BROADCOM®

Data Sheet

HSMF-C180

Bi-color Top-Mount ChipLED

Overview

The HSMF-C180 is a top-view yellow and yellow-green bi-color surface-mount ChipLED that comes in an industrial-standard 1.6 x 1.5 mm^2 footprint. This LED has a wide viewing angle, which makes this device suitable for applications that require uniform light distribution.

Its small form factor allows flexible board design, and multiple LEDs can be closely mounted in applications where space is constrained.

This ChipLED is shipped in tape and reel and is compatible with industry-standard automatic machine placement and reflow soldering.

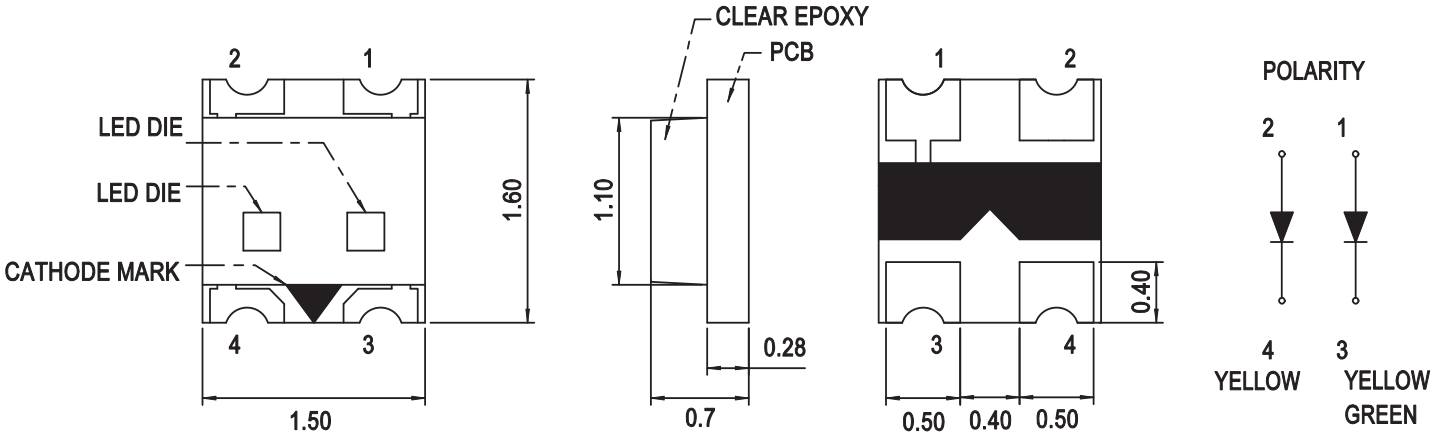
Features

- LED with AlInGaP yellow and yellow green
- Small package size
- Compatible with reflow soldering
- Available in 8-mm tape on 7-inch diameter reel

Applications

- Status indicators
- Keypad backlighting
- Pushbutton backlighting

Package Dimensions



NOTE:

- All dimensions are in millimeters (mm).
- Tolerance is ±0.10 mm unless otherwise specified.

CAUTION! This LED is Class 1A ESD sensitive per ANSI/ESDA/JEDEC JS-001. Observe appropriate precautions during handling and processing. Refer to Application Note 1142 for additional details.

Absolute Maximum Ratings

Parameter	Rating	Unit
DC Forward Current[a]	20	mA
Power Dissipation	52	mW
LED Junction Temperature	95	°C
Operating Temperature Range	–40 to +85	°C
Storage Temperature Range	–40 to +85	°C

a. Derate linearly as shown in Figure 5.

Optical Characteristics (T_J = 25°C, I_F = 20 mA)

Color	Luminous Intensity, I_V (mcd)[a]		Dominant Wavelength (nm)[b]	Peak Wavelength (nm)	Viewing Angle, 2θ½ (°)[c]
	Min.	Max.	Typ.	Typ.	Typ.
Yellow	2.8	18.0	588	593	160
Yellow Green	4.5	28.5	572	572	160

a. The luminous intensity is measured at the mechanical axis of the LED package. The actual peak of the spatial radiation pattern might not be aligned with the axis.

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

c. The viewing angle is the off axis angle where the luminous intensity is half of the peak intensity.

