

HSD6-C170

Top-View Surface-Mount Photodiode

Description

The Broadcom[®] HSD6-C170 is a top-view photodiode that is available in the industry-standard 2.0 mm x 1.3 mm footprint. This robust and high-quality photodiode is versatile and easy to use.

It has a wide spectral range of sensitivity of 300 nm to 1000 nm with peak sensitivity at 690 nm. Coupled with its fast response time, this product is an ideal solution for a variety of applications in consumer and industrial segments, such as ambient light sensing in wearables and home appliances. It is also suitably used in diagnostics applications involving color change in medical devices and test kits.

This product comes with an angle of half sensitivity of ± 70 degrees and is built with clear epoxy. It is compatible with industry-standard automatic machine placement and IR reflow soldering.

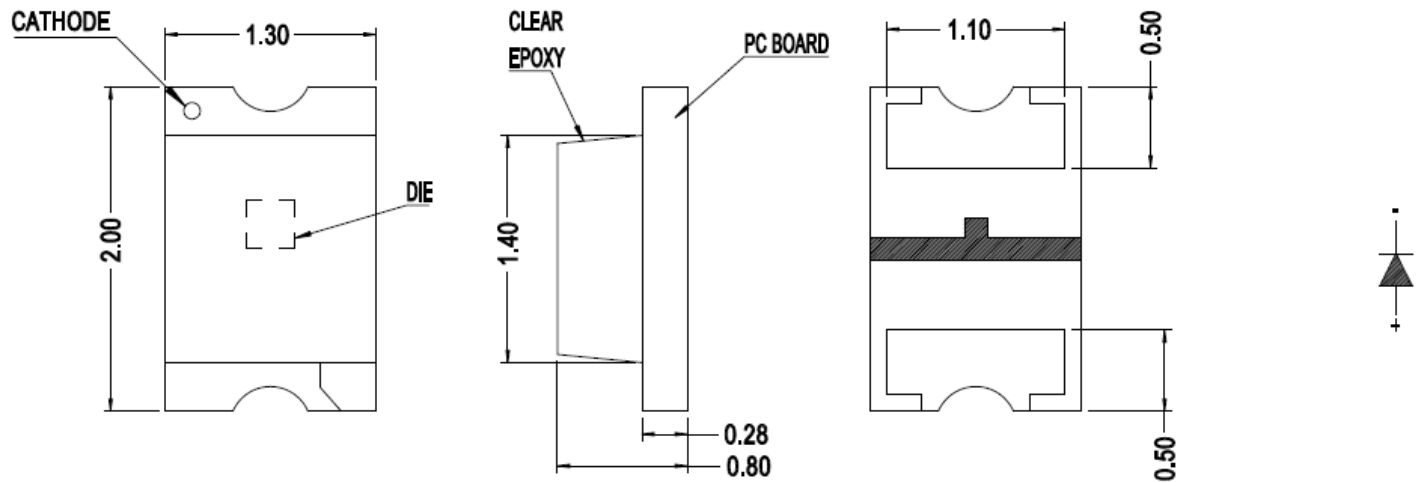
Features

- Photodiode in 0805 footprint
- Clear epoxy
- Wide spectral range of sensitivity of 300 nm to 1000 nm
- Peak sensitivity at 690 nm
- Angle of half sensitivity of ± 70 degrees

Applications

- Home appliances
- Ambient light sensing
- Wearables

Figure 1: Package Drawing

**NOTE:**

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

Absolute Maximum Ratings

Parameter	Rating	Unit
Reverse Voltage	30	V
Power Dissipation	150	mW
Operating Temperature Range	-40 to +85	°C
Storage Temperature Range	-40 to +100	°C

Optical and Electrical Characteristics ($T_A = 25^\circ\text{C}$)

Parameter	Symbol	Value			Unit	Test Condition
		Min.	Typ.	Max.		
Reverse Light Current	I_{ra}	0.4	0.6	—	μA	$E_V = 1000 \text{ lux}$, $\text{CCT} = 6500\text{K}$, $V_R = 5\text{V}$
Wavelength of Peak Sensitivity	$\lambda_{S \text{ max}}$	—	690	—	nm	—
Spectral Range of Sensitivity	$\lambda_{0.1}$	320	—	1000	nm	—
Angle of Half Sensitivity	φ	—	± 70	—	°	—
Reverse Dark Current	I_{ro}	—	—	10	nA	$V_R = 10\text{V}$, $E_V = 0 \text{ lux}$
Open Circuit Voltage	V_{OC}	—	370	—	mV	$E_V = 1000 \text{ lux}$
Short Circuit Current	I_{SC}	—	0.4	—	μA	$E_V = 1000 \text{ lux}$
Forward Voltage	V_F	—	1	—	V	$I_F = 100 \text{ mA}$
Diode Capacitance	C_o	—	23	—	pF	$V_R = 0\text{V}$, $E_V = 0 \text{ lux}$, $f = 1 \text{ MHz}$

