HBL9007

LED Shunt

The HBL9007 is an electronic shunt which provides a current bypass in the case of a single LED going into open circuit. LEDs are by nature quite fragile when subjected to transients and surge conditions. There are also many cases where high reliability of the LED lighting must be maintained, such as in headlights, lighthouses, bridges, aircraft, runways and so forth. In these cases the low cost addition of the HBL9007 will provide full assurance that an entire string of LEDs will not extinguish should one LED fail. HBL9007 is also applicable to other loads where circuit continuity is required. This device is designed to be used with 1 W LEDs (nominally 350 mA @ 3 V).

Features

- A Simple Two Terminal Device
- Automatically Resets Itself if the LED Heals Itself or is Replaced
- ON−State Voltage Typically 1 V
- OFF−State Current less than 250 μA
- This is a Pb−Free Device

Typical Applications

- LEDs where Preventive Maintenance is Non Practical
- LED Headlights
- LEDs with High Reliability Requirements
- Crowbar Protection for Open Circuit Conditions
- Overvoltage Protection for Sensitive Circuits

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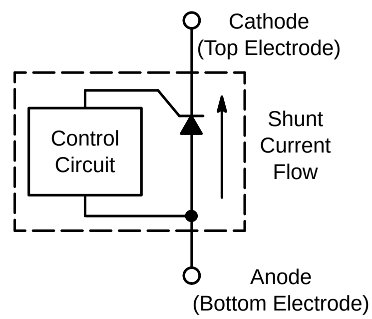

PIN FUNCTION DESCRIPTION

Pin	Description
Bottom	Positive Input Voltage to the Device
Top	Negative Input Voltage to the Device

ORDERING INFORMATION

Device	Package	Shipping†
HBL9007RP	Die Form (Pb−Free)	Metal Frame

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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Publication Order Number:
HBL9007/D

MAXIMUM RATINGS (Maximum ratings are those, that, if exceeded, may cause damage to the device. Electrical Characteristics are not guaranteed over this range)

Rating	Symbol	Value	Unit
Peak Repetitive Off State Voltage (Anode to Cathode)	V_{DM}	−0.3 to 10	V
Average On−State Current, (T_A = 25°C), (Note 1) (Note 2)	$I_{T(AVG)}$	 1.3 0.376	A
Operating Temperature Range	T_J	−40 to 150	°C
Non−Operating Temperature Range (Maximum)	T_J	150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Die in PowerMite package and mounted onto a 1“ x 1” square copper pad.
   Normally this device would be mounted on the same copper heat sink and adjacent to the LED. If the LED were to go open, then the HBL9007 shunt would now dissipate the power using the same copper heat sink. Since the HBL9007 has a voltage that is nominally 30% of the LED, then the power dissipation would be easily handled by the same heat sink as the LED.
2. Die in PowerMite package and mounted on minimum copper pad.

ELECTRICAL CHARACTERISTICS (Unless otherwise noted: T_A = 25°C)

Characteristics	Symbol	Min	Typ	Max	Unit
Off−State Current (V_{Anode} = 5 V)	I_{LEAK}	−	100	250	μA
Breakdown Voltage (I_{BR} = 1 mA)	$V_{(BR)}$	5.5	−	7.5	V
Holding Current (V_{Anode} = 10 V, $I_{initial}$ = 100 mA)	I_H	−	6.0	12	mA
Latching Current (V_{Anode} = 10 V)	I_L	−	35	70	mA
On−State Voltage (I_T = 0.350 A) (I_T = 0.750 A) (I_T = 1.0 A)	V_T	− − −	1.0 1.0 1.0	1.2 − −	V
DYNAMIC CHARACTERISTICS					
Critical Rate−of−Rise of Off State Voltage (V_{pk} = Rated $V_{(BR)}$, T_J = 125°C, Exponential Method)	dV/dt	250	−	−	V/μs

