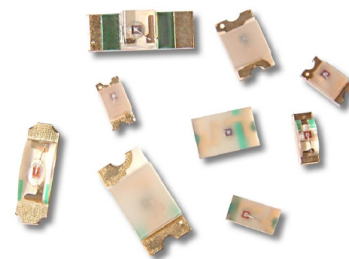


HSME-Cxxx

AllnGaP Green ChipLED

HSME-C110/C120/C150/C170/C177/C190/ C191/C197/C265



Description

These Broadcom® chip-type LED utilizes Aluminum Indium Gallium Phosphide (AllnGaP) material technology. The AllnGaP material has a very high luminous efficiency, capable of producing high light output.

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

All packages are binned by both color and intensity.

In order to facilitate pick-and-place operation, these chipLEDs are shipped in tape and reel, with 4000 units per reel for HSMx-C120/C170/C177/C190/C191/C197 and 3000 units per reel for HSMx-C110/C150/C265.

These packages are compatible with reflow soldering process.

Features

- Small size
- Industry-standard footprint
- Operating temperature range: -40°C to $+85^{\circ}\text{C}$
- Compatible with IR soldering
- Compatible for use with light piping
- Available in 8-mm tape on 7-in. diameter reel
- Reel sealed in zip-locked moisture barrier bags

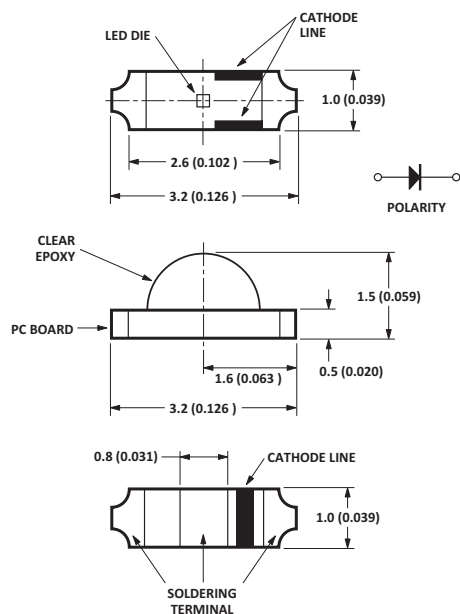
Applications

- Membrane switch indicator
- LCD backlighting
- Push button backlighting
- Front panel indicator
- Symbol backlighting
- Keypad backlighting

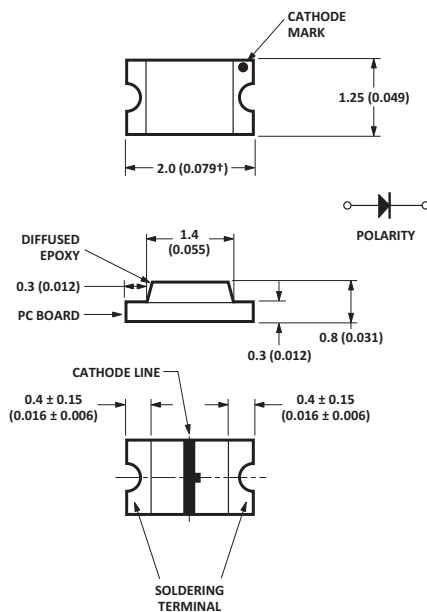
CAUTION! These LEDs are Class 1A ESD sensitive per JESD22-A114C.01. Observe appropriate precautions during handling and processing. Refer to Broadcom Application Note 1142 for additional details.