Electrical Characteristics (T_J = 25°C, I_F = 20 mA)

Color	Forward Voltage, V_F (V)[a]		Reverse Current, I_R (µA) at V_R = 5V[b]	Thermal Resistance, $R\theta_{J-S}$ (°C/W)[c]
	Min.	Max.	Max.	Typ.
Yellow	1.6	2.6	10	350
Yellow Green	1.6	2.6	10	350

a. The forward voltage tolerance is ±0.1V.

b. Indicates product final test condition only. Long-term reverse bias is not recommended.

c. Thermal resistance from the LED junction to the solder point.

Bin Information

Intensity Bin Limit (CAT)

Bin	Luminous Intensity (mcd)	
	Min.	Max.
H	2.8	4.5
J	4.5	7.2
K	7.2	11.2
L	11.2	18.0
M	18.0	28.5

Tolerance = ±15%

Color Bin Limit (BIN)

Yellow

Bin	Dominant 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 = ±1.0 nm

Yellow Green

Bin	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 = ±1.0 nm

CAUTION! The preceding optical specifications are valid in the case where a single LED is lit. The preceding product specifications *do not* provide any guarantee on color mixing, color consistency over time, or uniformity in luminous intensity when more than one LED is lit.

Figure 1: Spectral Power Distribution

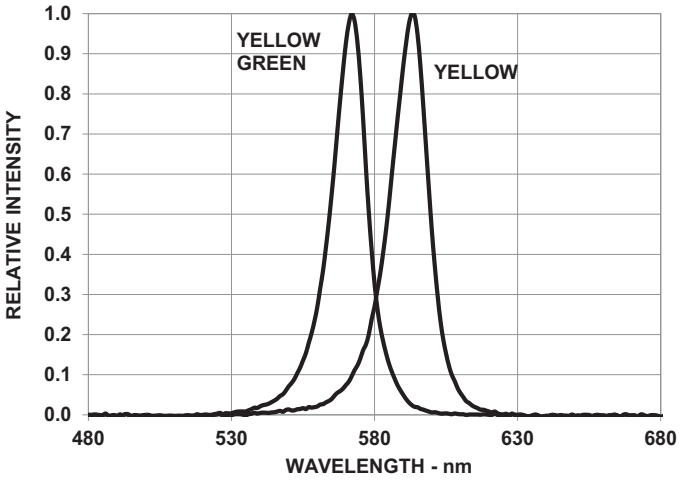


Figure 2: Relative Luminous Intensity vs. Forward Current

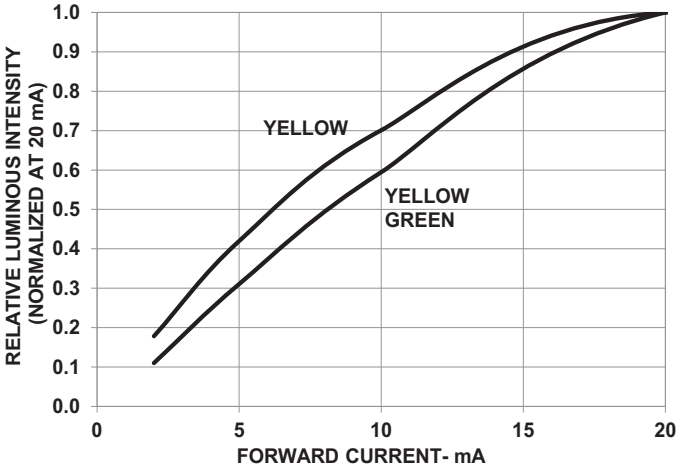


Figure 3: Forward Current vs. Forward Voltage

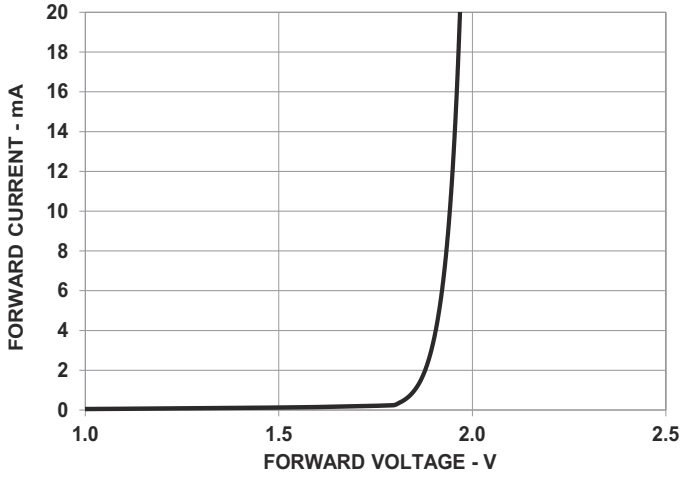


Figure 4: Radiation Pattern

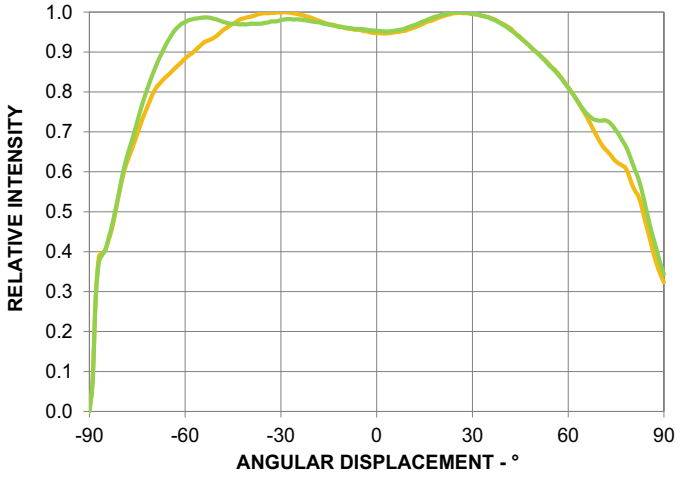


Figure 5: Derating Curve

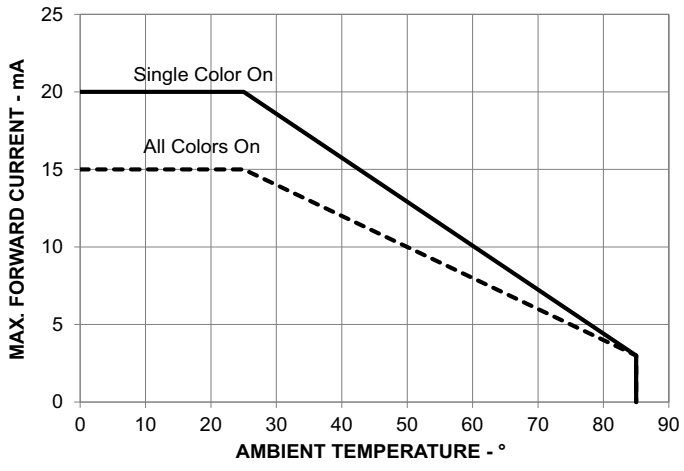
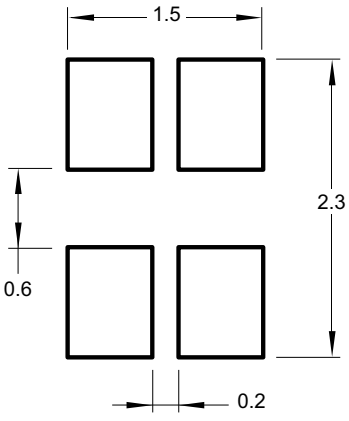
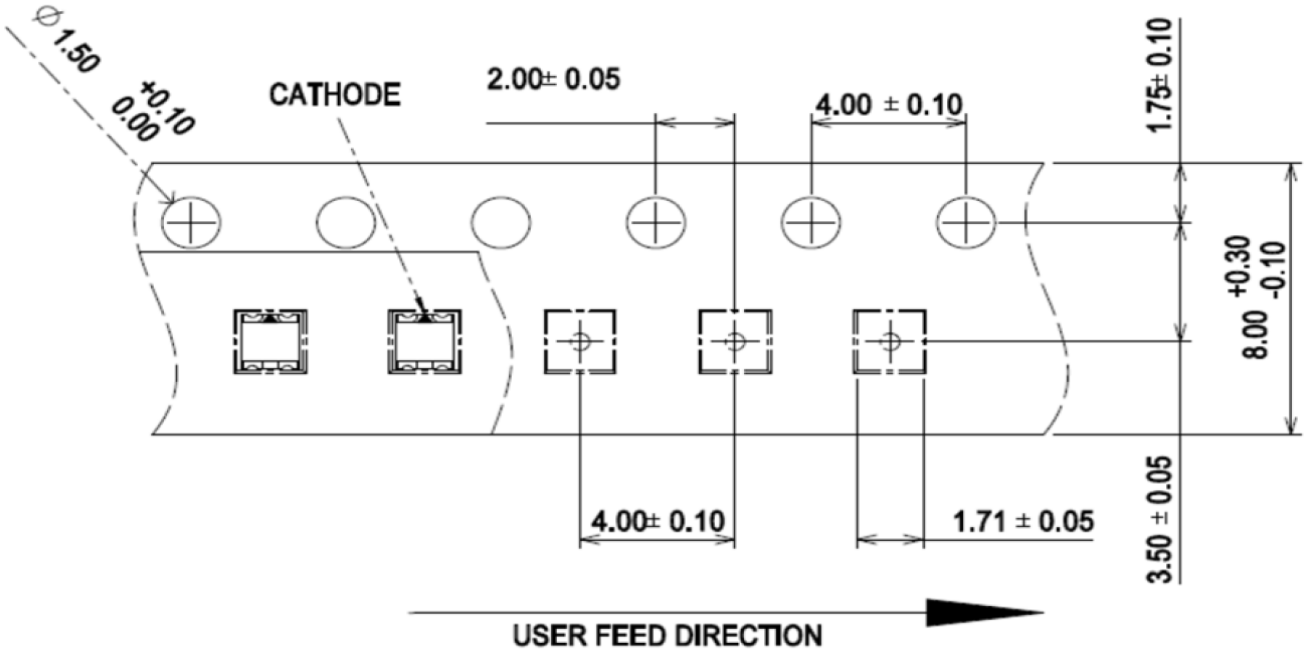


