

HST9-B120

Side-View Surface-Mount Phototransistor

Overview

The Broadcom® HST9-B120 is a side-emitting surface-mount IR ChipLED available in an industry-popular package footprint of 1.6 mm × 0.93 mm. This robust and high-quality infrared phototransistor is versatile and easy to use.

The HST9-B120 device comes with black epoxy that cuts off visible light and thus reduces unwanted noise from the visible light range. The superior package design makes this product ideal for a wide variety of applications in consumer and industrial segments.

It has a wide spectral range of sensitivity of 830 nm to 1100 nm with peak sensitivity at 1000 nm.

To facilitate easy pick-and-place assembly, the phototransistor is packed in tape and reel. It is compatible with industry-standard automatic machine placement and IR reflow soldering.

Features

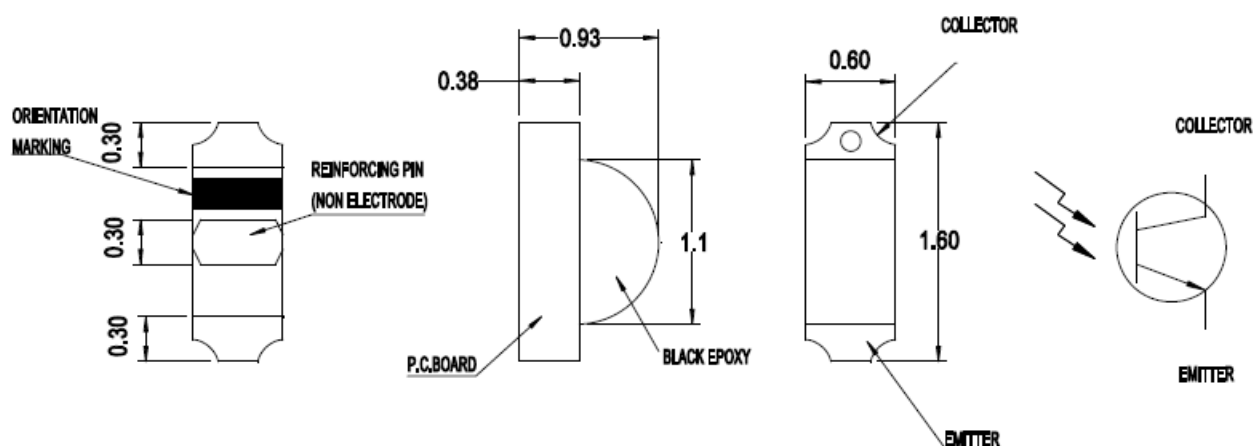
- Silicon NPN phototransistor
- Right angle
- Black epoxy package
- Wide spectral range of sensitivity of 830 nm to 1100 nm
- Angle of half sensitivity ± 70 degrees

Applications

- Industrial automation
- Office automation
- Home appliances
- Consumer electronics

CAUTION! This package is ESD sensitive per ANSI/ESDA/JEDEC JS-001. Observe appropriate precautions during handling and processing. Refer to Application Note 1142 for additional details.

Figure 1: Package Dimensions

**NOTE:**

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

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CE}	30	V
Emitter-Collector Voltage	V_{CE}	5	V
Collector Current	I_C	20	mA
Power Dissipation	P_d	100	mW
Operating Temperature Range		-40 to +85	°C
Storage Temperature Range		-40 to +85	°C

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

Parameter	Symbol	Value			Unit	Test Condition
		Min.	Typ.	Max.		
Collector Light Current	I_{ca}	0.3	0.8	—	mA	$E_e = 1 \text{ mW/cm}^2$, $\lambda = 940 \text{ nm}$, $V_{CE} = 5 \text{ V}$
Spectral Range of Sensitivity	$\lambda_{0.1}$	830	—	1100	nm	
Wavelength of Peak Sensitivity	λ_{max}	—	1000	—	nm	
Dark Current	I_{CEO}	—	—	100	nA	$E_e = 0 \text{ mW/cm}^2$, $V_{CE} = 10 \text{ V}$
Collector-Emitter Saturation Voltage	V_{CEsat}	—	—	0.4	V	$E_e = 1 \text{ mW/cm}^2$, $\lambda = 940 \text{ nm}$, $I_{ca} = 0 \text{ mA}$
Angle of Half Sensitivity	ϕ	—	± 70	—	°	

