

HLPD-B0D0-00000

Silicon PIN Photodiode

Description

The Broadcom[®] HLPD-B0D0-00000 is a robust and efficient infrared photodiode in an industry-standard 5-mm through-hole lamp.

This product comes with black epoxy, which filters off undesired visible light.

The product is available with an angle of half sensitivity of ± 10 degrees. It has a wide spectral range of sensitivity of 750 nm to 1100 nm; and coupled with its fast response time, this product is an ideal solution for a variety of applications in consumer and industrial segments, such as office automation, light curtains, and smoke detectors.

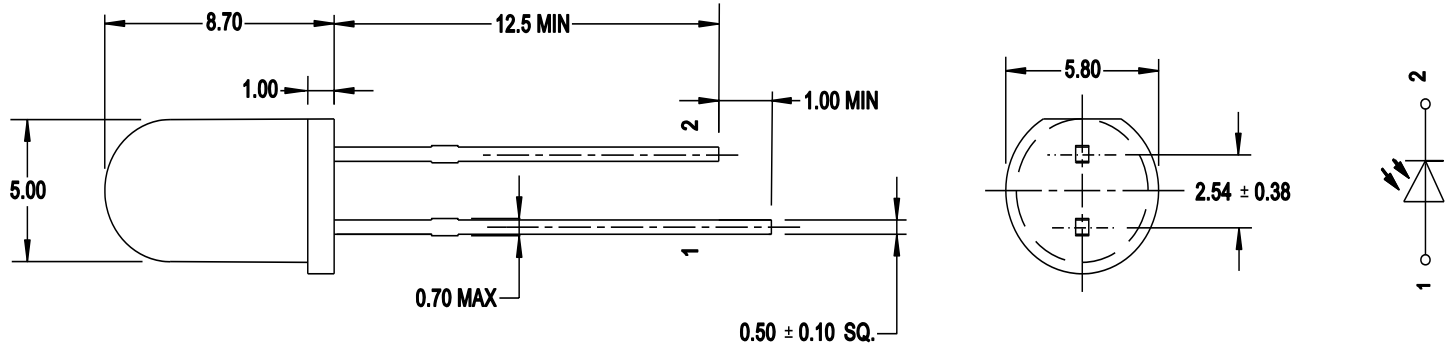
Features

- 5-mm radial package
- Black epoxy package
- High photosensitivity
- Angle of half sensitivity of ± 10 degrees

Applications

- Office automation
- Light curtains
- Smoke detectors

Figure 1: Package Drawing

**NOTE:**

1. All dimensions are in millimeters (mm).
2. The tolerance is ± 0.25 mm unless otherwise specified.
3. Lead spacing is measured at the location where the leads emerge from the body.
4. The epoxy meniscus may extend up to a maximum of 1.00 mm down the leads.

Device Selection Guide ($T_J = 25^\circ\text{C}$)

| Part Number | Reverse Light Current, I_{ra} (μA) | | Test Conditions |
|-----------------|---|------|--|
| | Min. | Typ. | |
| HLPD-B0D0-00000 | 65 | 90 | $E_e = 1 \text{ mW/cm}^2$, $\lambda = 940 \text{ nm}$, $V_R = 5\text{V}$ |

Absolute Maximum Ratings

| Parameter | Rating | Unit |
|-----------------------------|-------------|------------------|
| Reverse Voltage | 20 | V |
| Power Dissipation | 150 | mW |
| Operating Temperature Range | -40 to +85 | $^\circ\text{C}$ |
| Storage Temperature Range | -40 to +100 | $^\circ\text{C}$ |