Figure 6: Recommended Soldering Land Pattern



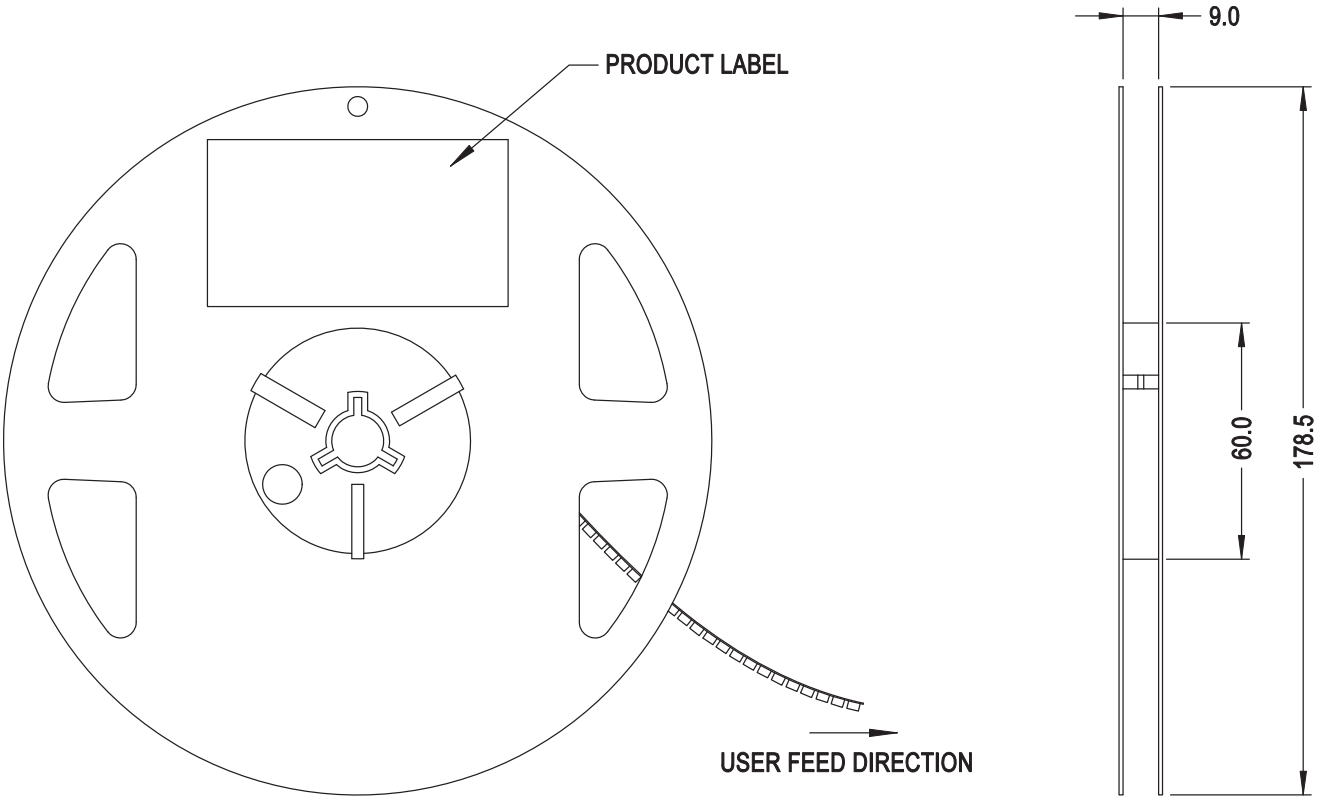
Units: millimeters.

