BROADCOM®

Data Sheet

HSMF-C188

Bi-color Top-Mount ChipLED

Overview

HSMF-C188 is a top-view amber and green bi-color surface-mount chipLED that comes in an industrial standard 1.6 mm × 1.5 mm footprint. This LED uses high-efficiency AlInGaP and InGaN chip technologies and has high light output performance. Coupled with a wide viewing angle, this device is suitable for applications that require uniform light output and high brightness.

Its small form factor allows flexible board design and multiple LEDs can be closely mounted in application where space is a constraint.

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

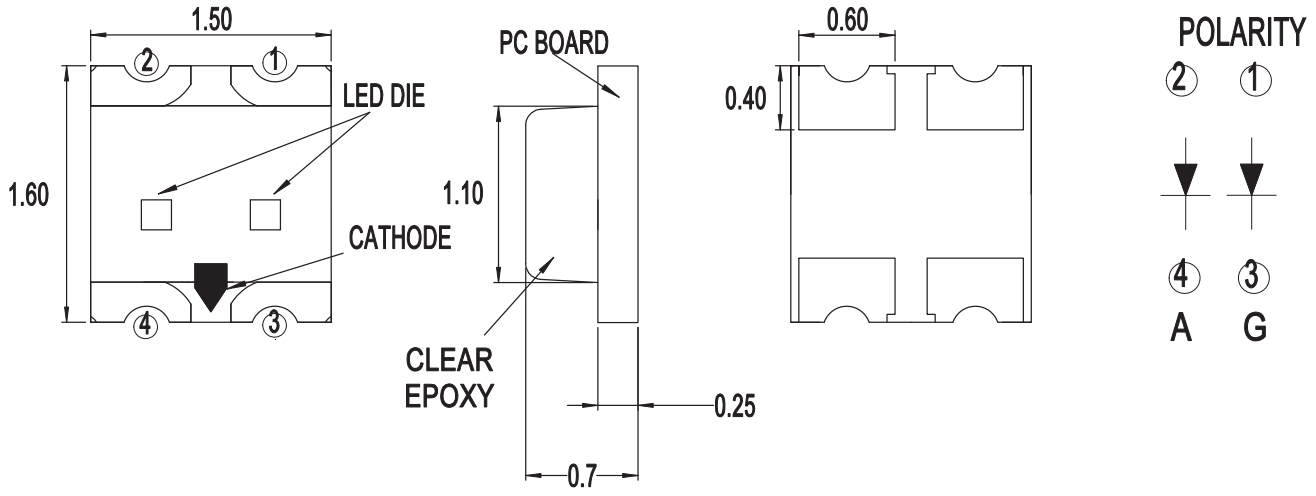
Features

- LED with AlInGaP Amber and InGaN Green
- Compatible with reflow soldering
- Available in 8-mm tape on 7-inch diameter reel

Applications

- Status indicator
- Keypad backlighting
- Pushbutton backlighting

Package Dimensions



NOTE:

- All dimensions 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 AN-1142 for additional details.

Absolute Maximum Ratings

Parameter	Amber	Green	Unit
DC Forward Current[a]	20	20	mA
Power Dissipation	48	78	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)
	Min.	Max.	Typ.	Typ.
Amber	28.5	180.0	592	595
Green	45.0	285.0	525	523

a. The luminous intensity is measured at the mechanical axis of the LED package. The actual peak of the spatial radiation pattern may 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.

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.
Amber	1.6	2.4	100	350
Green	2.9	3.9	100	350

a. Forward voltage tolerance = ±0.1V.

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

c. Thermal resistance from LED junction to solder point.

Bin Information

Intensity Bin Limit (CAT)

Bin	Luminous Intensity (mcd)	
	Min.	Max.
N	28.5	45.0
P	45.0	71.5
Q	71.5	112.5
R	112.5	180.0
S	180.0	285.0

Tolerance = ±15%

Color Bin Limit (BIN)

Amber

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

Green

Bin	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 = ±1.0 nm

CAUTION! The above optical specifications are valid in the case where a single LED is lit up.
The above 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 up.

