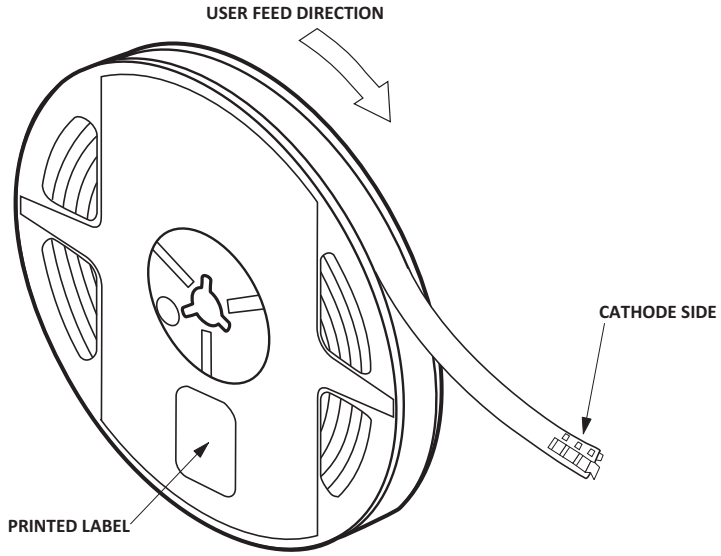
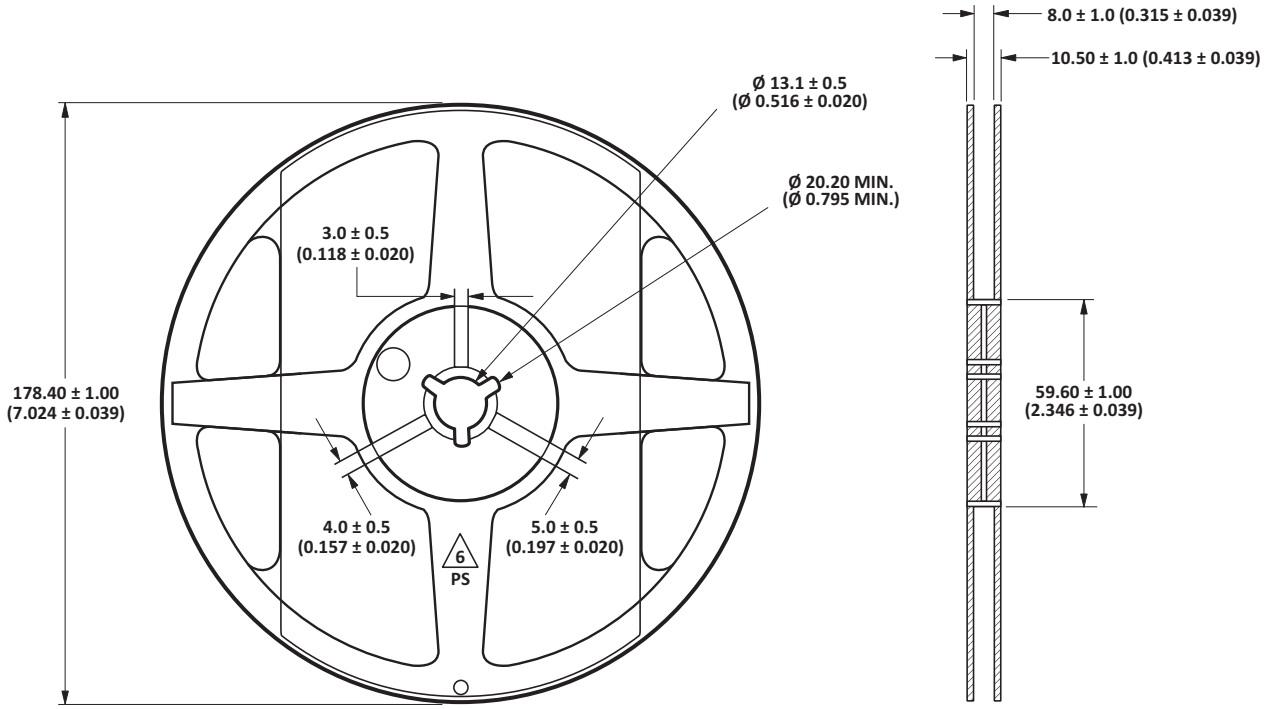


Figure 22: Reel Dimensions



NOTE: All dimensions are in millimeters (inches).