Figure 2: Relative Sensitivity vs. Wavelength

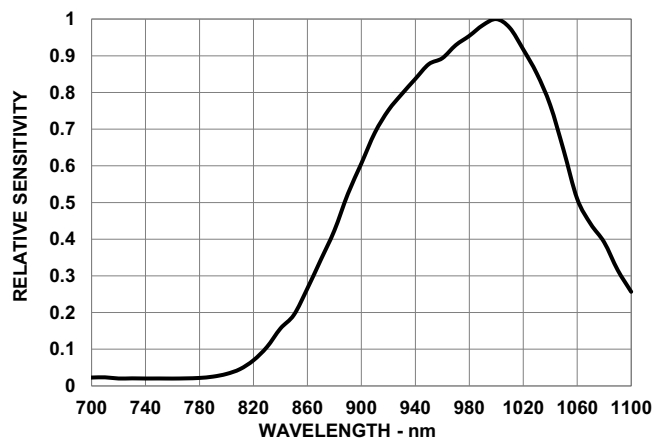


Figure 3: Relative Sensitivity vs. Angular Displacement

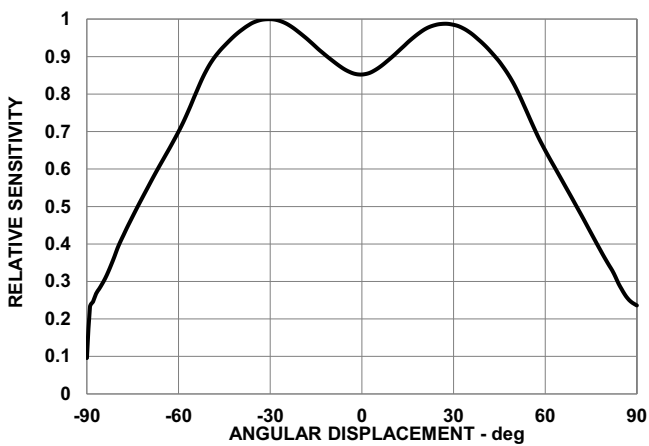


Figure 4: Collector Current vs. Irradiance ($V_{CE} = 5V$, $\lambda = 940\text{ nm}$)

