Data Sheet

HR5P-N1CB-00000

5-mm Round Infrared LED Lamp

Description

The Broadcom® HR5P-N1CB-00000 is a 5-mm round infrared LED lamp. It is available in an industrial-standard 5-mm through lamp, making it easy to use and assemble. This product is capable of withstanding a peak current of 1000 mA, offering greater design flexibility to the user. It has an 850-nm peak wavelength and a viewing angle of 30 degrees. This makes the HR5P-N1CB-00000 suitable for a variety of applications, such as smart meters and remote controls.

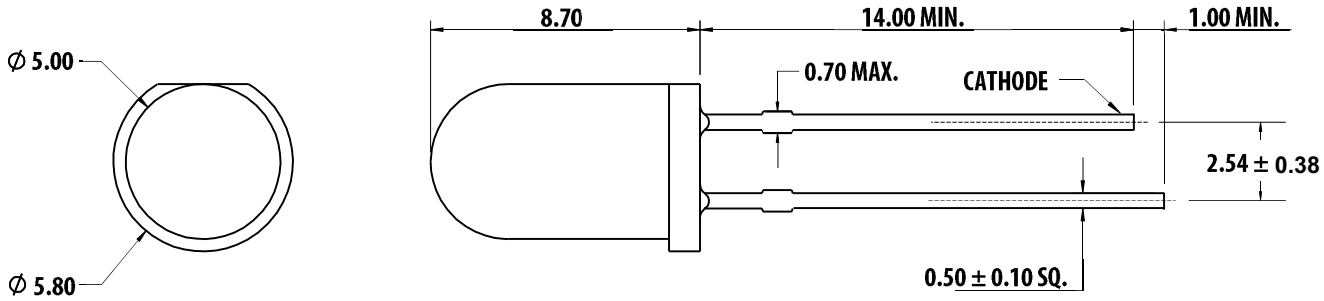
Features

- Untinted, non-diffused
- Low power consumption
- Easy assembly

Applications

- Illumination for surveillance cameras

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 where the leads emerge from the body.
4. The epoxy meniscus can extend up to maximum 1.00 mm down the leads.

Device Selection Guide (T_J = 25°C, I_F = 100 mA)

Part Number	Die Type	Radiant Intensity, I_e (mW/sr)[a, b, c]			Viewing Angle, $2\theta_{½}$ (°)[d]
		Min.	Typ.	Max.	Typ.
HR5P-N1CB-00000	AlGaAs	80	150	200	30

a. The radiant intensity is measured at the mechanical axis of the package with a single-current pulse condition (t_p = 20 ms).

b. The optical axis is closely aligned with the mechanical axis of the package.

c. The tolerance is ±15%.

d. $\theta_{½}$ is the off-axis angle where the radiant intensity is half of the peak intensity.

Absolute Maximum Ratings

Parameters	Rating	Unit
DC Forward Current[a]	100	mA
Peak Forward Current[b, c]	1000	mA
Power Dissipation	195	mW
LED Junction Temperature	100	°C
Operating Temperature Range	–40 to +85	°C
Storage Temperature Range	–40 to +100	°C

a. Derate linearly as shown in Figure 4.

b. Duty factor = 1%, t_p = 100 µs.

c. Pin temperature, T_p = 25°C.