Figure 23: Tape Dimensions

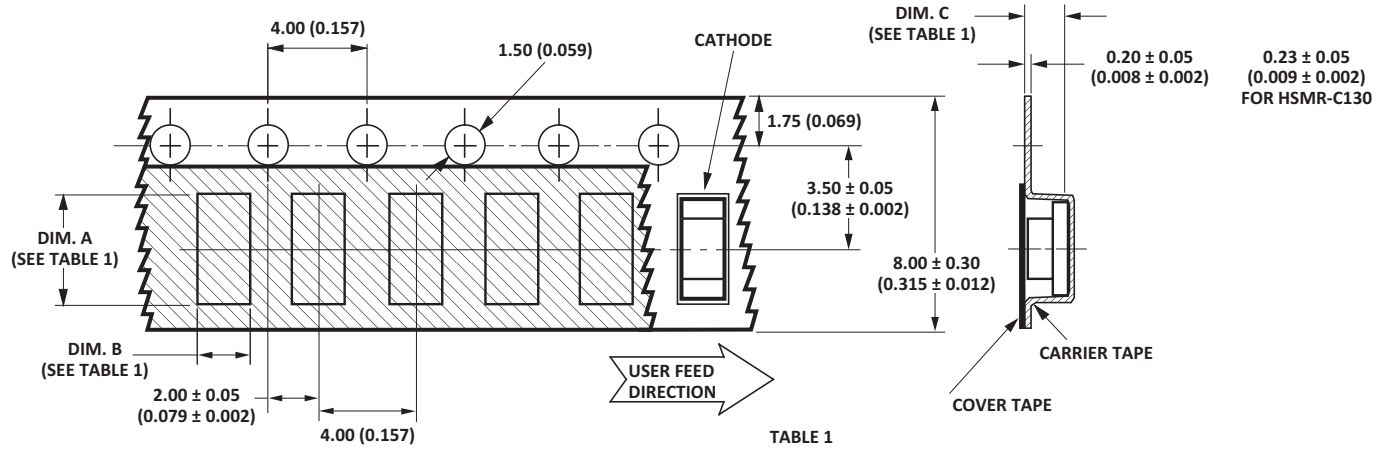
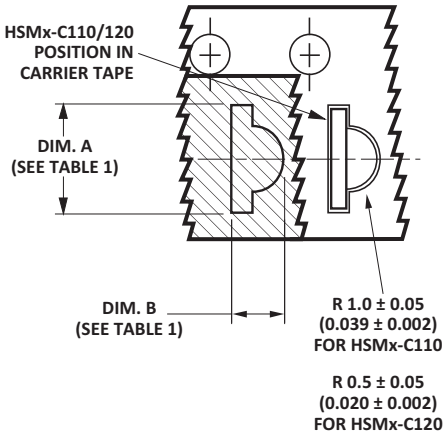


TABLE 1
DIMENSIONS IN MILLIMETERS (INCHES)

PART NUMBER	DIM. A ± 0.10 (0.004)	DIM. B ± 0.10 (0.004)	DIM. C ± 0.10 (0.004)
HSMx-C110 SERIES	3.40 (0.134)	1.70 (0.067)	1.20 (0.047)
HSMx-C120 SERIES	1.90 (0.075)	1.15 (0.045)	0.75 (0.030)
HSMx-C130 SERIES	1.75 (0.069)	0.88 (0.035)	0.50 (0.020)
HSMx-C150 SERIES	3.50 (0.138)	1.88 (0.074)	1.27 (0.050)
HSMx-C170 SERIES	2.30 (0.091)	1.45 (0.057)	0.95 (0.037)
HSMx-C177 SERIES	2.30 (0.091)	1.40 (0.055)	0.60 (0.024)
HSMx-C190 SERIES	1.75 (0.069)	0.90 (0.035)	0.90 (0.035)
HSMx-C191 SERIES	1.85 (0.073)	0.88 (0.035)	0.85 (0.033)
HSMx-C197 SERIES	1.75 (0.069)	0.95 (0.037)	0.60 (0.024)



