HSMF-C187

Bi-color Top-Mount ChipLED

Overview

HSMF-C187 is a top-view yellow-green and blue bi-color surface-mount chipLED that comes in an industrial standard 1.6 x 1.5 mm^2 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 which 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.

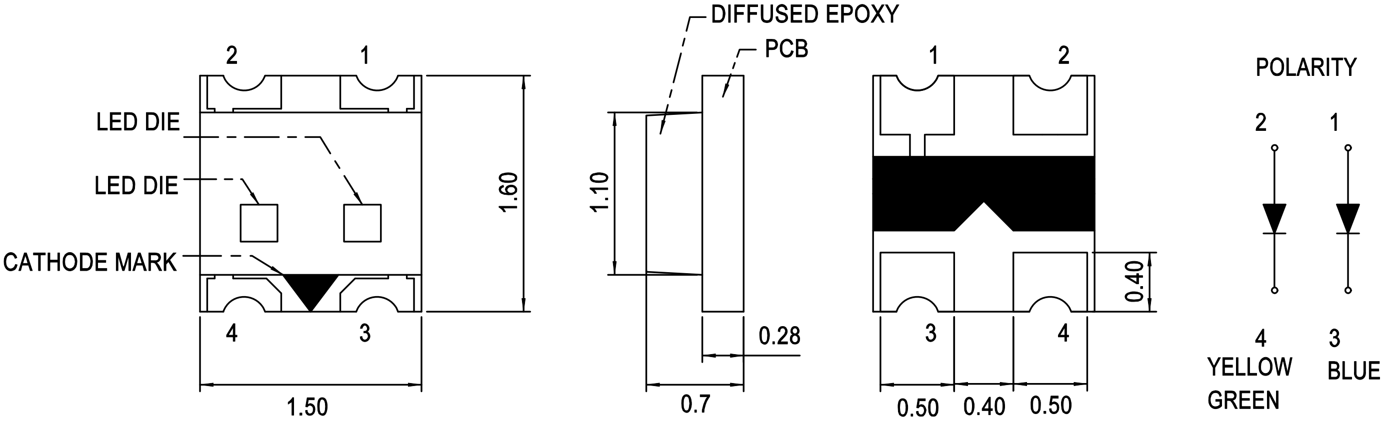
Features

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

Applications

- Status indicator
- 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	AlInGaP	InGaN	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 7.

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

	Luminous Intensity, I_V (mcd)[a]		**Peak Wavelength (nm)**	**Dominant Wavelength (nm)[b]**	**Viewing Angle, 2θ½ (°)[c]**
Color	**Min.**	**Max.**	**Typ.**	**Typ.**	**Typ.**
Yellow Green	18.0	112.5	571	572	150
Blue	28.5	180.0	468	473	140

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.

c. 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)

	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]**
Color	**Min.**	**Max.**	**Max.**	**Typ.**
Yellow Green	1.6	2.4	10	350
Blue	2.9	3.9	10	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.**
M	18.0	28.5
N	28.5	45.0
P	45.0	71.5
Q	71.5	112.5
R	112.5	180.0

Tolerance = ±15%

Color Bin Limit (BIN)

Blue

Bin	Dominant Wavelength (nm)	
	Min.	**Max.**
A	460	465
B	465	470
C	470	475
D	475	480

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 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: Relative Intensity vs. Wavelength