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

| Parameter | Symbol | Min. | Typ. | Max. | Units | Test Conditions |
|-------------------------------------|---------------------------|------|----------|------|----------------------------|--|
| Wavelength of Peak Sensitivity | $\lambda_{S \text{ max}}$ | — | 960 | — | nm | — |
| Spectral Range of Sensitivity | λ | 750 | — | 1100 | nm | — |
| Angle of Half Sensitivity | φ | — | ± 10 | — | $^\circ$ | — |
| Reverse Dark Current | I_{ro} | — | 1 | 30 | nA | $V_R = 10\text{V}$, $E_e = 0 \text{ mW/cm}^2$ |
| Open Circuit Voltage | V_{OC} | — | 419 | — | mV | $E_e = 1 \text{ mW/cm}^2$, $\lambda = 940 \text{ nm}$ |
| Short Circuit Current | I_{SC} | — | 74 | — | μA | $E_e = 1 \text{ mW/cm}^2$, $\lambda = 940 \text{ nm}$ |
| Temperature Coefficient of V_{OC} | TC_{VOC} | — | -2.33 | — | $\text{mV}/^\circ\text{C}$ | $E_e = 1 \text{ mW/cm}^2$, $\lambda = 940 \text{ nm}$ |
| Temperature Coefficient of I_{SC} | TC_{ISC} | — | -0.52 | — | $\%/^\circ\text{C}$ | $E_e = 1 \text{ mW/cm}^2$, $\lambda = 940 \text{ nm}$ |
| Forward Voltage | V_F | — | 0.77 | — | V | $I_F = 10 \text{ mA}$ |
| Diode Capacitance | C_O | — | 6.0 | — | pF | $V_R = 0\text{V}$, $f = 1 \text{ MHz}$, $E_e = 0 \text{ mW/cm}^2$ |