Package Dimensions

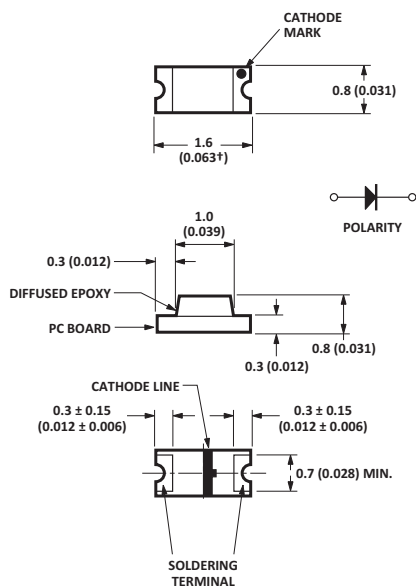
HSMx-C110



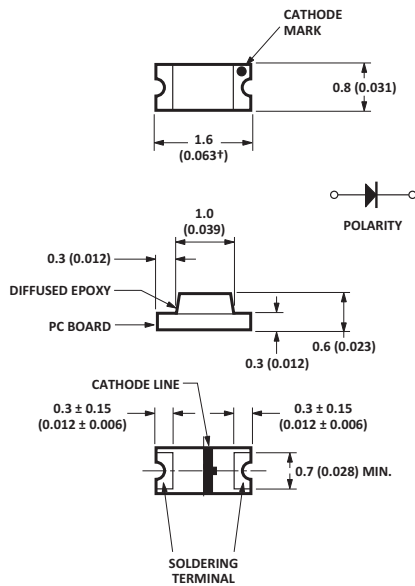
HSMx-C170



HSMx-C190



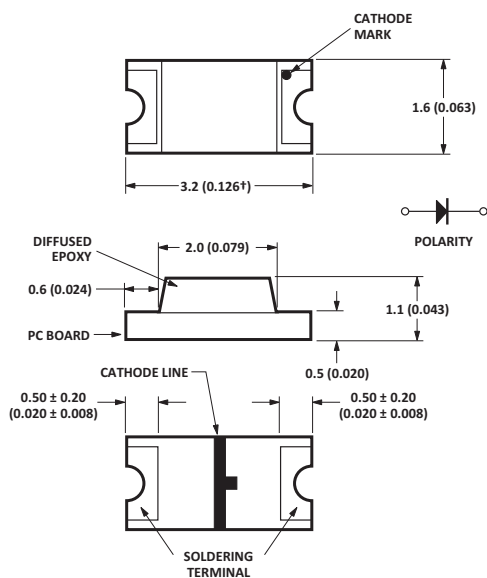
HSMx-C191



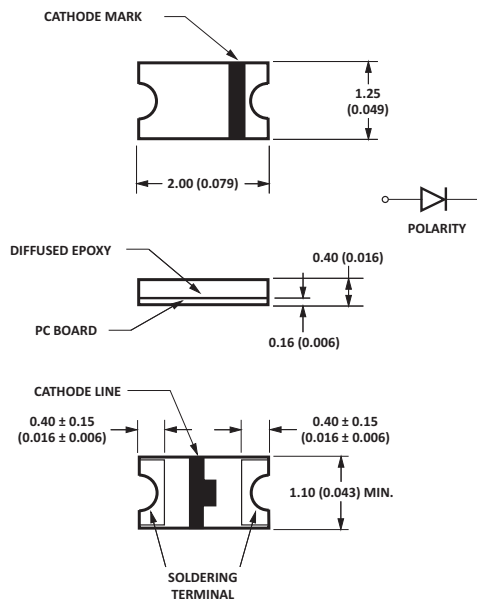
NOTE:

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

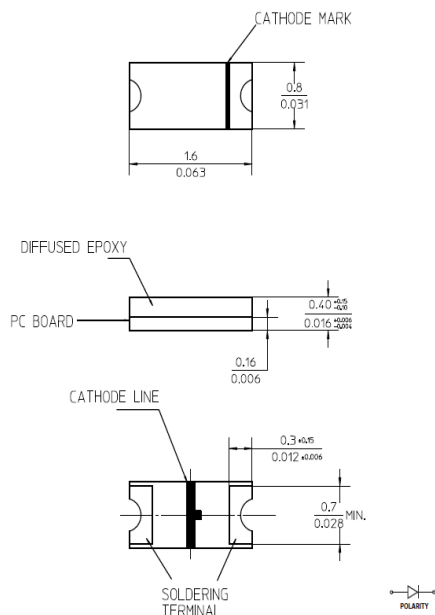
HSMx-C150



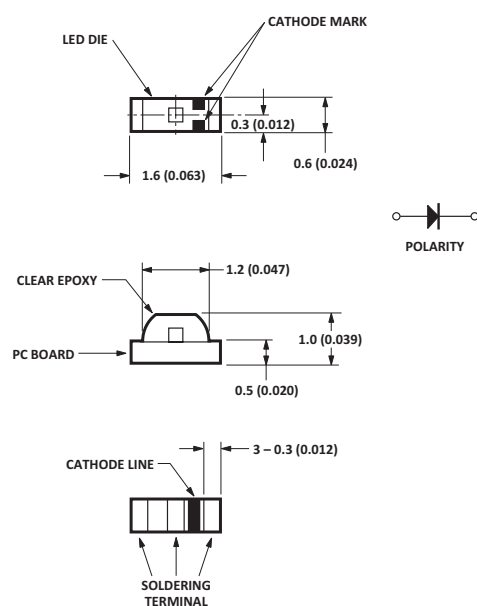
HSMx-C177



HSMx-C197



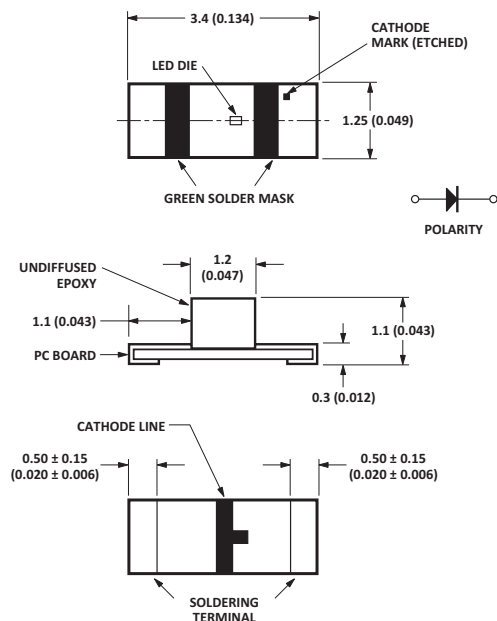
HSMx-C120



NOTE:

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

HSMx-C265



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}	AlInGaP Green	Package Description
1.6 (L) × 0.8 (W) × 0.6 (H)	HSME-C191	Untinted, diffused
1.6 (L) × 0.8 (W) × 0.4 (H)	HSME-C197	Untinted, diffused
1.6 (L) × 0.8 (W) × 0.8 (H)	HSME-C190	Untinted, diffused
2.0 (L) × 1.25 (W) × 0.8 (H)	HSME-C170	Untinted, diffused
2.0 (L) × 1.25 (W) × 0.4 (H)	HSME-C177	Untinted, diffused
1.6 (L) × 1.0 (W) × 0.6 (H)	HSME-C120	Untinted, non-diffused
3.2 (L) × 1.5 (W) × 1.0 (H)	HSME-C110	Untinted, non-diffused
3.2 (L) × 1.6 (W) × 1.1 (H)	HSME-C150	Untinted, diffused
3.4 (L) × 1.25 (W) × 1.1 (H)	HSME-C265	Untinted, non-diffused

a. Dimensions are in mm.

b. Tolerance is ± 0.1 mm unless otherwise noted.