Figure 2: Relative Sensitivity vs. Wavelength

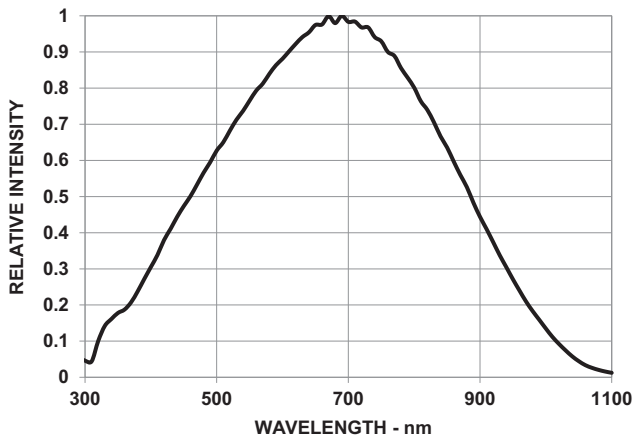


Figure 3: Relative Sensitivity vs. Angular Displacement

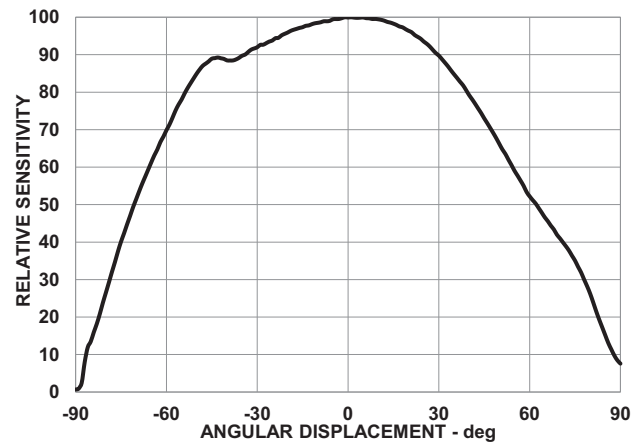


Figure 4: Reverse Dark Current vs. Reverse Voltage ($E_v = 0lx$)

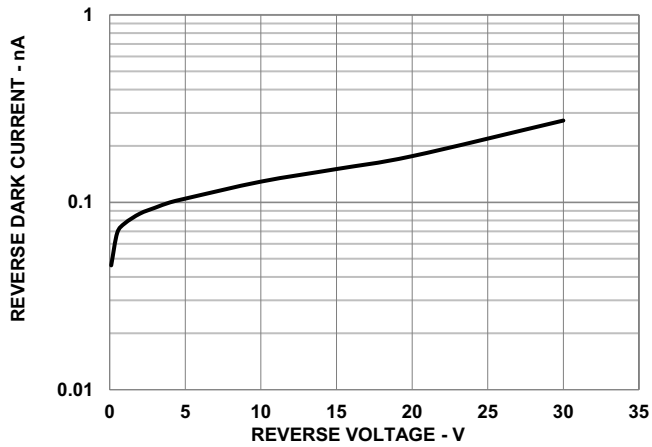


Figure 5: Diode Capacitance vs. Reverse Voltage ($E_v = 0lx, f = 1MHz$)

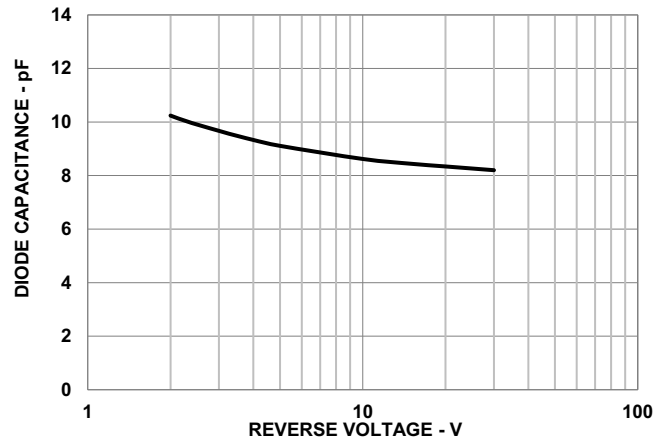


Figure 6: Reverse Light Current vs. Illuminance ($V_R = 5V, CCT = 6500K$)