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL PERFORMANCE CURVES

(T_A = 25°C unless otherwise noted)

(**Note:** These curves were characterized in PowerMite® package)

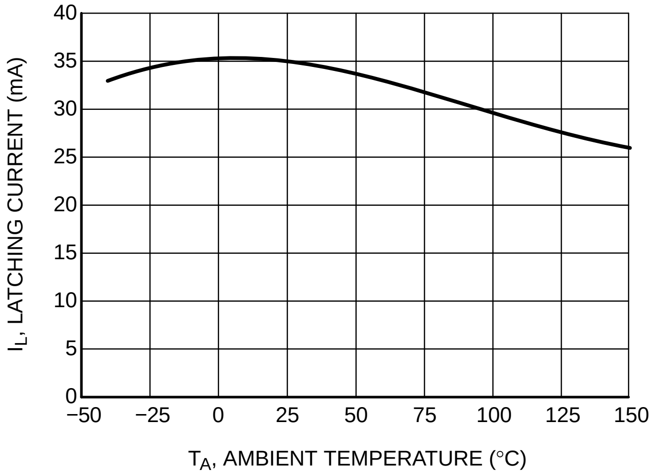

Figure 1. Latching Current vs Temperature

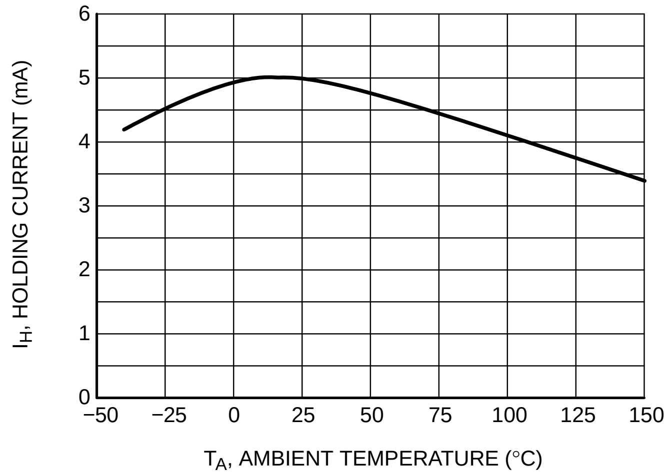

Figure 2. Holding Current vs Temperature

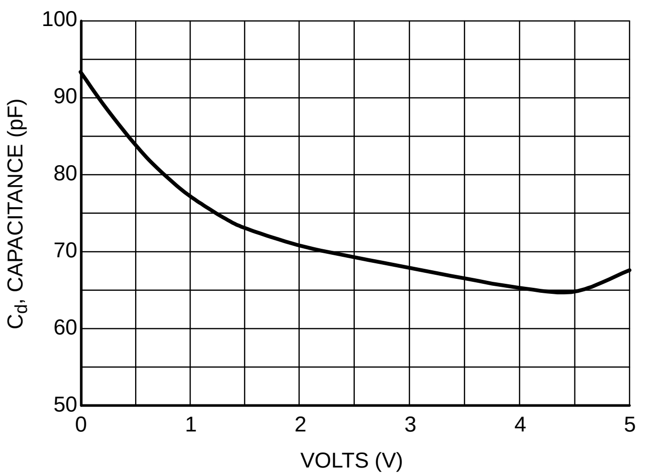

Figure 3. Capacitance vs Voltage