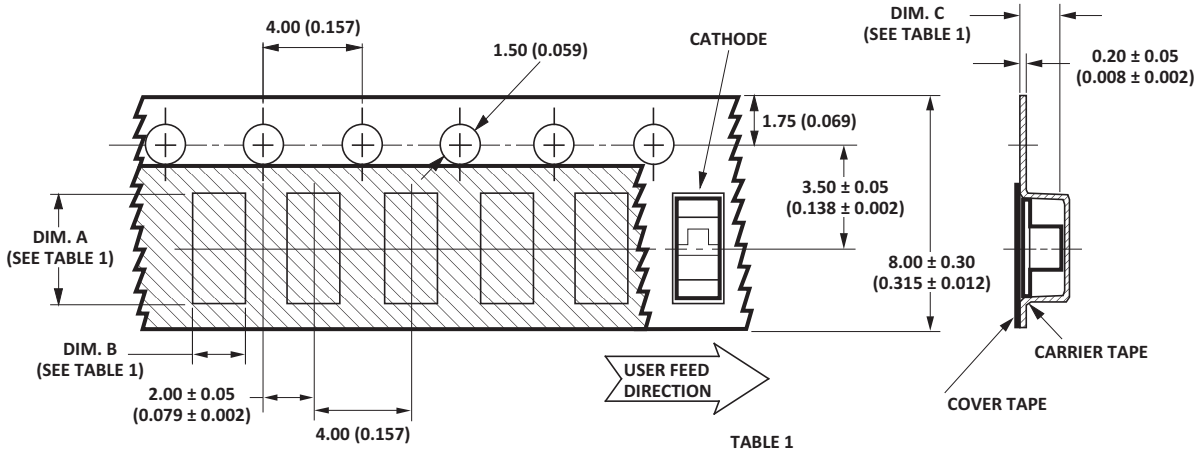
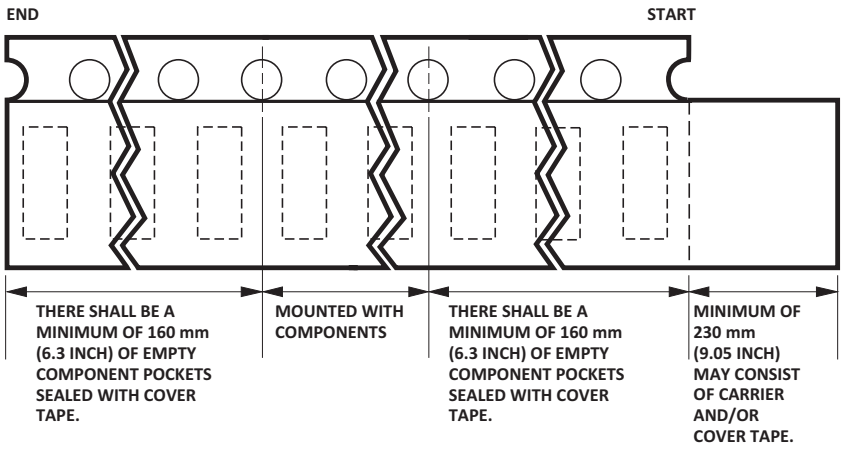


TABLE 1
DIMENSIONS IN MILLIMETERS (INCHES)

PART NUMBER	DIM. A ± 0.10 (0.004)	DIM. B ± 0.10 (0.004)	DIM. C ± 0.10 (0.004)
HSMx-C265 SERIES	3.70 (0.146)	1.45 (0.057)	1.30 (0.051)

NOTE: All dimensions are in millimeters (inches).

Figure 24: Tape Leader and Trailer Dimensions



NOTE:

1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.1 mm (± 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°C to 30°C @ 60% RH maximum.

Baking is required under the following conditions:

1. The humidity indicator card is >10% when read at 23°C ± 5°C.
2. The device is exposed to factory conditions <30°C/60% RH for more than 672 hours.

Baking recommended conditions: 60°C ± 5°C for 20 hours.