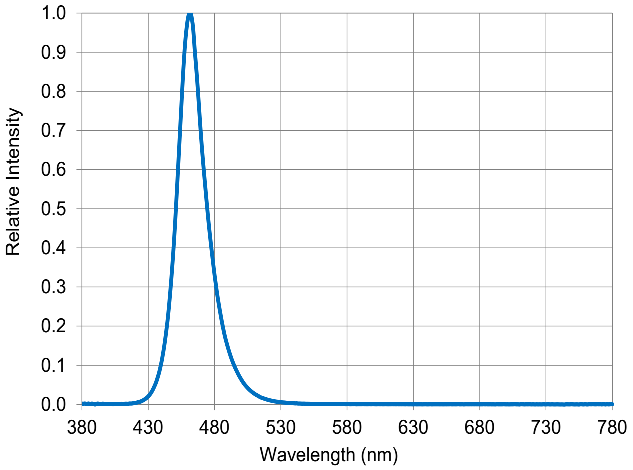


Figure 2: Relative Intensity vs. Wavelength

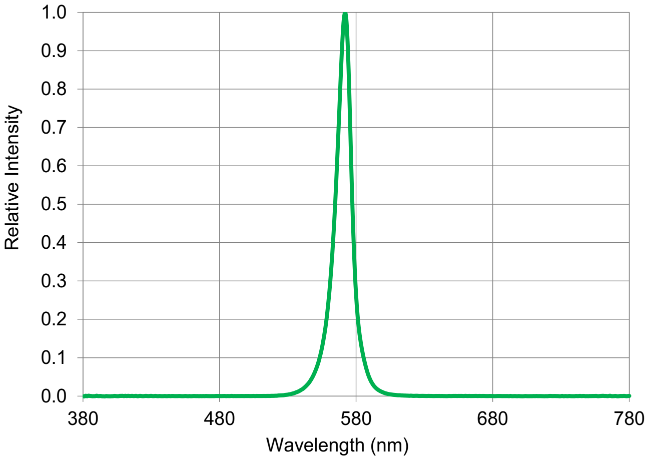


Figure 3: Forward Current vs. Forward Voltage

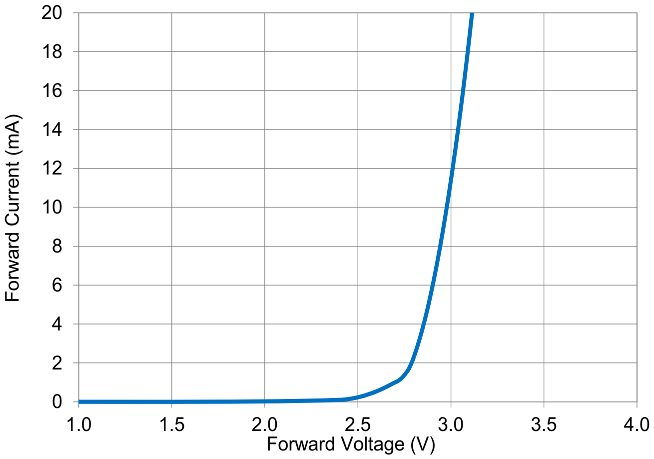


Figure 4: Forward Current vs. Forward Voltage