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

Parameter	HSME-C110/120/170/177/190/191/ 197/150/265	Units
DC Forward Current ^{a, b}	20	mA
Power Dissipation	52	mW
Reverse Voltage ($I_R = 100\ \mu\text{A}$)	5	V
LED Junction Temperature	95	$^\circ\text{C}$
Operating Temperature Range	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	-40 to +85	$^\circ\text{C}$
Soldering Temperature	See reflow soldering profile (Figure 12 and Figure 13)	

a. Derate linearly as shown in Figure 4.

b. Drive current above 5 mA is recommended for best long-term performance.

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

Part Number	Forward Voltage, V_F (V) at $I_F = 20\ \text{mA}$		Reverse Breakdown, V_R (V) at $I_R = 100\ \mu\text{A}$	Capacitance, C (pF) $V_F = 0$, $f = 1\ \text{MHz}$	Thermal Resistance $R_{\theta\text{J-PIN}}$ ($^\circ\text{C/W}$)
	Typ.	Max.	Min.	Typ.	Typ.
HSME-C110/120	2.1	2.6	5	18	550
HSME-C150/170/177/190/191/197	2.1	2.6	5	15	450
HSME-C265	2.1	2.6	5	16	450

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

Part Number	Luminous Intensity, I_V (mcd) at 20 mA ^a		Peak Wavelength, λ_{PEAK} (nm)	Color, Dominant Wavelength, λ_d (nm) ^b	Viewing Angle, $2\theta_{1/2}$ ($^\circ$) ^c	Luminous Efficacy, η_V (lm/w)
	Min.	Typ.	Typ.	Typ.	Typ.	Typ.
HSME-C110	18	52	570	572	130	570
HSME-C120	18	52	570	572	155	570
HSME-150/170/190/191	18	50	570	572	170	570
HSME-C177/197	18	50	570	572	130	570
HSME-C265	18	50	570	572	150	570

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, λ_d , is derived from the CIE Chromaticity Diagram and represents the perceived color of the device.

c. $\theta_{1/2}$ is the off-axis angle where the luminous intensity is $1/2$ the peak intensity.

Bin Information

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 (I_V) Bin Limits

The I_V binning specification setup is for lowest allowable I_V binning only. There are no upper I_V bin limits.

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
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

Tolerance: $\pm 15\%$

Green Color Bin Limits

Bin ID	Dominant 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: ± 1 nm.

