Data Sheet

HSM9-C192

Top View Infrared Emitter

Overview

The Broadcom® HSM9-C192 is a is a top-view, surface-mount IR chipLED that comes in an industrial-standard footprint of 1.6 x 0.8 mm. This part has a low package height of 0.68 mm. Its small form factor allows for flexible board design, and the IR chipLED can be closely mounted. This feature offers maximum-miniaturization benefits to the user, especially in portable devices where space is a constraint.

This IR chipLED has a wide viewing angle and is available in a 940-nm peak wavelength. This product is suitable for applications such as remote control in home appliances, smart utility meter, light curtains in industrial automation, and so on. It is compatible with industry-standard automatic machine placement and reflow soldering.

Features

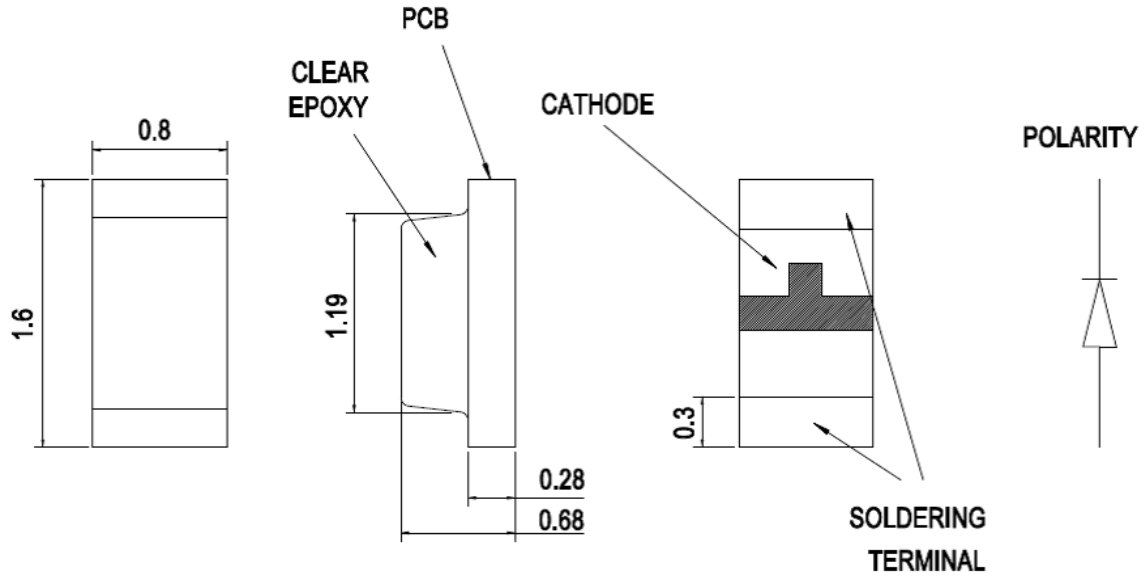
- SMD LED
- Compatible with reflow soldering
- Available in 8-mm tape and 7-in. diameter reel

Applications

- Infrared emitter

CAUTION! This LED is Class 1A ESD sensitive per ANSI/ESDA/JEDEC JS-001. Please observe appropriate precautions during handling and processing. Refer to application note AN-1142 for additional details.

Package Dimensions



NOTE:

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

Absolute Maximum Rating

Parameters	Value	Unit
DC Forward Current[a]	70	mA
Peak Forward Current[b]	350	mA
Power Dissipation	104	mW
LED Junction Temperature	100	°C
Operating Temperature Range	–25 to +85	°C
Storage Temperature Range	–40 to +85	°C

a. Derate linearly as shown in Figure 5.

b. Frequency = 100 Hz, duty factor = 1%, Ts = 25°C.