Figure 2: Relative Sensitivity vs. Wavelength

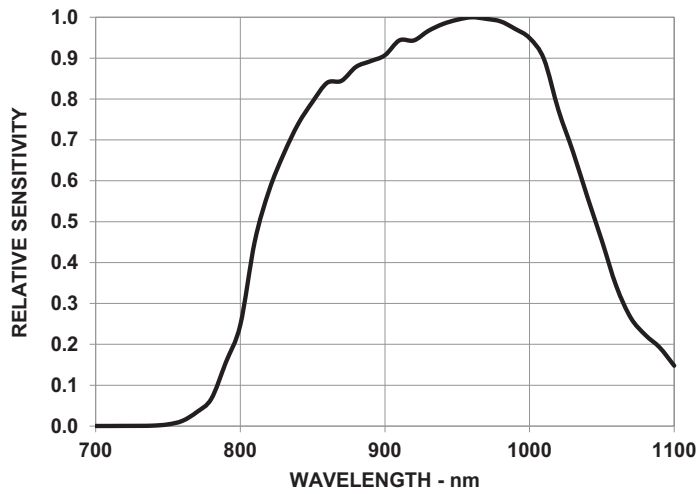


Figure 3: Relative Sensitivity vs. Angular Displacement

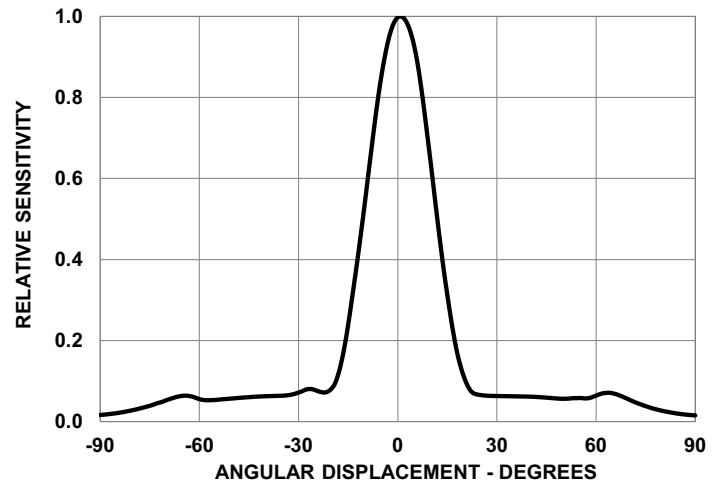


Figure 4: Reverse Light Current vs. Irradiance

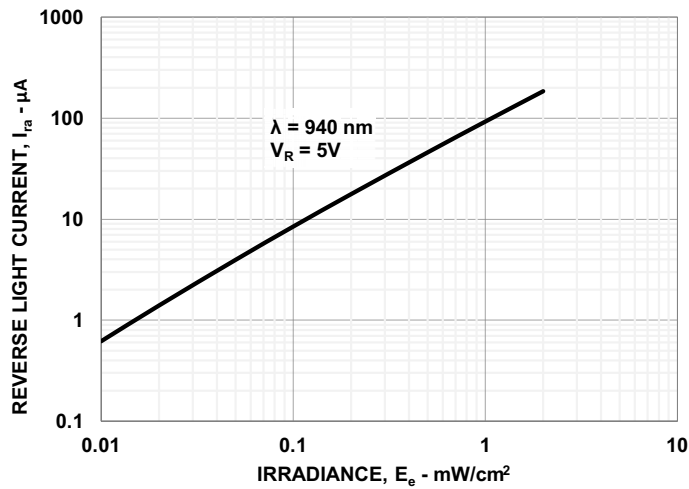


Figure 5: Reverse Dark Current vs. Reverse Voltage

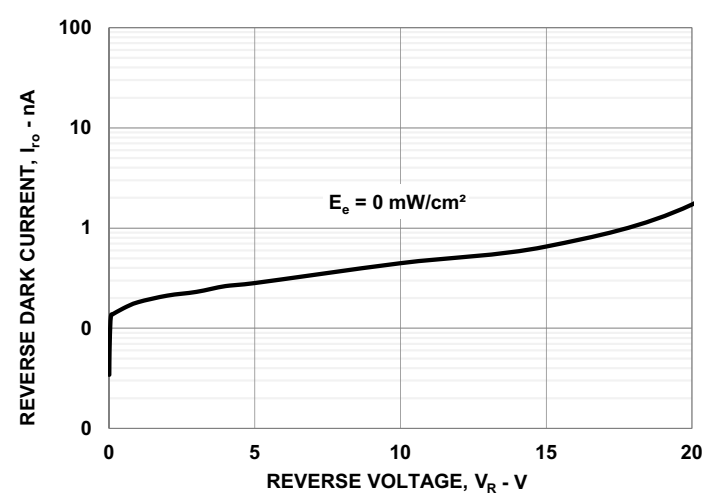


Figure 6: Reverse Dark Current vs. Ambient Temperature

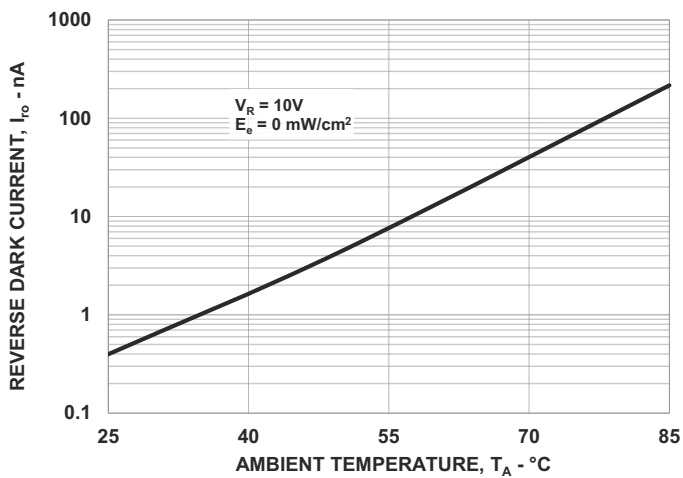


Figure 7: Relative Reverse Light Current vs. Ambient Temperature

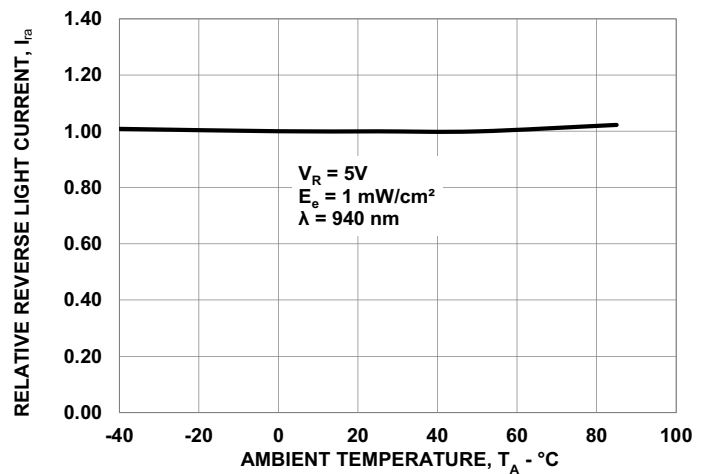
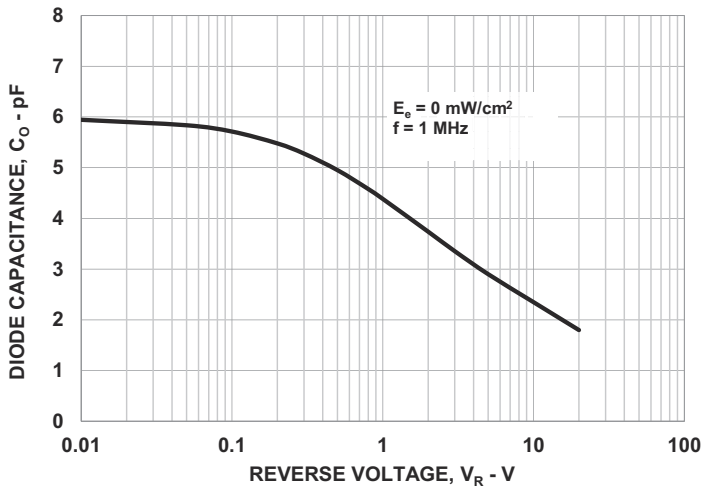