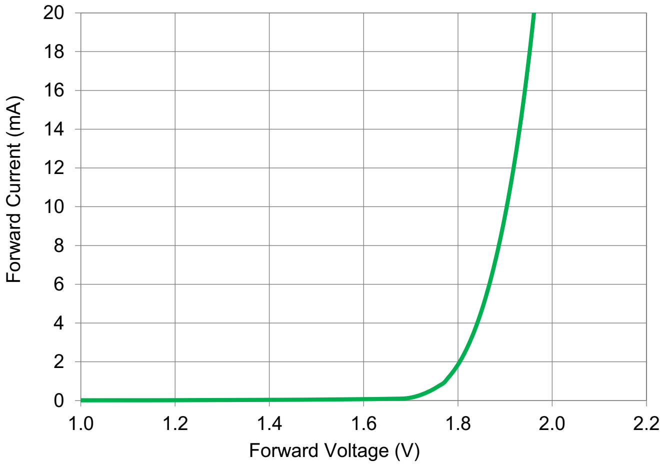


Figure 5: Luminous Intensity vs. Forward Current

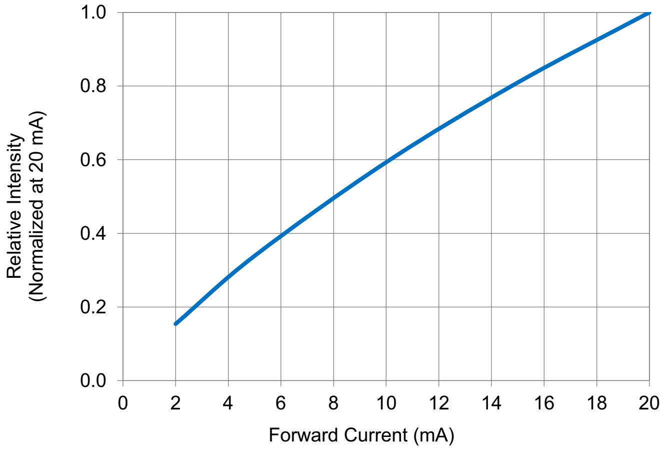


Figure 6: Luminous Intensity vs. Forward Current

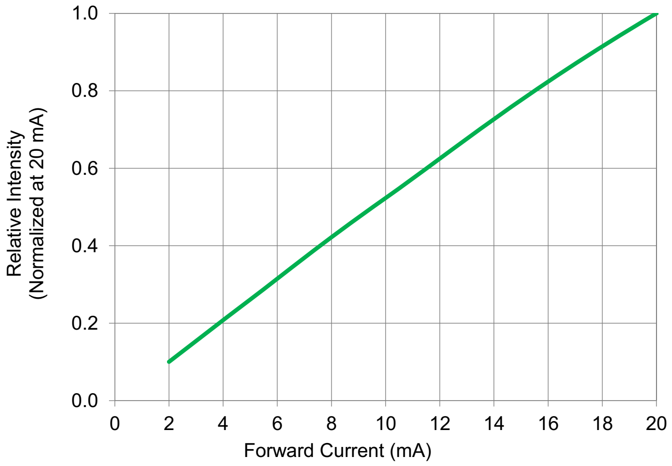