Figure 1: Relative Intensity vs. Wavelength

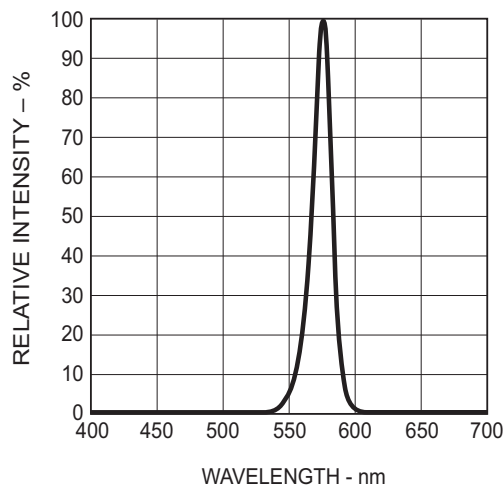


Figure 2: Forward Current vs. Forward Voltage

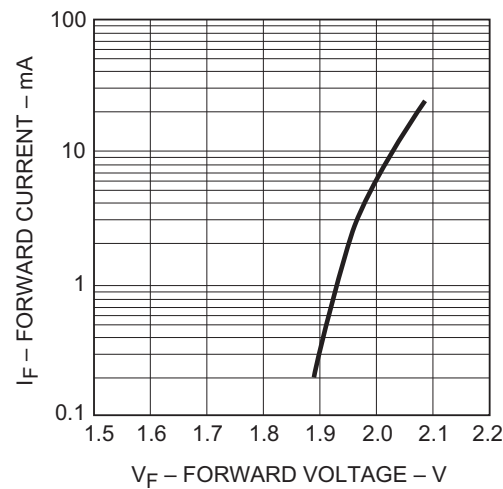


Figure 3: Luminous Intensity vs. Forward Current

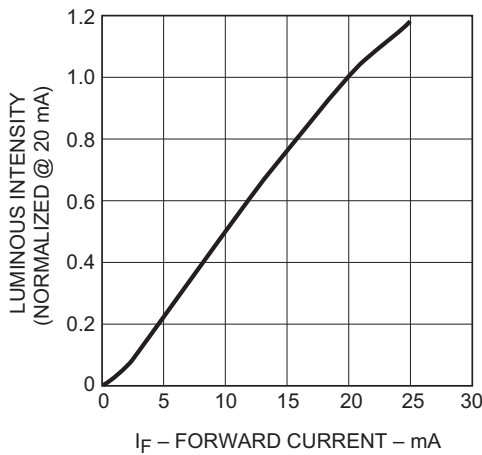


Figure 4: Maximum Forward Current vs. Ambient Temperature

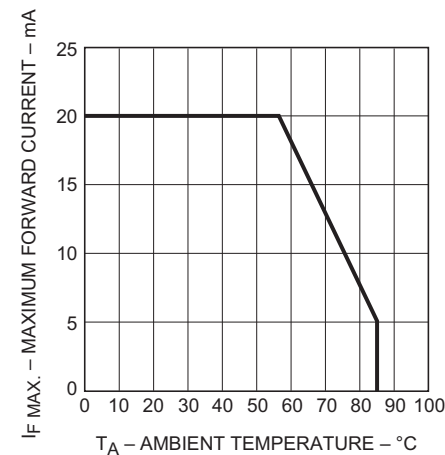


Figure 5: Relative Intensity vs. Angle for HSMx-C170/C190/C191/C150

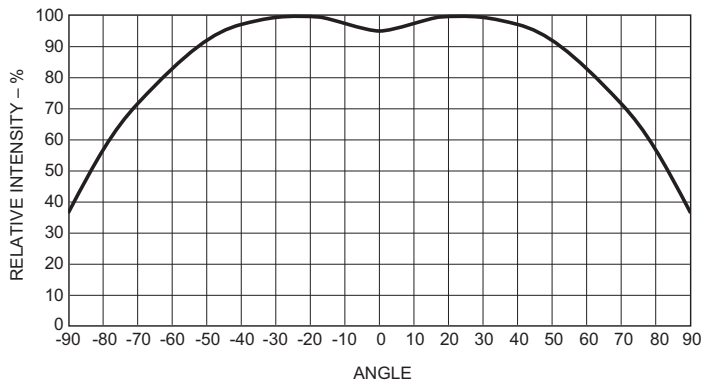


Figure 6: Relative Intensity vs. Angle for HSMx-C177/C197

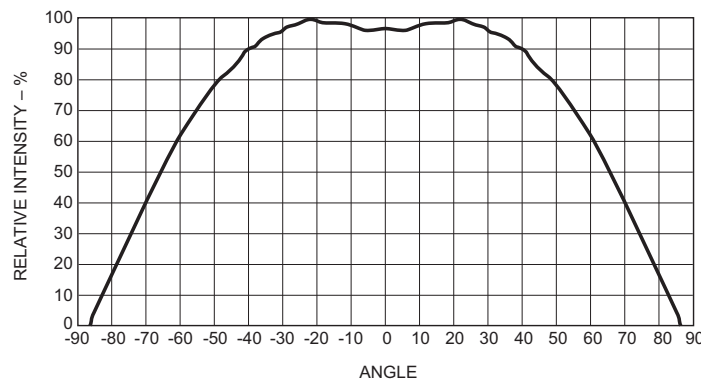


Figure 7: Relative Intensity vs. Angle for HSMx-C110

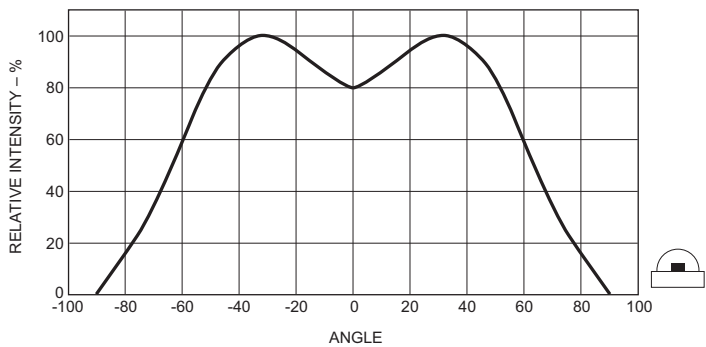


Figure 8: Relative Intensity vs. Angle for HSMx-C110

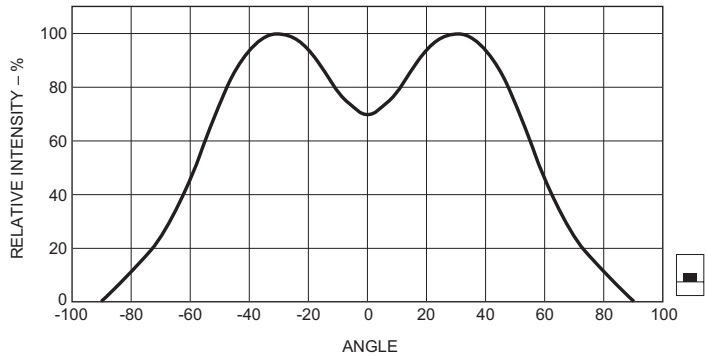


Figure 9: Relative Intensity vs. Angle for HSMx-C120

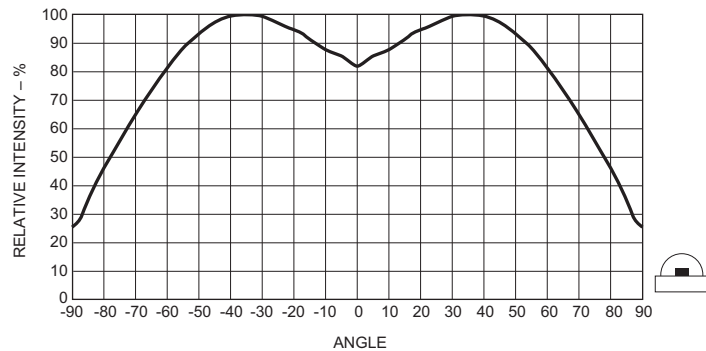