Figure 8: Diode Capacitance vs. Reverse Voltage



Precautionary Notes

Soldering and Handling Precautions

- Set and maintain the wave soldering parameters according to the recommended temperature and dwell time. Perform a daily check on the profile to ensure that it always conforms to the recommended conditions. Exceeding these conditions will overstress the package and cause premature failures.
- Use only bottom preheaters to reduce the thermal stress experienced by the package.
- Recalibrate the soldering profile before loading a new type of PCB. PCBs with different sizes and designs (component density) will have a different heat capacity and might cause a change in temperature experienced by the PCB if the same wave soldering setting is used.
- Do not perform wave soldering more than once.
- Any alignment fixture used during wave soldering must be loosely fitted and must not apply stress on the package. Use a nonmetal material because it will absorb less heat during the wave soldering process.
- At elevated temperatures, the package is more susceptible to mechanical stress. Allow the package to sufficiently cool to room temperature before handling. Do not apply stress to the package when it is hot.
- Use wave soldering to solder the package. Use hand soldering only for rework or touch-up if unavoidable, but it must be strictly controlled to following conditions:
 - Soldering iron tip temperature = 315°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 because it might cause damage to the package.
- Confirm beforehand whether the functionality and performance of the package are affected by hand soldering.
- Keep the heat source at least 1.6 mm away from the package body during soldering.
- Design the appropriate hole size to avoid problems during insertion or clinching (for auto-insertable devices).

Figure 9: Recommended PCB Through-Hole Size

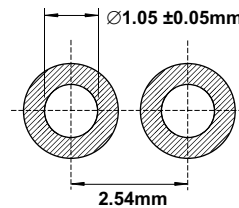
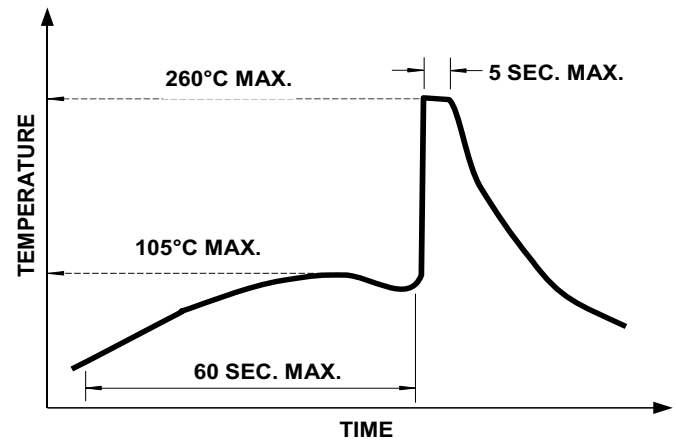


Figure 10: Recommended Wave Soldering Profile



NOTE: Refers to measurements with a thermocouple mounted at the bottom of the PCB.

Lead Forming

- To pre-form or cut the leads prior to insertion and soldering onto PCB, use the proper tool instead of doing it manually.
- Do not bend the leads at the location less than 3 mm from the package body.
- Do not use the base of the package body as a fulcrum for lead bending. Secure the leads properly before bending.
- If manual lead cutting is unavoidable, cut the leads after soldering to reduce stress to the package body.

Application Precautions

- Avoid rapid changes in the ambient temperature, especially in high-humidity environments, because they cause condensation on the package.
- If the package is intended to be used in a harsh or 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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Lead (Pb) Free
RoHS Compliant