Optical and Electrical Characteristics (T_J = 25°C, I_F = 100 mA)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Radiant Flux[a]	Φ_e	—	68	—	mW	I_F =100 mA, t_p = 20 ms
Peak Wavelength	λ_{PEAK}	—	850	—	nm	I_F =100 mA, t_p = 20 ms
Temperature Coefficient of Brightness	TC_{Ie}	—	–0.25	—	%/°C	I_F = 100 mA
Temperature Coefficient of λ_p	$TC_{\lambda p}$	—	0.27	—	nm/°C	I_F = 100 mA
Spectral Line Half-Width	$\Delta\lambda_{1/2}$	—	38	—	nm	I_F = 100 mA, t_p = 20 ms
Junction Capacitance	C_J	—	28	—	pF	V_R = 0, f = 1 MHz
Forward Voltage[b]	V_F	1.30	1.70	1.95	V	I_F = 100 mA
Temperature Coefficient of V_F	TC_{VF}	—	–1.3	—	mV/°C	I_F = 100 mA
Reverse Voltage[c]	V_R	5	—	—	V	I_R = 10 µA
Rise Time	t_r	—	15	—	ns	I_F = 100 mA
Fall Time	t_f	—	15	—	ns	I_F = 100 mA
Cut-Off Frequency	f_c	—	23	—	MHz	I_{DC} = 70 mA, I_{AC} = 30 mA pp
Thermal Resistance	$R\theta_{J-P}$	—	180	—	°C/W	LED junction to pin

a. The radiant flux, Φ_e, is the total flux output as measured with an integrating sphere at a single-current pulse condition (t_p = 20 ms).

b. The forward voltage tolerance is ±0.1V.

c. Indicates the product final test condition. Long-term reverse bias is not recommended.