Figure 7: Carrier Tape Dimensions



NOTE: Units are in millimeters.

Figure 8: Reel Dimensions



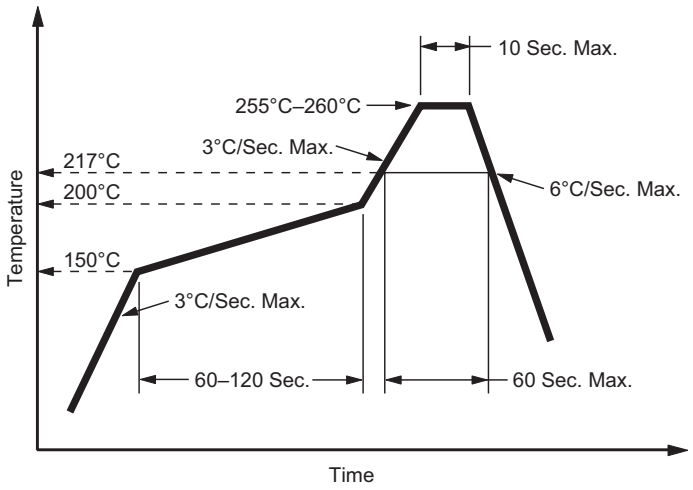
NOTE: Units are in millimeters.

Precautionary Notes

Soldering

- Do not perform reflow soldering more than twice. Observe the 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 or after reflow when the LED is still hot.
- Use reflow soldering to solder the LED. Hand soldering shall be used only for rework if unavoidable, but must be strictly controlled to the 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 can damage the LED.
- Confirm beforehand whether the functionality and performance of the LED are affected by hand soldering.

Figure 9: Recommended Lead-Free Reflow Soldering Profile



Handling the Moisture Sensitive Device

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

- Before use:
  - An unopened moisture barrier bag (MBB) can be stored at <40°C/90% RH for 12 months. If the actual shelf life exceeds 12 months and the humidity indicator card (HIC) indicates that baking is not required, then it is safe to reflow the LEDs per the original MSL rating.
  - It is recommended that the MBB not be opened prior to assembly (for IQC, as an example).
- Control after opening the MBB:
  - The HIC must be read immediately upon opening of MBB.
  - The LEDs must be kept at <30°C/60% RH at all times, and all high-temperature-related processes, including soldering, curing, or rework, must be completed within 672 hours.
- Control for unfinished reel: Unused LEDs must be stored in a sealed MBB with desiccant or desiccator at <5% RH.
- Control of assembled boards: If the PCB soldered with the LEDs is to be subjected to other high-temperature processes, the PCB must be stored in a sealed MBB with desiccant or desiccator at <5% RH to ensure that all LEDs do not exceed their floor life of 672 hours.
- Baking is required under the following circumstances:
  - The HIC indicates a change in color for 10% and 5% as stated on the HIC.
  - The LEDs are exposed to a condition of >30°C/60% RH at any time.
  - The LED floor life exceeds 672 hours.

  The recommended baking condition is: 60°C ±5°C for 20 hours. Baking should be done only 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.
- The circuit design must cater to the whole range of the forward voltage of the LEDs to ensure that the intended drive current can always be achieved.
- LEDs do exhibit slightly different characteristics at different drive currents, which might result in a larger variation in their performance (meaning intensity, wavelength, and forward voltage). The user should set the application current as close as possible to the test current in order to minimize these variations.
- LEDs are not intended for reverse bias. Use other appropriate components for such purpose. When driving the LED in matrix form, it is crucial to 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 as this will cause condensation on the LED.
- If the LED is intended to be used in a harsh environment, the LED must be protected against damage caused by rain water, dust, oil, corrosive gases, external mechanical stress, and so on.

Eye Safety and Precautions

LEDs can pose optical hazards when in operation. Do not look directly at operating LEDs because your eyes can be harmed. For safety reasons, use appropriate shielding or personnel protection equipment.

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