Figure 10: Relative Intensity vs. Angle for HSMx-C120

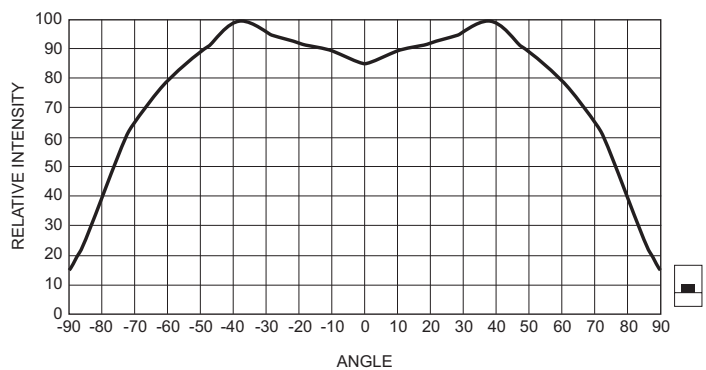


Figure 11: Relative Intensity vs. Angle for HSMx-C265

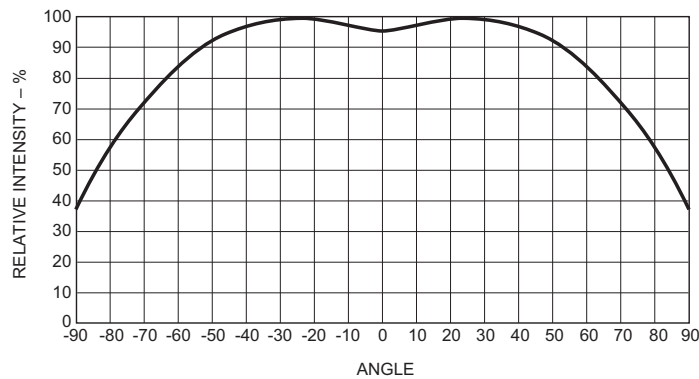


Figure 12: Recommended Reflow Soldering Profile

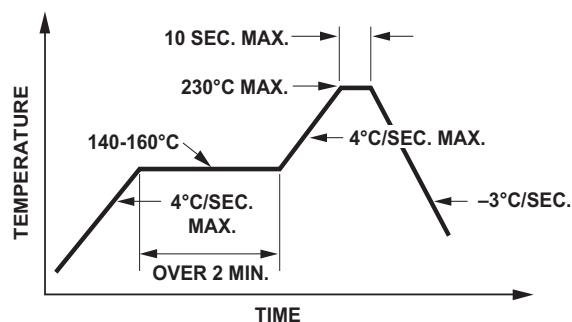
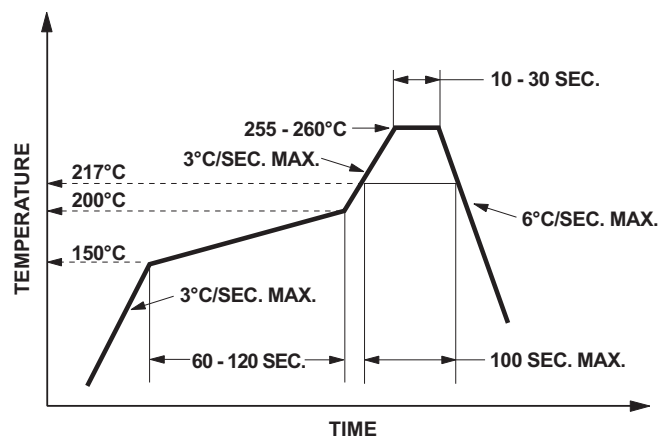


Figure 13: Recommended Lead-Free Reflow Soldering Profile



(Acc. to J-STD-020C)

Figure 14: Recommended Soldering Pattern for HSMx-C265

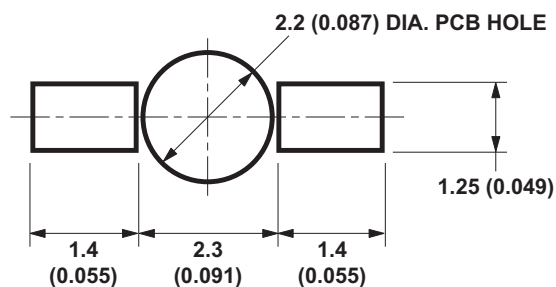


Figure 15: Recommended Soldering Pattern for HSMx-C120

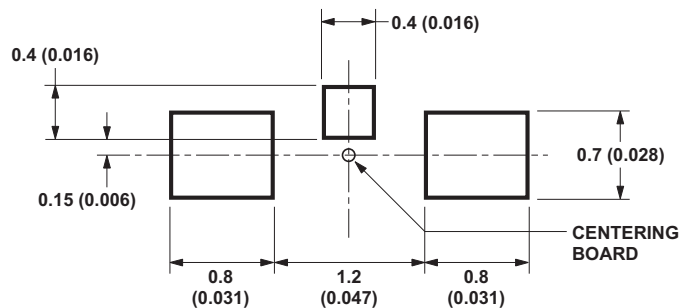


Figure 16: Recommended Soldering Pattern for HSMx-C110

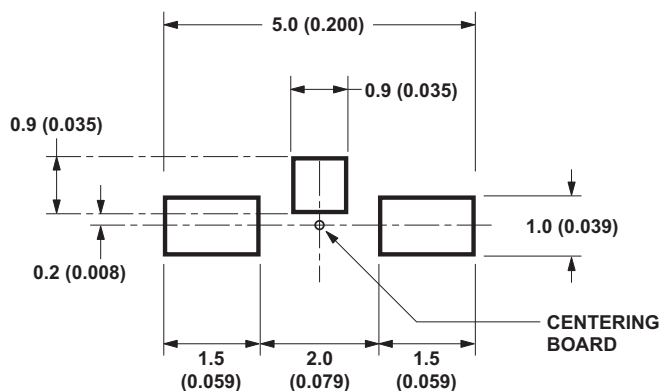


Figure 17: Recommended Soldering Pattern for HSMx-C170/C177

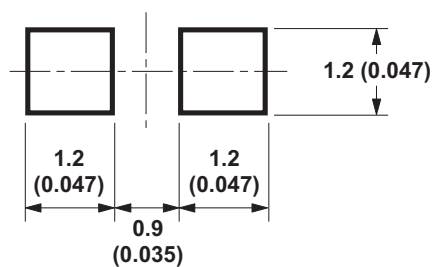
**NOTE:** All dimensions are in millimeters (inches).