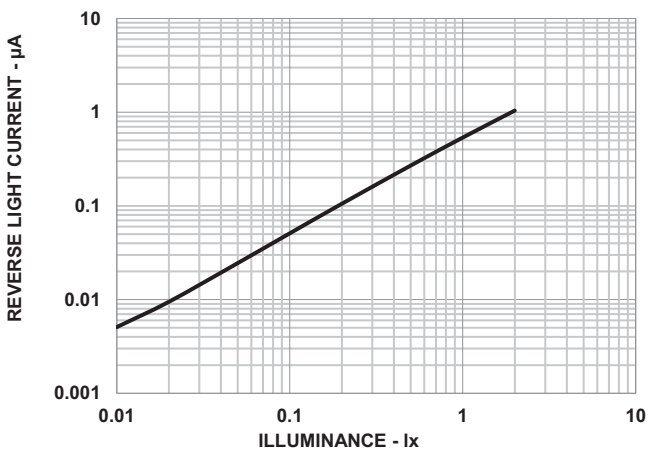


Figure 7: Reverse Dark Current vs. Ambient Temperature ($V_R = 10V, E_v = 0lx$)

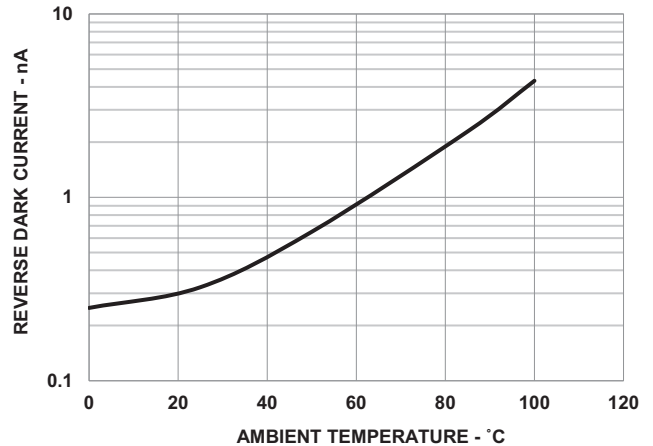


Figure 8: Recommended Soldering Land Pattern

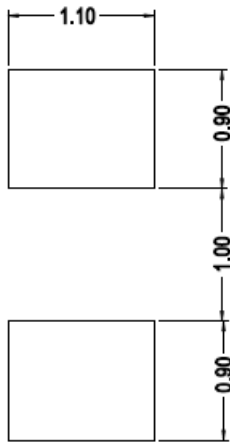
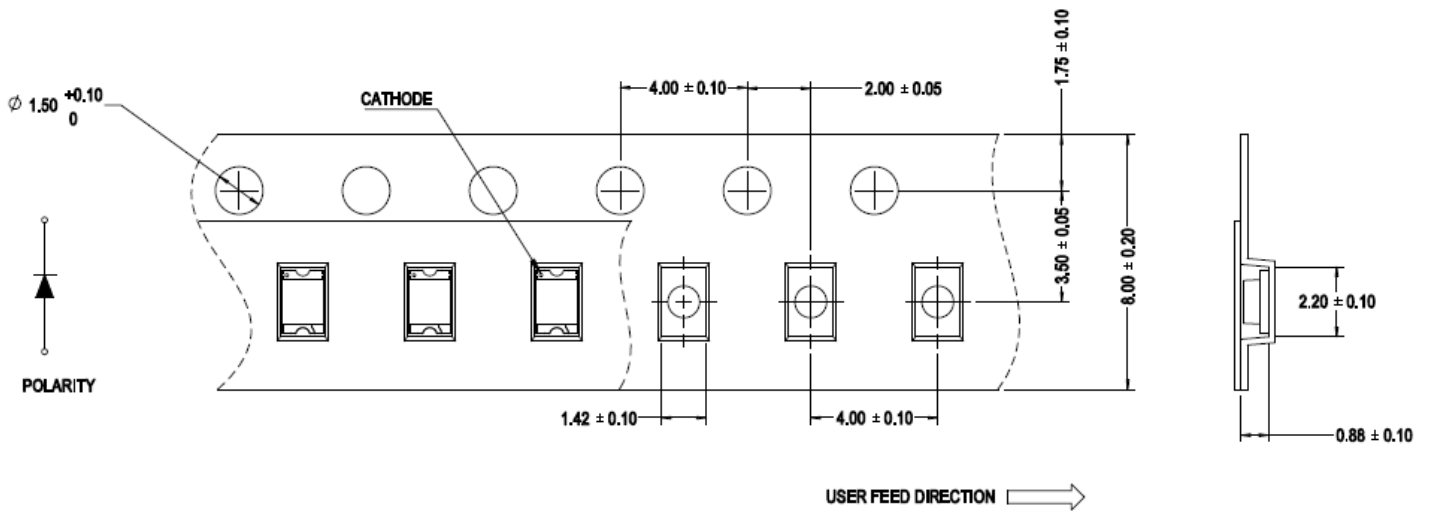
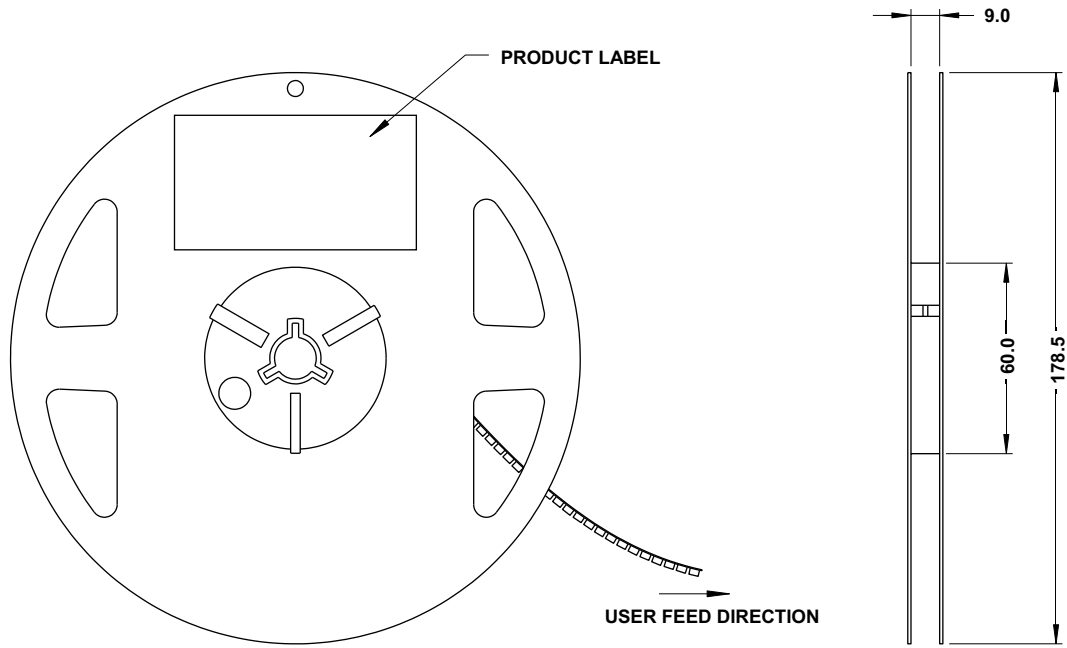


Figure 9: Carrier Tape Dimensions



NOTE: All dimensions in are millimeters (mm).

Figure 10: Reel Dimensions



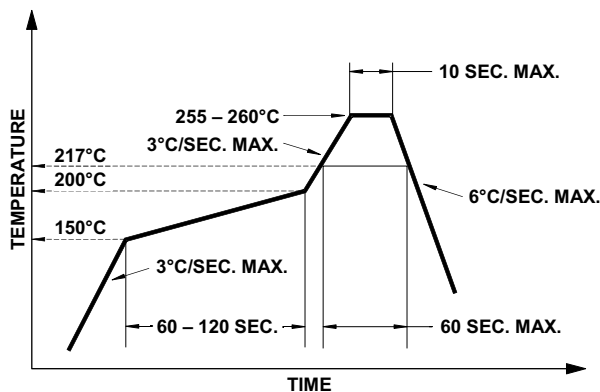
NOTE: All dimensions are in millimeters (mm).

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 package during reflow and after reflow when the package is still hot.
- Use reflow soldering to solder the package. 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 package body with the soldering iron except for the soldering terminals, as it may cause damage to the package.
- Confirm beforehand whether the functionality and performance of the package is affected by soldering with hand soldering.

Figure 11: 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 package 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 package in a sealed MBB with desiccant or a desiccator at <5% RH.
- Control of assembled boards:

If the PCB soldered with the package 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 have not exceeded their floor life of 168 hours.
- Baking is required if:
 - The HIC indicator indicates a change in color for 10% and 5%, as stated on the HIC.
 - The package is exposed to conditions of >30°C/60% RH at any time.
 - The package's floor life exceeded 168 hours.

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

Baking can only be done once.

Application Precautions

- If the package is intended to be used in a harsh or an outdoor environment, protect the package against damages caused by rain water, water, dust, oil, corrosive gases, external mechanical stresses, and so on.

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