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

Parameters	Min.	Typ.	Max.	Unit
Radiant Intensity, I_e [a]	0.45	0.80	—	mW/sr
Peak Wavelength, λp	—	940	—	nm
Viewing Angle, $2\theta_{1/2}$ [b]	—	140	—	°
Forward Voltage, V_F [c]	—	1.2	1.6	V
Reverse Current, I_R = 5V [d]	—	—	10	µA

a. t_p = 20 ms

b. Viewing angle is the off axis angle where the radiant intensity is half of the peak intensity.

c. Forward voltage tolerance = ±0.1V.

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

Figure 1: Spectral Power Distribution

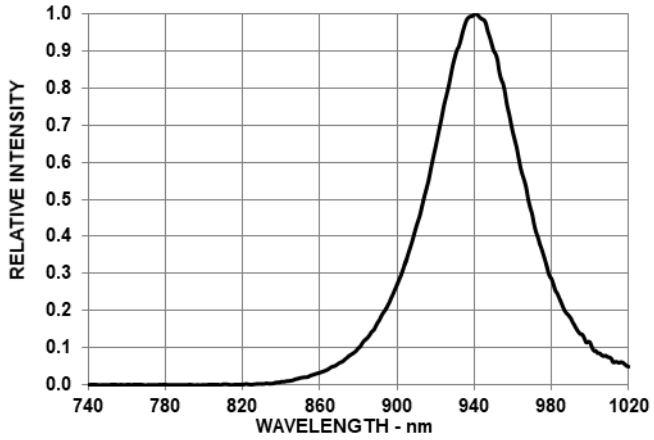


Figure 2: Forward Current versus Forward Voltage

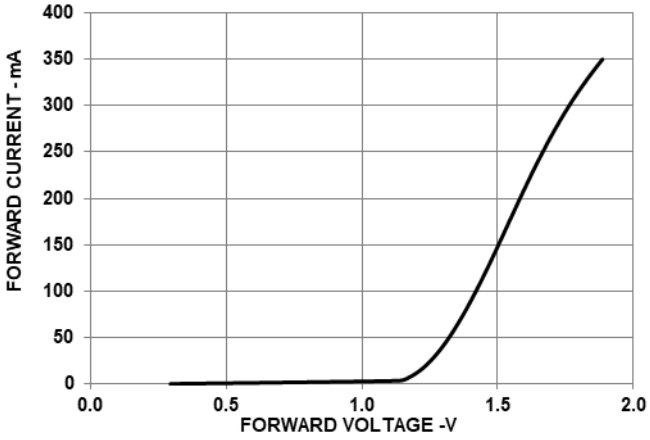


Figure 3: Relative Radiant Intensity versus Forward Current

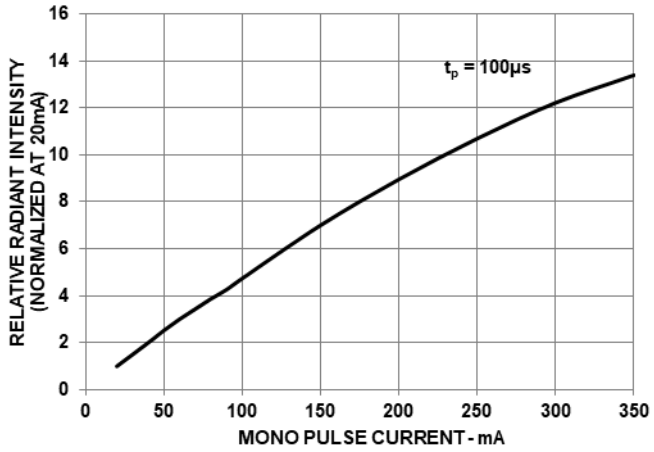


Figure 4: Radiation Pattern

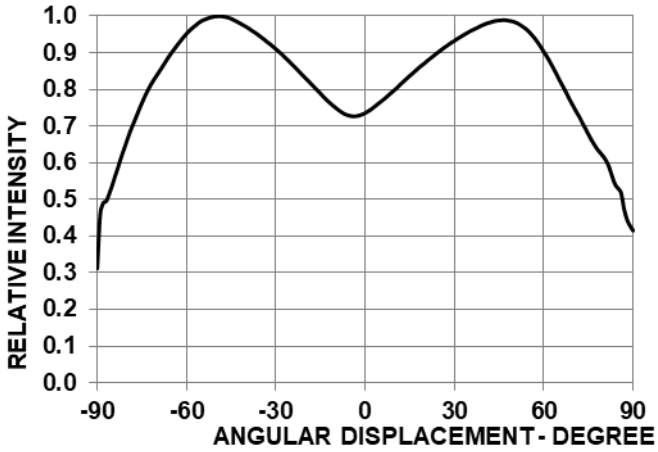


Figure 5: Derating Curve

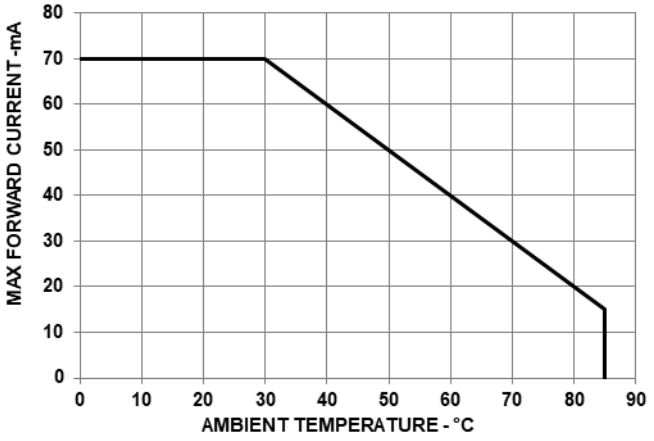
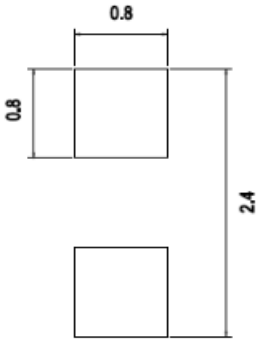


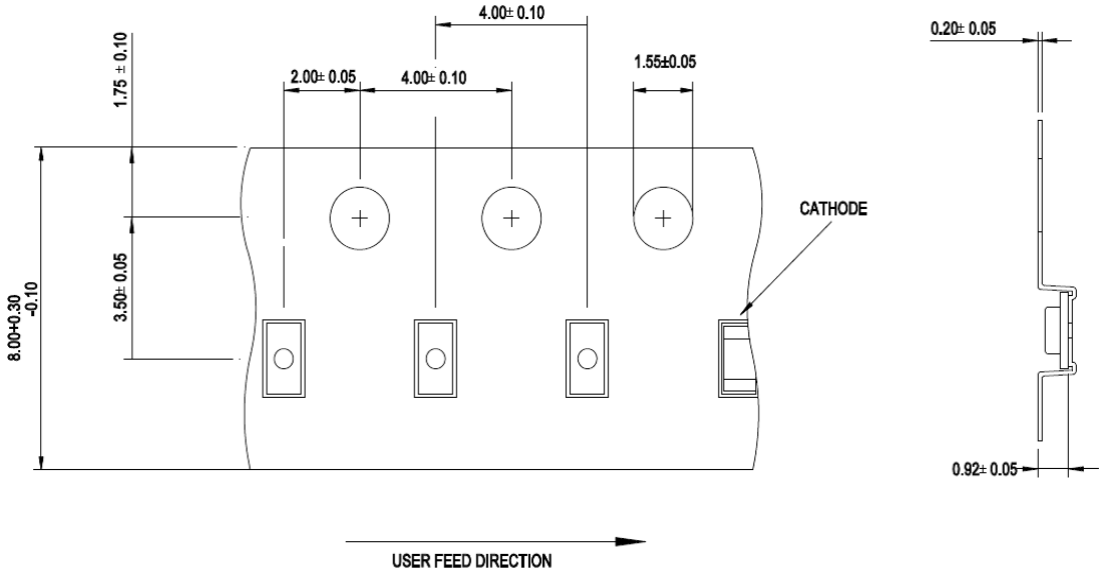
Figure 6: Recommended Soldering Land Pattern