Figure 7: Max. Forward Current vs. Ambient Temperature

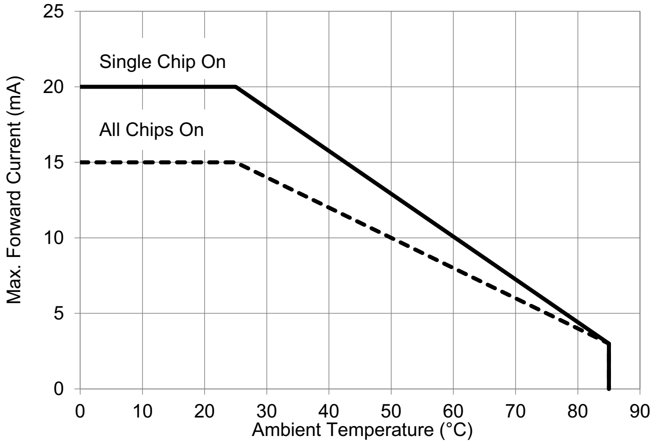


Figure 8: Relative Intensity vs. Angle

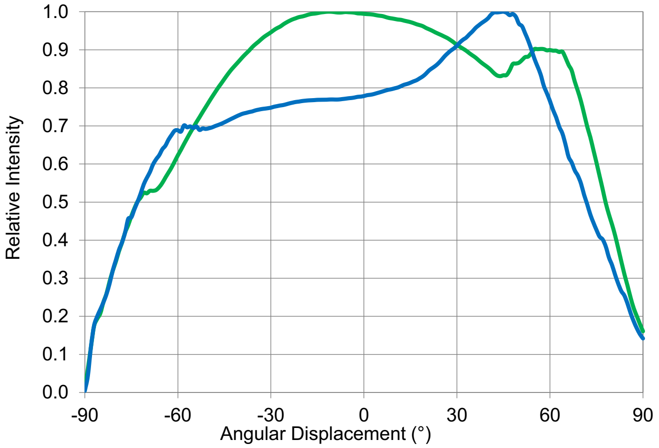
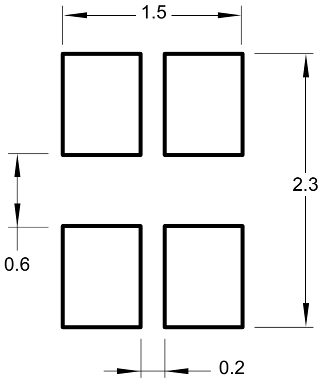
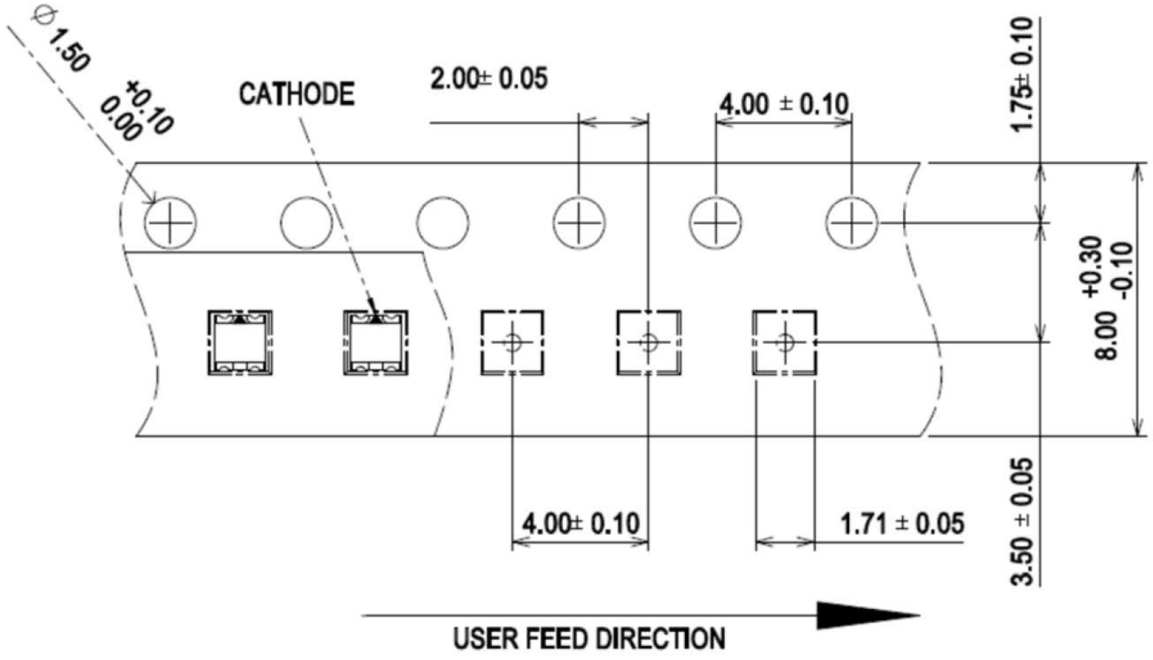