Figure 1: Spectral Power Distribution

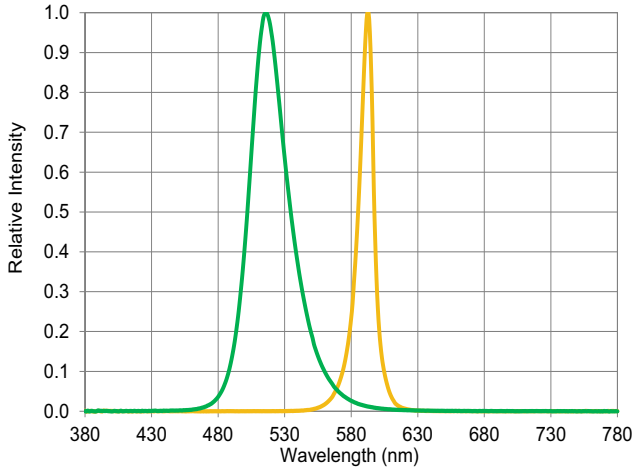


Figure 2: Forward Current vs. Forward Voltage

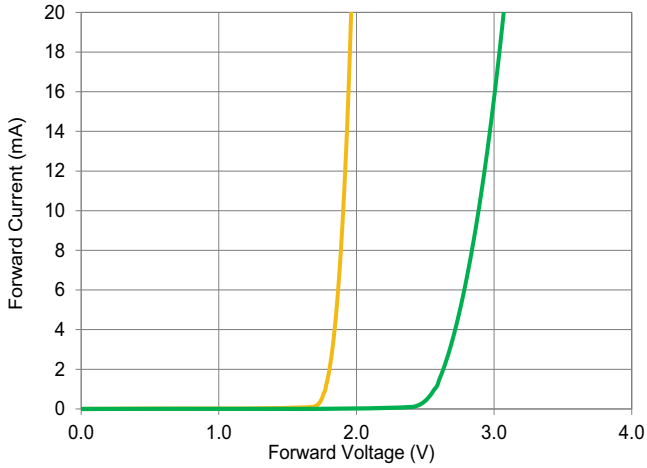


Figure 3: Relative Luminous Intensity vs. Mono Pulse Current