Figure 18: Recommended Soldering Pattern for HSMx-C190/C191/C197

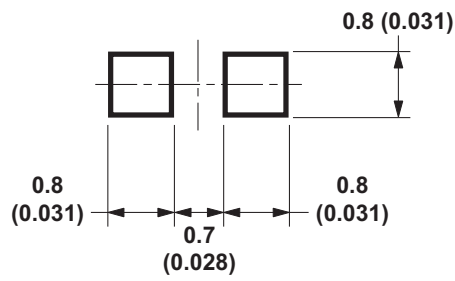
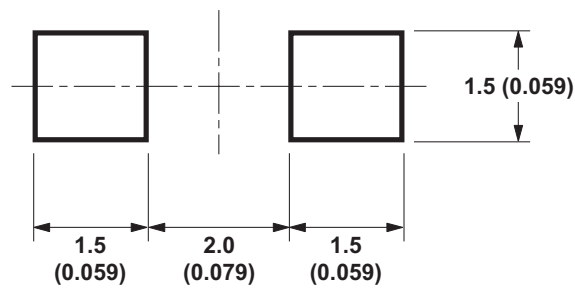


Figure 19: Recommended Soldering Pattern for HSMx-C150



NOTE: All dimensions are in millimeters (inches).

Figure 20: Reeling Orientation

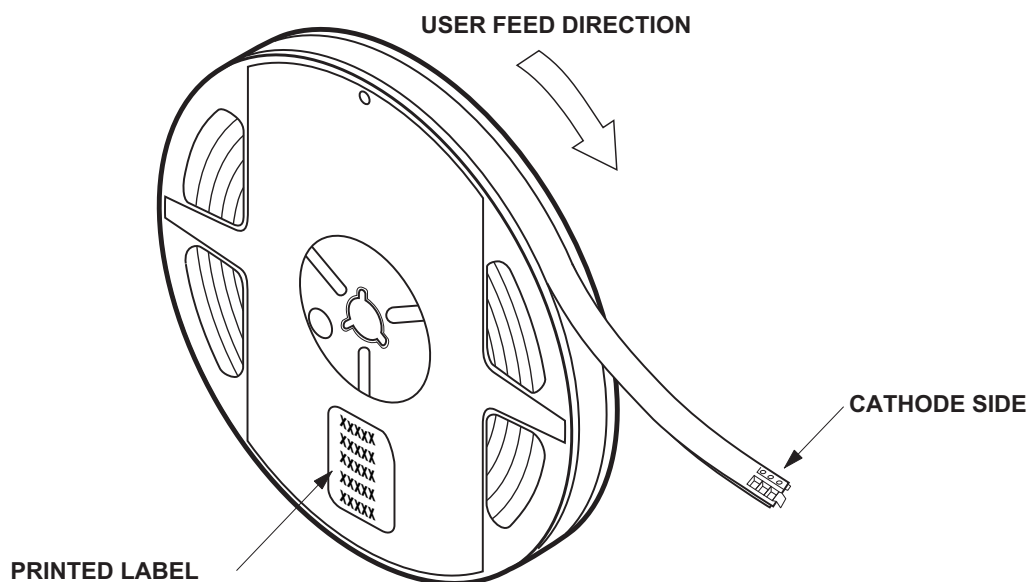
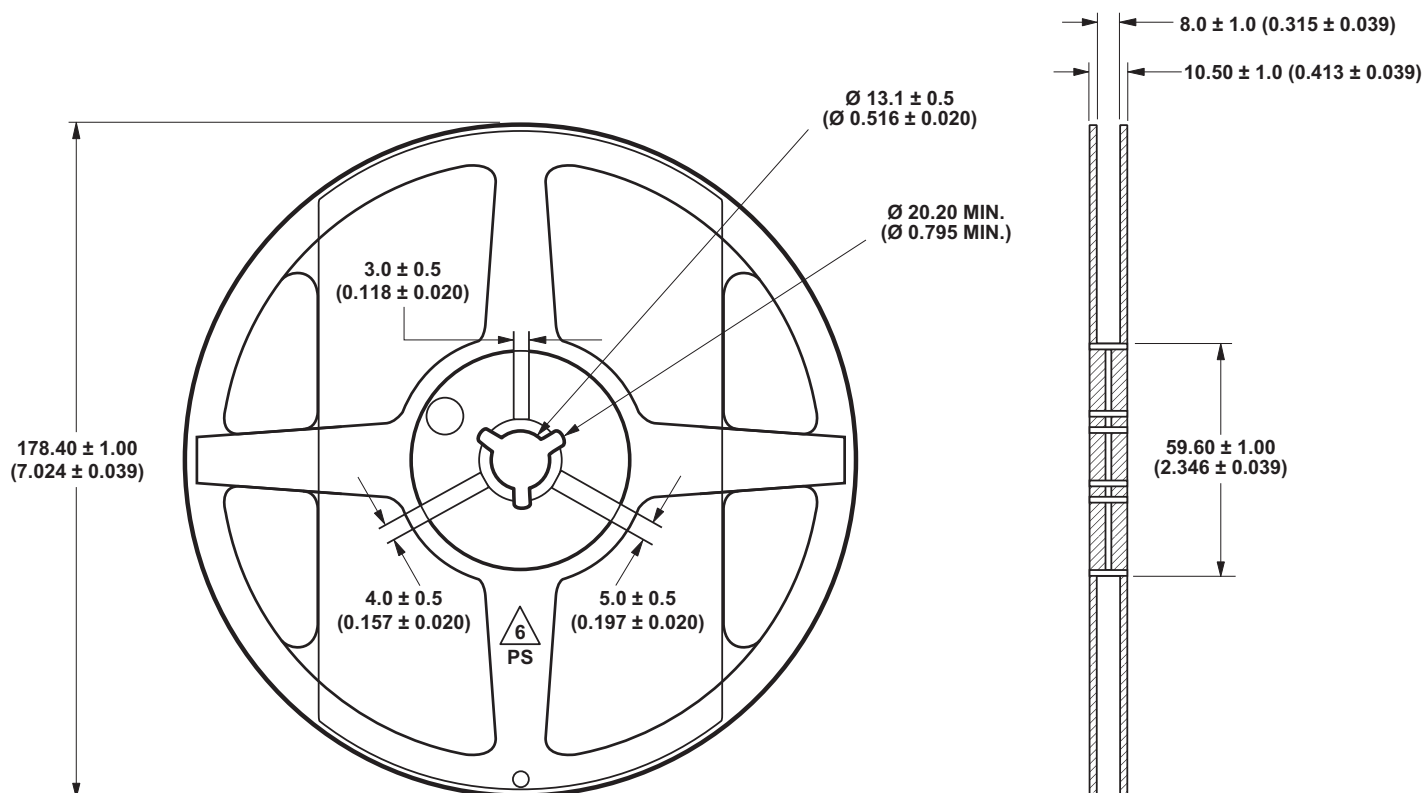
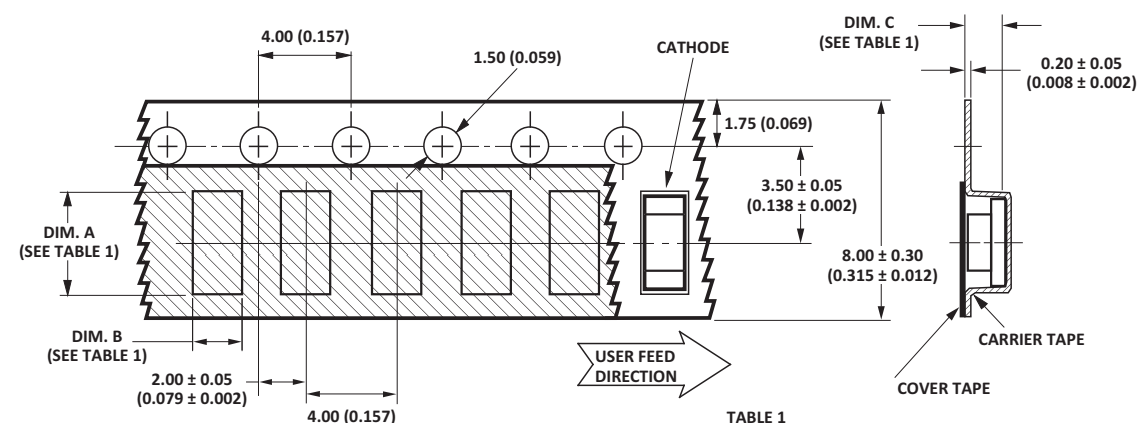