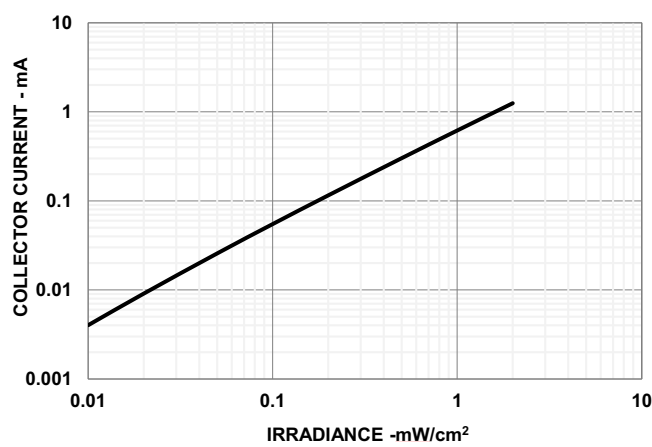


Figure 5: Collector Current vs. Collector Emitter Voltage

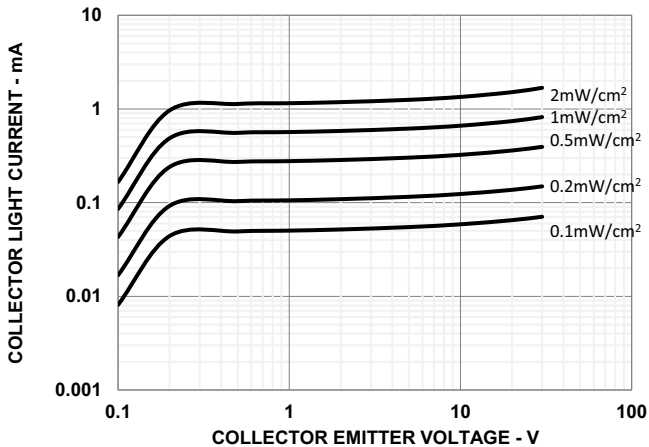


Figure 6: Dark Current vs. Ambient Temperature

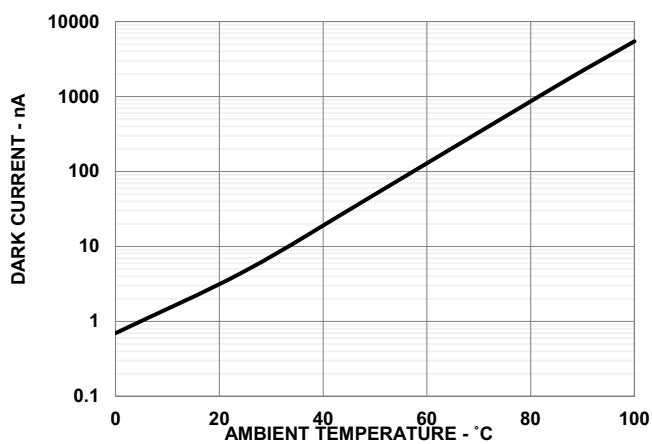


Figure 7: Relative Light Current vs. Ambient Temperature ($V_{CE} = 5V$, $E_e = 1\text{ mW/cm}^2$, $\lambda = 940\text{ nm}$)