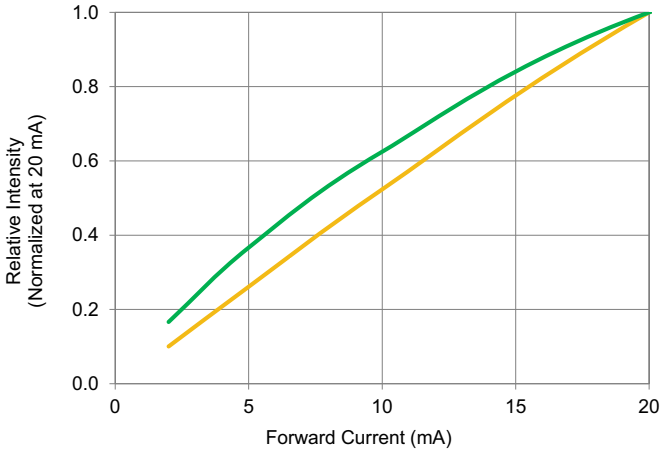


Figure 4: Radiation Pattern

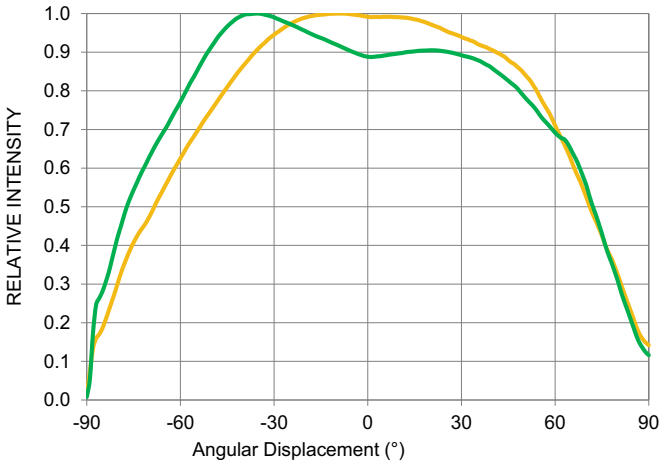


Figure 5: Derating Curve

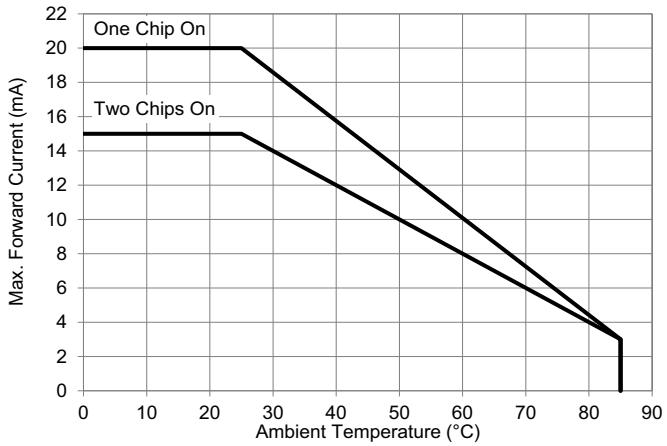
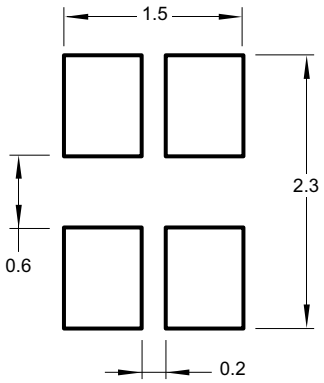
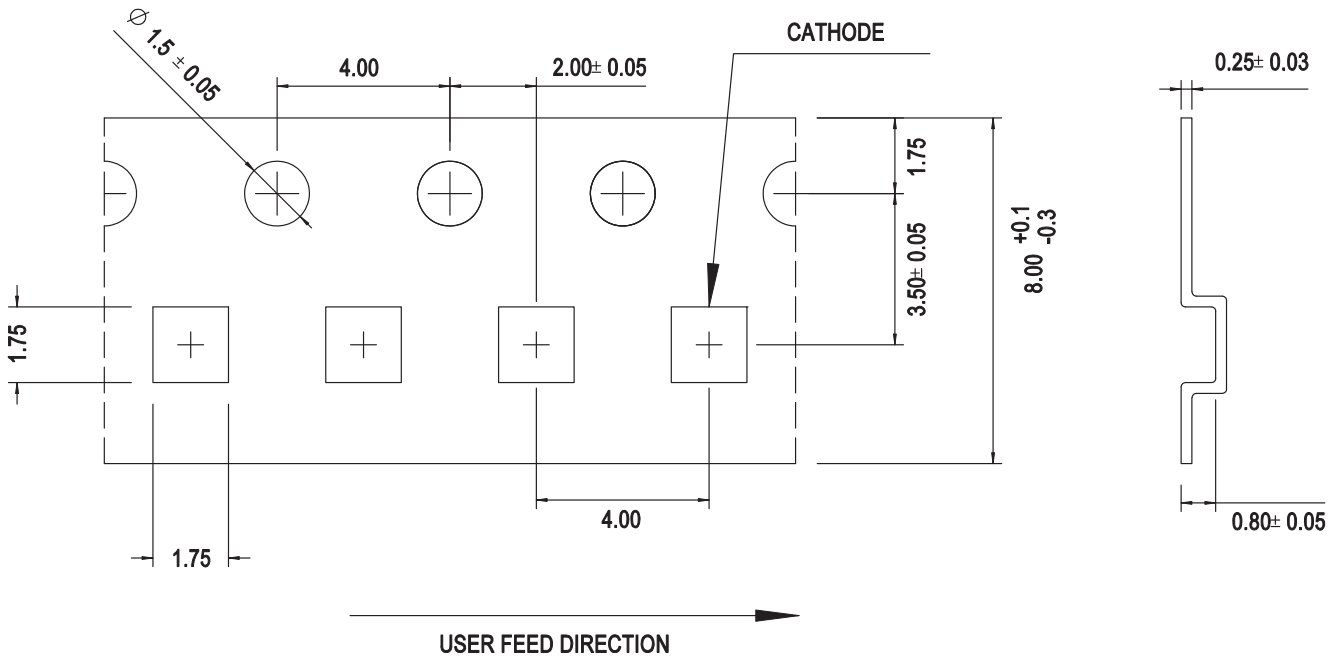