NOTE:

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

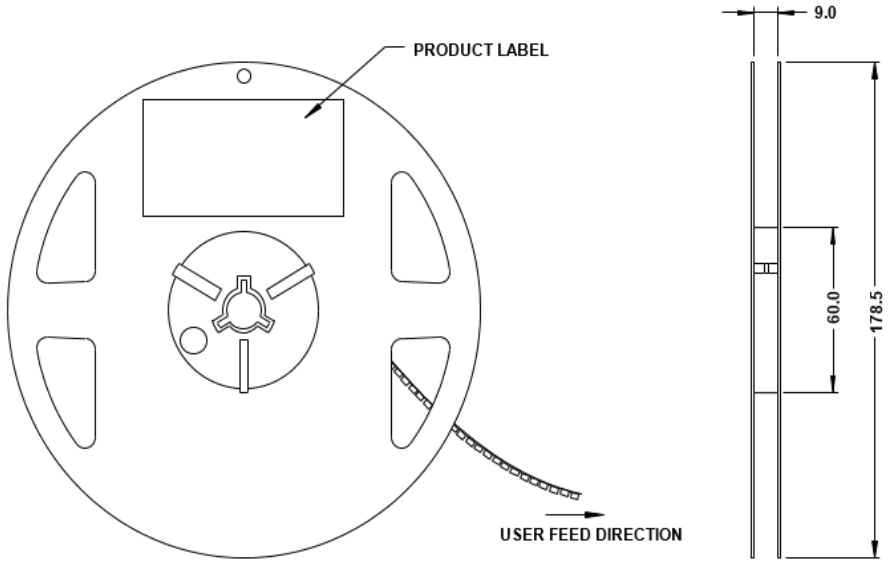
Figure 7: Carrier Tape Dimensions



NOTE:

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

Figure 8: Reel Dimensions



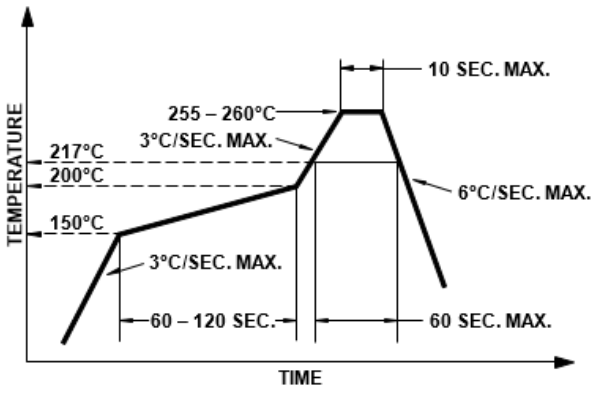
NOTE: All dimensions are in mm.

Precautionary Notes

Soldering

- Do not perform reflow soldering more than twice. Observe necessary precautions of handling moisture-sensitive device 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, as it may cause damage to the LED.
- Confirm beforehand whether the functionality and performance of the LED is affected by hand soldering.

Figure 9: Recommended Lead-Free Reflow Soldering Profile



Handling Precautions

This product has a Moisture Sensitive Level 3 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 168 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 168 hours.

Baking is required if the following conditions exist:

- 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 168 hours.

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

  Baking can only be done once.

Storage:

The soldering terminals of these Broadcom LEDs are silver plated. If the LEDs are exposed in ambient environment for too long, the silver plating might be oxidized, thus affecting its solderability performance. As such, keep unused LEDs in a sealed MBB with desiccant or in a desiccator at <5% RH.

Application Precautions

- The drive current of the LED must not exceed the maximum-allowable limit across temperature as stated in the data sheet. Constant current driving is recommended to ensure consistent performance.
- Circuit design must cater to the whole 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 may 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.
- The LED is not intended for reverse bias. Use other appropriate components for such purposes. When driving the LED in matrix form, ensure that 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 for use in harsh or outdoor environments, protect the LED against damage caused by rain water, water, 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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