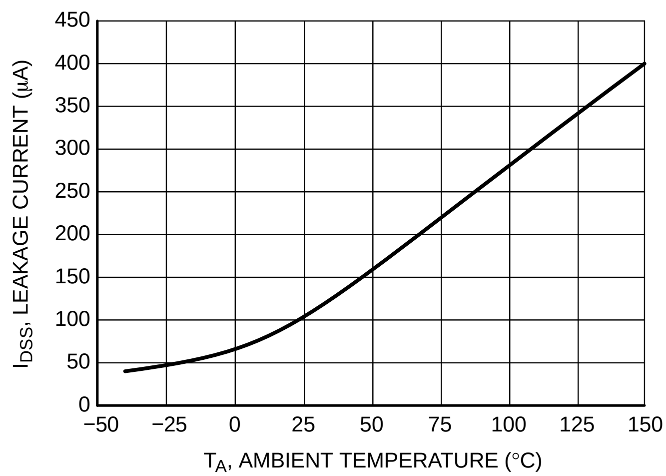

Figure 4. Leakage Current vs Temperature

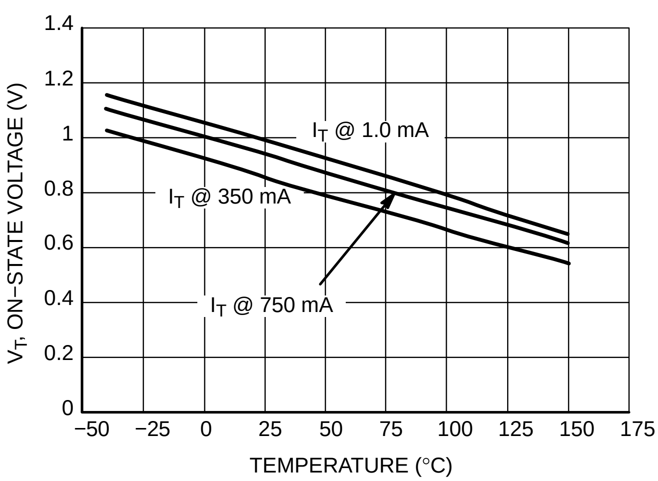

Figure 5. On−State Voltage vs. Temperature

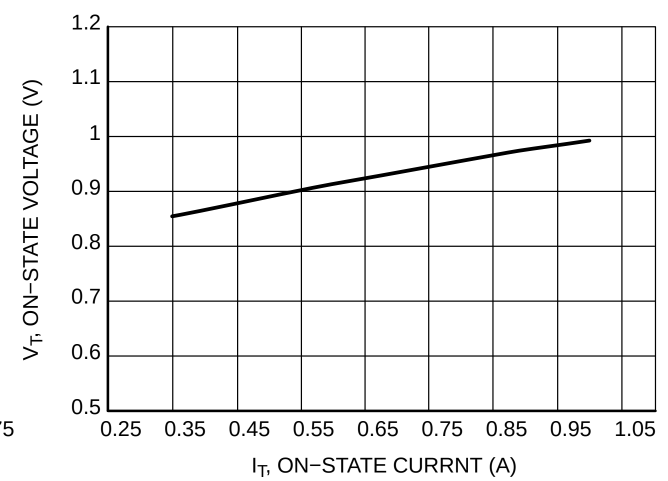

Figure 6. On−State Voltage vs. On−State Current (I_T) at 25°C

TYPICAL APPLICATION CIRCUIT

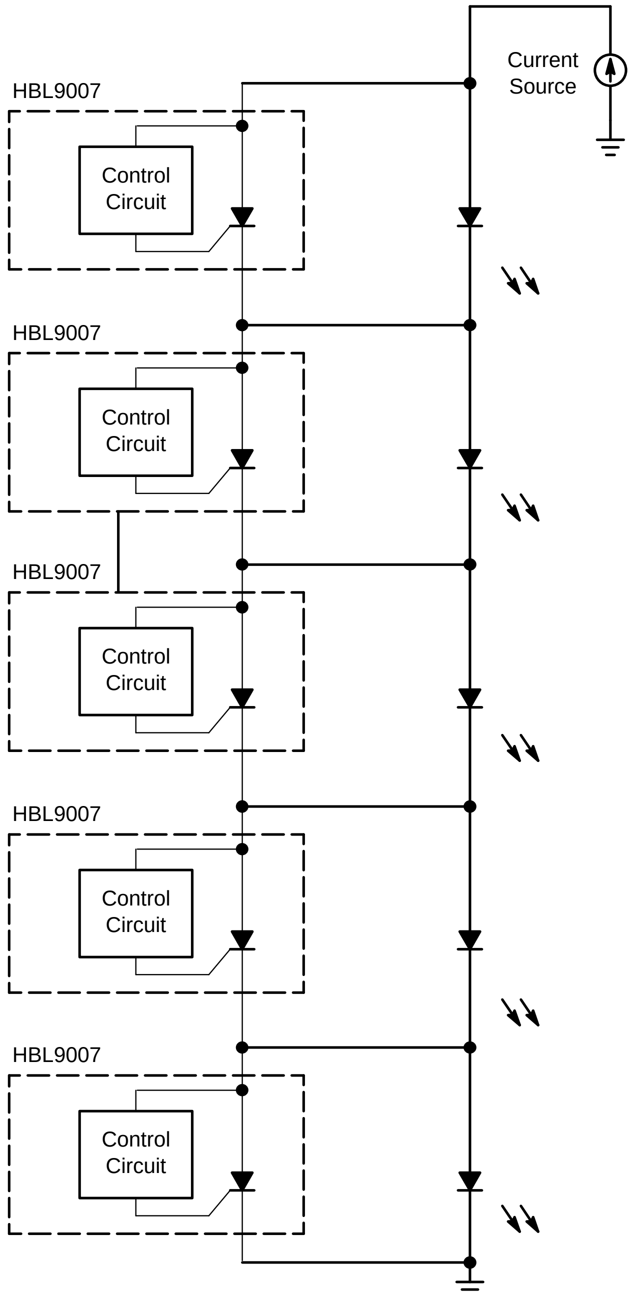

Figure 7. Typical Application Circuit

TYPICAL OPERATION WAVEFORMS

(**Note:** Characterized in PowerMite package)