Figure 6: Recommended Soldering Land Pattern



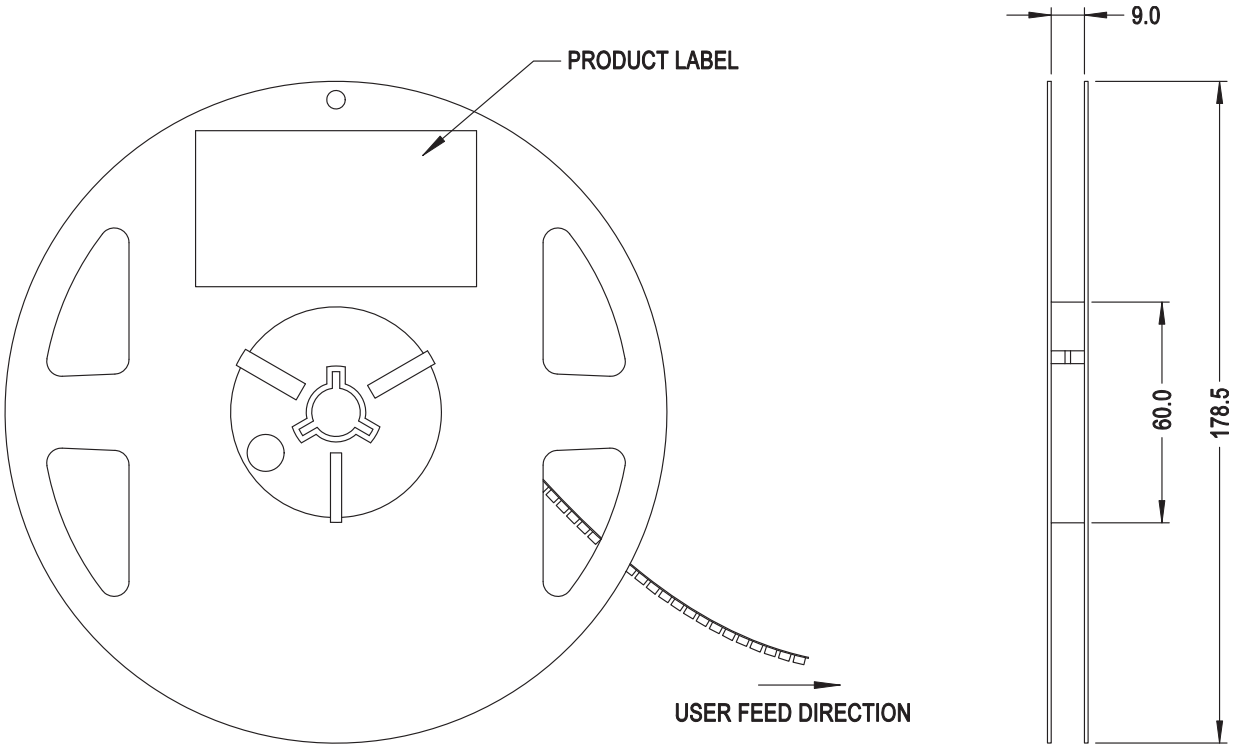
Tolerance is ±0.10 mm unless otherwise specified.
Units: millimeters.

Figure 7: Carrier Tape Dimensions



NOTE: Units in millimeters.

Figure 8: Reel Dimensions

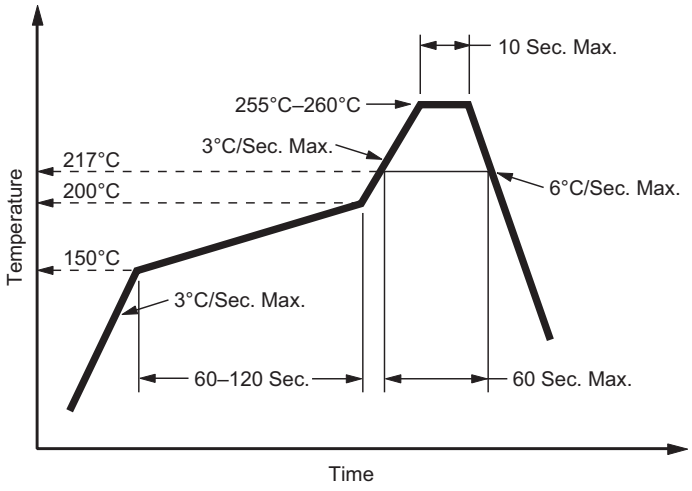


NOTE: Units in millimeters.

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 only be used for rework if unavoidable, but must be strictly controlled to the conditions below:
  - Soldering iron tip temperature = 310°C max.
  - Soldering duration = 2 sec. max.
  - Number of cycle = 1 only
  - Power of soldering iron = 50W max.
- Do not touch the LED package body with the soldering iron except for the soldering terminals as it may cause damage to the LED.
- Confirm beforehand whether the functionality and performance of the LED is affected by hand soldering.



Handling of Moisture Sensitive Device

This product has a Moisture Sensitive Level 2a rating per JEDEC J-STD-020. Refer to Application Note AN5305, Handling of Moisture Sensitive Surface Mount Devices, 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 has exceeded 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 humidity indicator card (HIC) shall 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 need to 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 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:
  - The HIC indicator is indicating 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 exceeded 672 hrs.

  The recommended baking condition is: 60°C ±5°C for 20 hrs. Baking should only be done once.

Application Precautions

- Drive current of the LED must not exceed the maximum allowable limit across temperature as stated in the datasheet. Constant current driving is recommended to ensure consistent performance.
- Circuit design must cater to the whole range of the forward voltage of the LEDs to ensure the intended drive current can always be achieved.
- LEDs do exhibit slightly different characteristics at different drive current which might result in larger variation of their performance (meaning intensity, wavelength and forward voltage). User is recommended to 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 is not exceeding the allowable limit of the LED.
- Avoid rapid change in ambient temperature especially in high humidity environment as this will cause condensation on the LED.
- If the LED is intended to be used in harsh environment, the LED must be protected against damages caused by rain water, dust, oil, corrosive gases, external mechanical stress, and so on.

Eye Safety and Precautions

LEDs may pose optical hazards when in operation. It is not advisable to view directly at operating LEDs as it may be harmful to the eyes. For safety reasons, use appropriate shielding or personnel protection equipment.

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