Figure 2: Relative Radiant Intensity vs. Mono Pulse Current

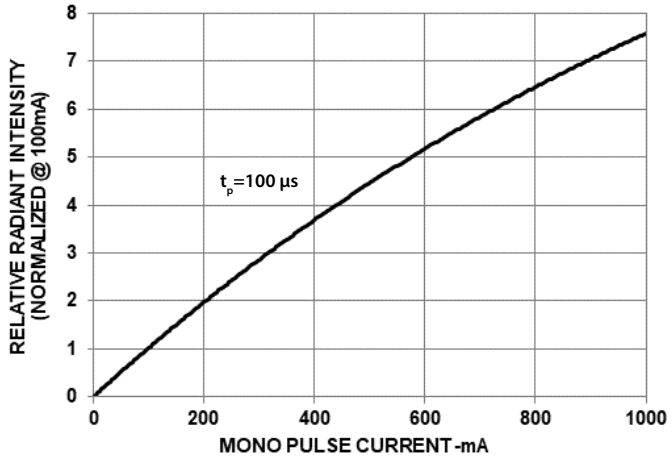


Figure 3: Forward Current vs. Forward Voltage

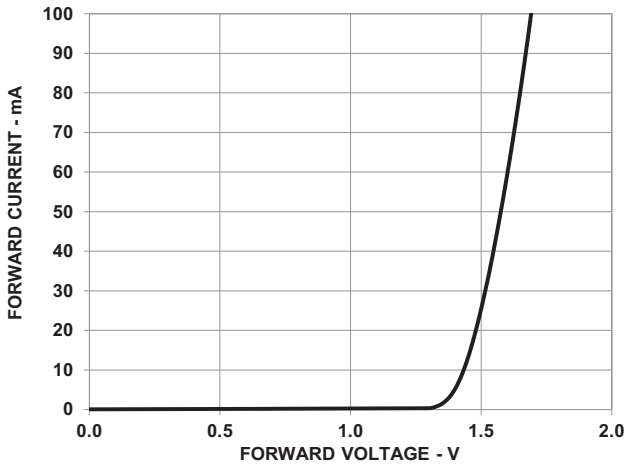


Figure 4: Maximum Forward Current vs. Ambient Temperature

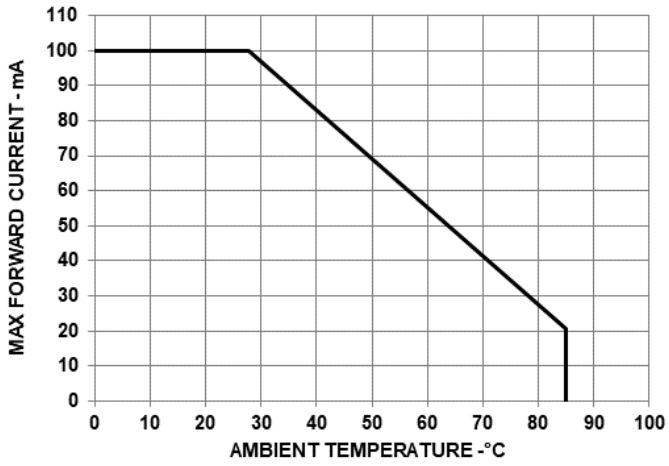


Figure 5: Radiation Pattern

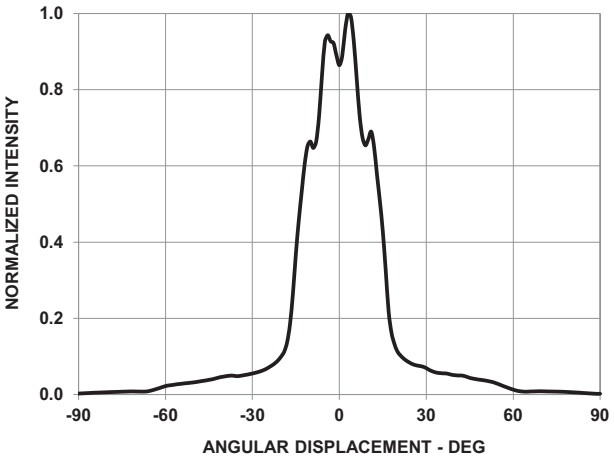


Figure 6: Spectral Distribution

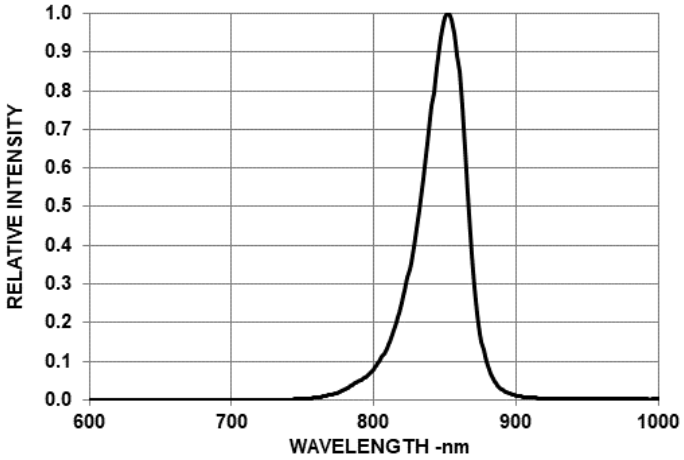
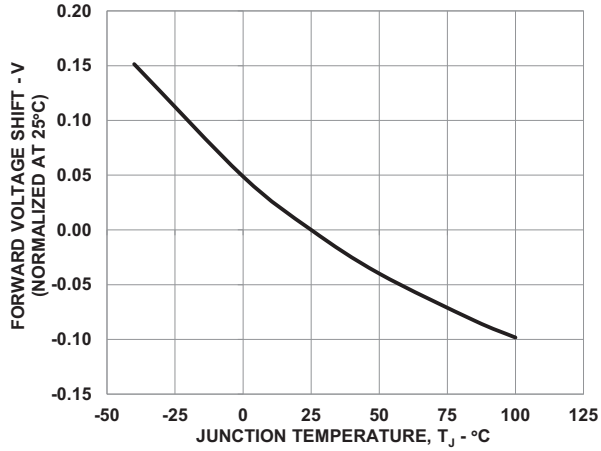


Figure 7: Forward Voltage Shift vs. Junction Temperature



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 LEDs and cause premature failures.
- Use only bottom preheaters to reduce the thermal stress experienced by the LEDs.
- 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 the 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 LEDs. Use a non-metal material because it will absorb less heat during the wave soldering process.
- At elevated temperatures, the LEDs are more susceptible to mechanical stress. Allow the PCB to sufficiently cool to room temperature before handling. Do not apply stress to the LED when it is hot.
- Use wave soldering to solder the LED. 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
- For ESD-sensitive devices, apply the proper ESD precautions at the soldering station. Use an ESD-safe soldering iron only.
- Do not touch the LED package body with the soldering iron except for the soldering terminals because it can cause damage to the LED.
- Confirm beforehand whether the functionality and performance of the LED are affected by soldering with hand soldering.
- Keep the heat source at least 1.6 mm away from the LED body during soldering.
- Design the appropriate hole size to avoid problems during insertion or clinching (for auto-insertable devices).