Figure 9: Recommended Soldering Land Pattern



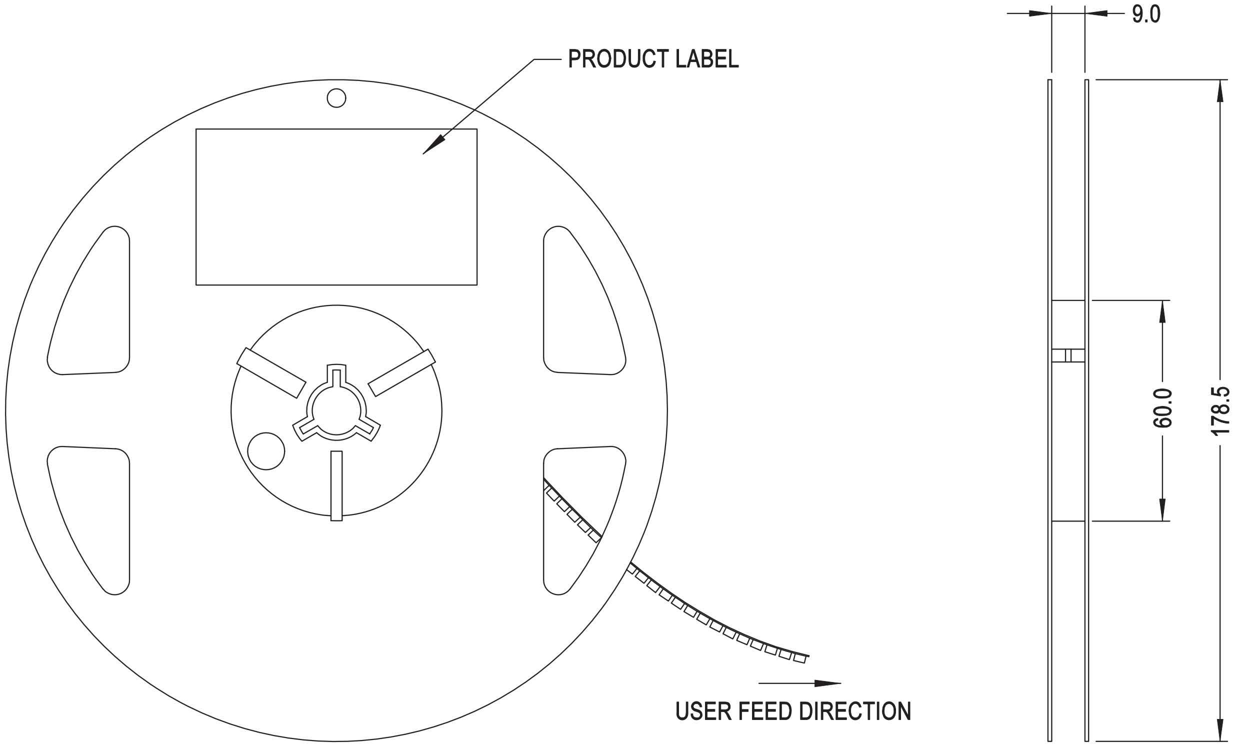
Tolerance is ±0.10 mm unless otherwise specified.
Units: millimeters.

Figure 10: Carrier Tape Dimensions



NOTE: Units in millimeters.

Figure 11: Reel Dimensions



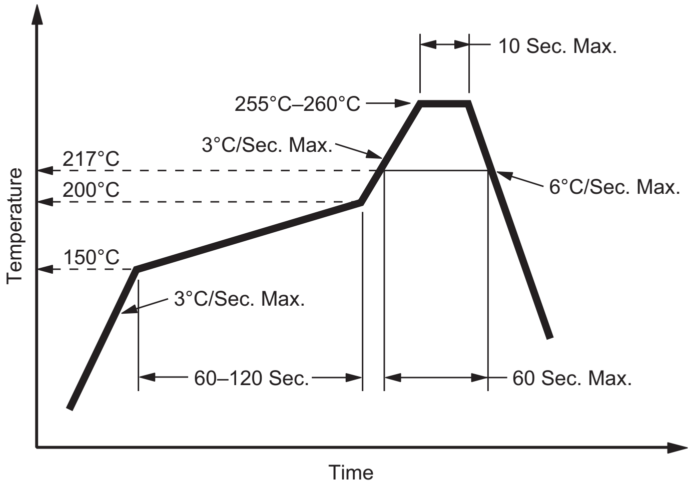
NOTE: Units in millimeters.

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.

Figure 12: Recommended Lead-Free Reflow Soldering Profile



Handling of Moisture Sensitive Device

This product has a Moisture Sensitive Level 4 rating per JEDEC J-STD-020. Refer to Broadcom 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.
  - Do not open the MBB prior to assembly (for example, for IQC). If unavoidable, 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 of MBB.
  - Keep the LEDs at <30°/60%RH at all times, and complete all high temperature-related processes, including soldering, curing or rework within 72 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 72 hours.
- Baking is required if:
  - The HIC indicator 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 72 hours.

  The recommended baking condition is: 60°C ±5°C for 20 hrs. Baking can 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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Lead (Pb) Free
RoHS Compliant