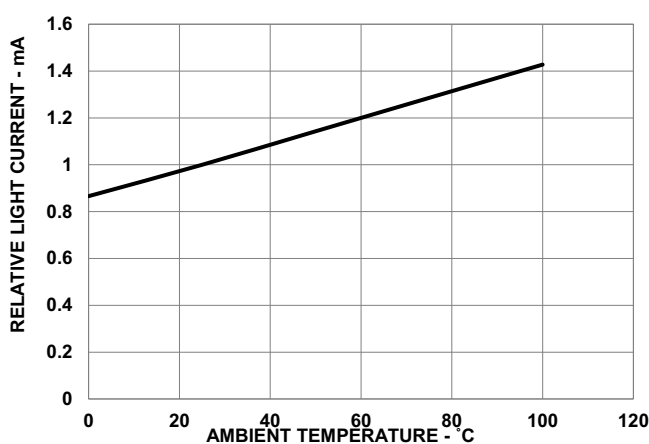


Figure 8: Recommended Soldering Land Pattern

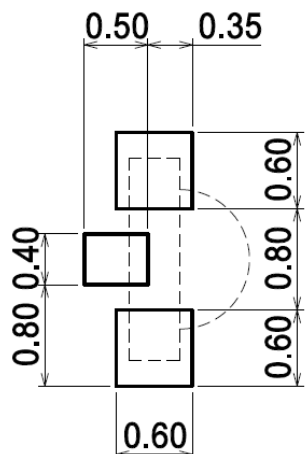
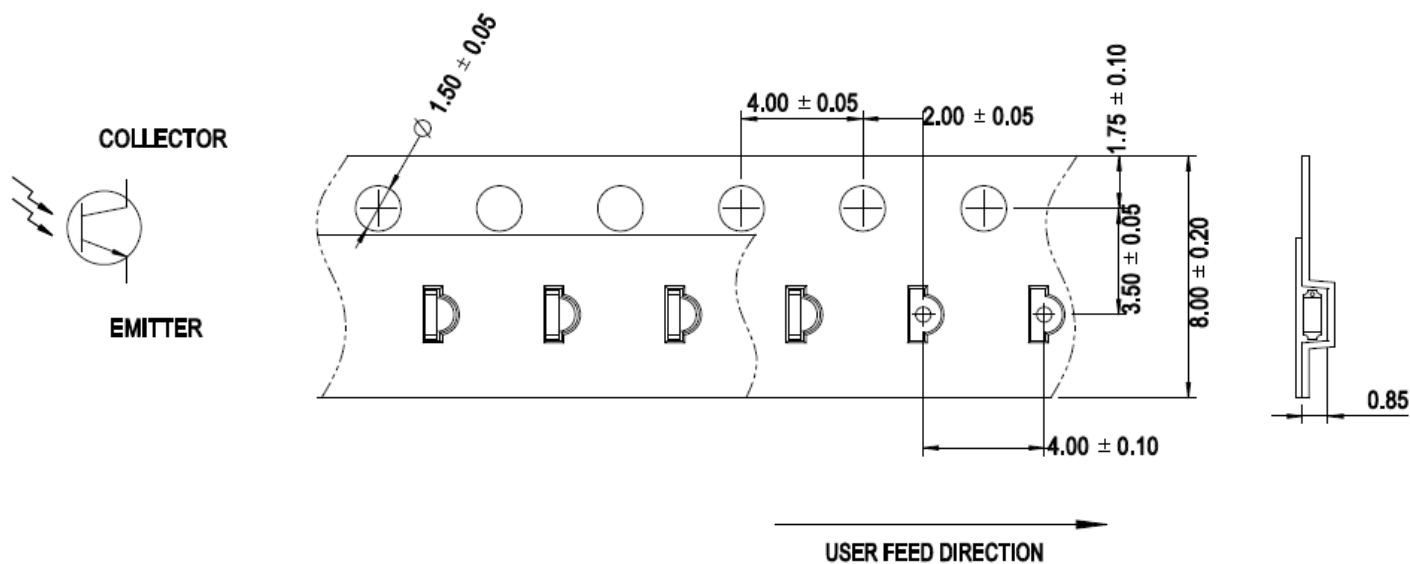
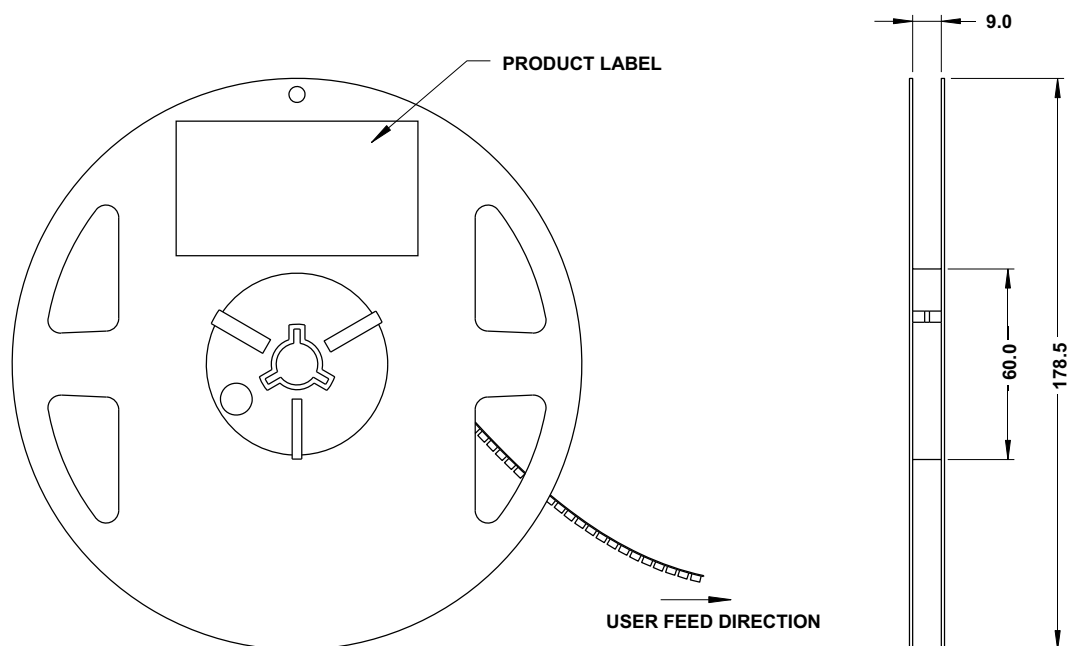


Figure 9: Carrier Tape Dimensions

**NOTE:**

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

Figure 10: Reel Dimensions

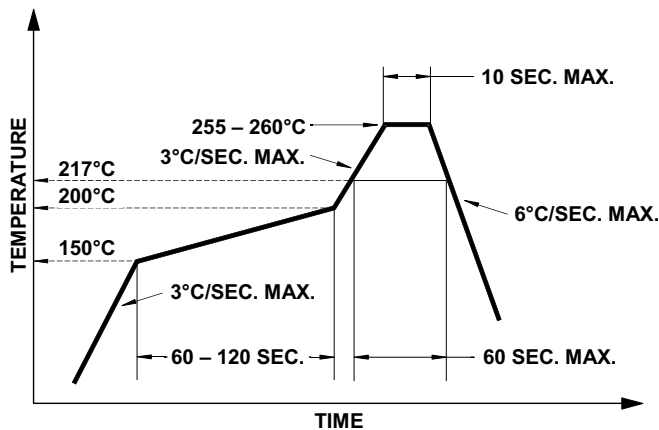
NOTE: All dimensions in millimeters (mm).

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 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 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 5305, *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 packages 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 packages 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 packages in a sealed MBB with desiccant or a desiccator at <5%RH.
- Control of assembled boards:

If the PCB soldered with the packages 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 packages have not exceeded their floor life of 168 hours.
- Baking is required if any of these 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 ± 5°C for 20 hours.

Baking can only be done once.

Application Precautions

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

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Lead (Pb) Free
RoHS Compliant

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