Figure 8: Recommended PCB Through-Hole Size

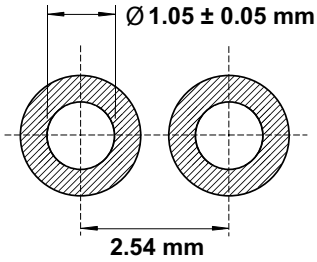
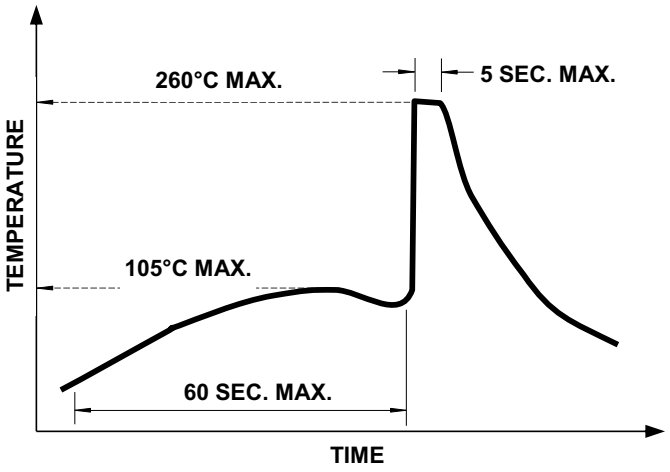


Figure 9: Recommended Wave Soldering Profile



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

Refer to Application Note 5334 for more information on the soldering and handling of the TH LED lamp.

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 LED body.
- Do not use the base of the LED 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 LED body.

Application Precautions

- The drive current of the LED must not exceed the maximum allowable limit across temperatures as stated in the data sheet. Use constant current driving to ensure consistent performance.
- The circuit design must cater to the whole range of the forward voltage (V_F) of the LEDs to ensure that the intended drive current can always be achieved.
- The LED exhibits slightly different characteristics at different drive currents, which can result in a larger variation in 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 the reverse bias voltage does not exceed the allowable limit of the LED.
- Avoid rapid changes in the ambient temperature, especially in high-humidity environments, because they cause condensation on the LED.
- If the LED is intended to be used in harsh or outdoor environments, protect the LED against damages caused by rain water, water, dust, oil, corrosive gases, external mechanical stresses, and so on.

Eye Safety Precautions

LEDs can 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.

Disclaimer

Broadcom's products and software are not specifically designed, manufactured, or authorized for sale as parts, components, or assemblies for the planning, construction, maintenance, or direct operation of a nuclear facility or for use in medical devices or applications. The customer is solely responsible, and waives all rights to make claims against Broadcom or its suppliers, for all loss, damage, expense, or liability in connection with such use.

Copyright © 2019–2026 Broadcom. All Rights Reserved. The term "Broadcom" refers to Broadcom Inc. and/or its subsidiaries. For more information, go to www.broadcom.com. All trademarks, trade names, service marks, and logos referenced herein belong to their respective companies.

Broadcom reserves the right to make changes without further notice to any products or data herein to improve reliability, function, or design. Information furnished by Broadcom is believed to be accurate and reliable. However, Broadcom does not assume any liability arising out of the application or use of this information, nor the application or use of any product or circuit described herein, neither does it convey any license under its patent rights nor the rights of others.

BROADCOM®

Lead (Pb) Free
RoHS Compliant