Figure 21: Reel Dimensions

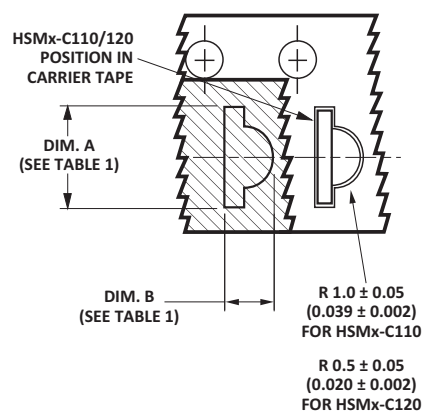


NOTE: All dimensions are in millimeters (inches).

Figure 22: 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)	0.80 (0.031)
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	1.86 (0.073)	0.89 (0.035)	0.87 (0.034)
HSMx-C197 SERIES	1.75 (0.069)	0.95 (0.037)	0.60 (0.024)

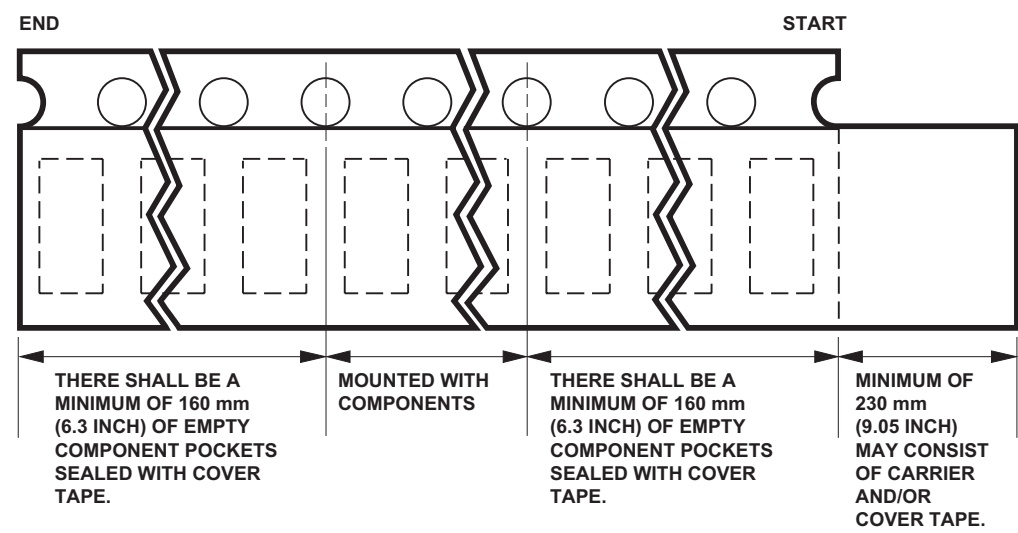
TABLE 1
DIMENSIONS IN MILLIMETERS (INCHES)