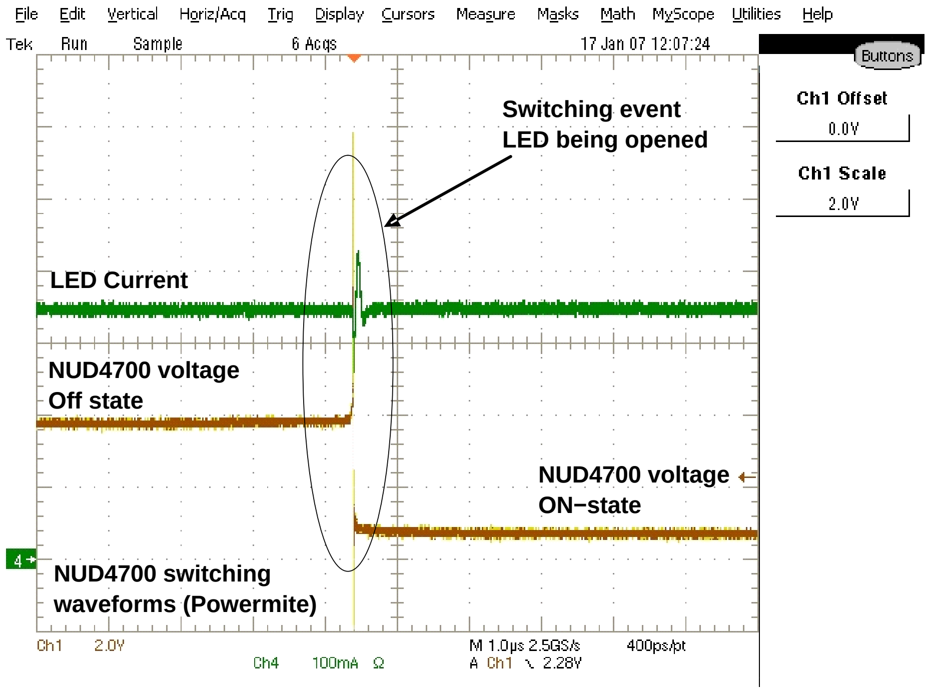

Figure 8. HBL9007 Switching Waveforms

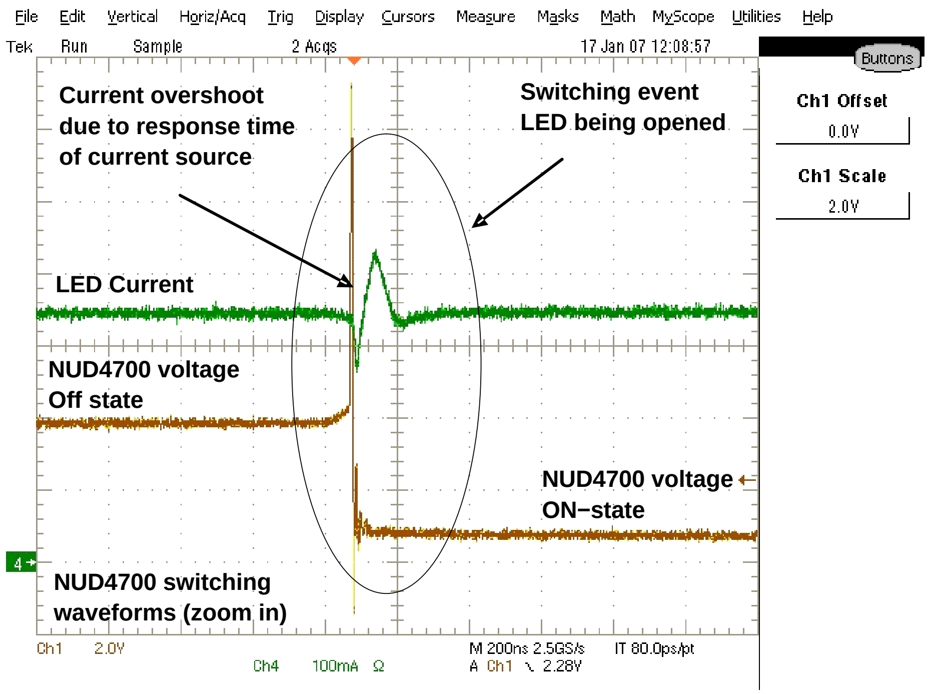

Figure 9. Zoom in of Figure 8

MECHANICAL DETAILS

MECHANICAL SPECIFICATIONS

Parameter	Value	Unit
Composition	Silicon wafer	
Length (Sawn)	1030	μm
Width (Sawn)	1030	μm
Thickness	200	μm
Top Pad Length		μm
Top Pad Width		μm
Top Pad Composition	Al (Aluminum)	
Top Pad Thickness	4	μm
Back Metal (Underside)	TiNiAg	

NOTE: Dimensions are typical values if tolerances are not specified.

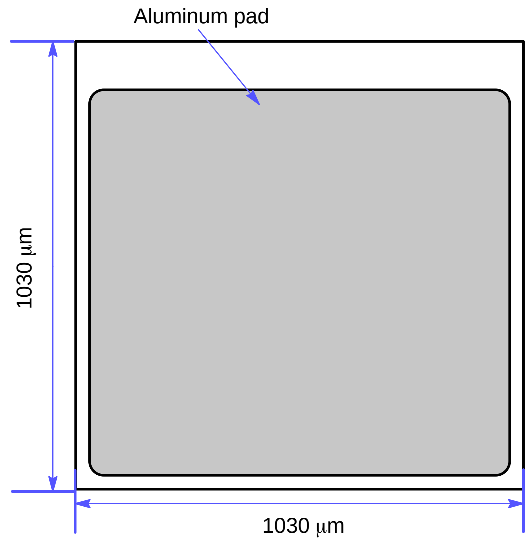

Figure 1. Die Layout

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PUBLICATION ORDERING INFORMATION

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