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:

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

Figure 23: Tape Leader and Trailer Dimensions

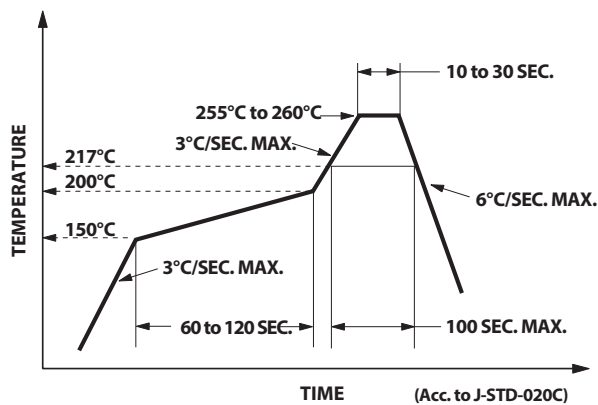


Precautionary Notes

Soldering

- Do not perform reflow soldering more than twice. Observe necessary precautions of handling moisture-sensitive devices as stated in the following section.
- Do not apply any pressure or force on the LED during reflow and after reflow when the LED is still hot.
- Use reflow soldering to solder the LED. Use hand soldering only for rework if unavoidable, but it must be strictly controlled to following conditions:
 - Soldering iron tip temperature = 310°C maximum
 - Soldering duration = 2 seconds maximum
 - Number of cycles = 1 only
 - Power of soldering iron = 50W maximum
- Do not touch the LED package body with the soldering iron except for the soldering terminals, because it may cause damage to the LED.
- Confirm beforehand whether the functionality and performance of the LED are affected by soldering with hand soldering.

Figure 24: Recommended Lead-Free Reflow Soldering Profile



Handling Moisture-Sensitive Devices

This product has a Moisture Sensitive Level 2a rating per JEDEC J-STD-020. For additional details and a review of proper handling procedures, refer to Broadcom Application Note 5305, *Handling Moisture-Sensitive Surface-Mount LEDs*.

- Before use:
 - An unopened moisture barrier bag (MBB) can be stored at <40°C/90% RH for 12 months. If the actual shelf life has exceeded 12 months and the Humidity Indicator Card (HIC) indicates that baking is not required, it is safe to reflow the LEDs per the original MSL rating.
 - Do not open the MBB prior to assembly (for example, for IQC). If unavoidable, the MBB must be properly resealed with fresh desiccant and HIC. The exposed duration must be taken in as floor life.
- Control after opening the MBB:
 - Read the HIC immediately upon opening the MBB.
 - Keep the LEDs at <30°C/60% RH at all times, and complete all high temperature-related processes, including soldering, curing, or rework, within 672 hours.
- Control for unfinished reel:

Store unused LEDs in a sealed MBB with desiccant or a desiccator at <5% RH.
- Control of assembled boards:

If the PCB soldered with the LEDs is to be subjected to other high-temperature processes, store the PCB in a sealed MBB with desiccant or desiccator at <5% RH to ensure that all LEDs have not exceeded their floor life of 672 hours.
- Baking is required if any of these conditions exist:
 - The HIC indicates a change in color for 10% and 5%, as stated on the HIC.
 - The LEDs are exposed to conditions of >30°C/60% RH at any time.
 - The LED's floor life exceeded 672 hours.

The recommended baking condition is 60°C ± 5°C for 20 hours.

Baking can only be done once.

Application Precautions

- The drive current of the LED must not exceed the maximum allowable limit across temperature as stated in this data sheet. Constant current driving is recommended to ensure consistent performance.
- Circuit design must cater to the entire range of forward voltage (V_F) of the LEDs to ensure the intended drive current can always be achieved.
- The LED exhibits slightly different characteristics at different drive currents, which can result in a larger variation of performance (meaning intensity, wavelength, and forward voltage). Set the application current as close as possible to the test current to minimize these variations.
- If the LED is intended to be used along with LEDs of other colors to achieve color mixing, Broadcom does not guarantee the consistency of the resultant color. Contact your Broadcom sales representative for these applications.
- The LED is not intended for reverse bias. Use other appropriate components for such purposes. When driving the LED in matrix form, ensure that the reverse bias voltage does not exceed the allowable limit of the LED.
- Avoid rapid changes in ambient temperature, especially in high-humidity environments, because they cause condensation on the LED.
- If the LED is intended to be used in a harsh or outdoor environment, protect the LED against damages caused by rainwater, dust, oil, corrosive gases, external mechanical stresses, and so on.

Eye Safety Precautions

LEDs may pose optical hazards when in operation. Do not look directly at operating LEDs because it might be harmful to the eyes. For safety reasons, use appropriate shielding or personal protective equipment.

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Lead (Pb) Free
RoHS Compliant