HBL1015, HBL1025 Series

LED Shunt

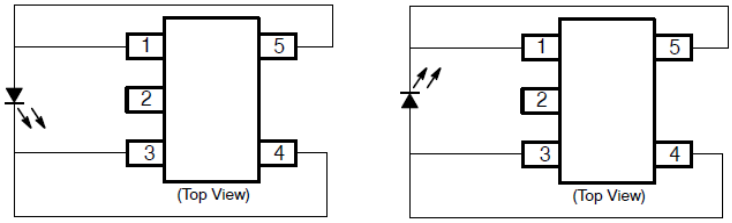
The HBL1015/25 Series are electronic shunts which provide a current bypass in the case of LEDs going into open circuit. LEDs are by nature quite fragile when subjected to transients and surge conditions. There are also many cases where high reliability of the LED lighting must be maintained such as in headlights, lighthouses, bridges, aircraft, runways and so forth. In these cases the low cost addition of the HBL device will provide full assurance that an entire string of LEDs will not extinguish should one LED fail open. The HBL device is also applicable to other loads where circuit continuity is required. The devices can be used with LED string currents from 140 to 500 mA.

Features

- A Bidirectional Device
- Automatically Resets Itself if the LED Heals Itself or is Replaced
- ON−State Voltage Typically 1.8 V
- OFF−State Current less than 0.5 μA
- These are Pb−Free Devices

Typical Applications

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



1. Device is bidirectional. Either configuration shown is acceptable.
2. Pin 2 must be electrically floating

Figure 1. Pin Connections

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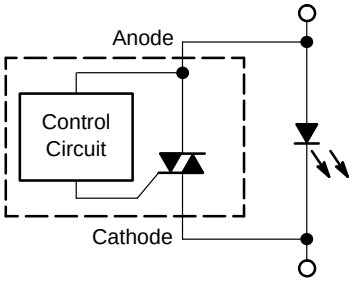
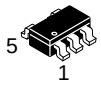
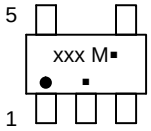




TSOP−5
CASE 483

MARKING DIAGRAM



xxx = Specific Device Code (015 or 025)
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
On−State Current, (T_A = 25°C) (Note 1) (Note 2) (Note 3)	$I_{T(AVG)}$	 500 425 250	mA
Thermal Resistance, Junction−to−Air (Note 1) (Note 2) (Note 3)	θ_{JA}	 140 150 255	°C/W
Operating Temperature Range	T_J	−40 to 150	°C
Non−Operating Temperature Range	T_J	150	°C
Lead Temperature, Soldering (10 Sec)	T_L	260	°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. Mounted onto a 1500 mm^2, Denka K1, 1.5 mm AI, 2 kV thermally conductive dielectric, 2 oz. Cu, or equivalent board. Heat sinking should be spread equally among all pins (caution: pin 2 must be electrically isolated).
2. Mounted onto a 2−layer, 1000 mm^2 per layer, 3 oz Cu, FR4 PCB. Heat sinking should be spread equally among all pins (caution: pin 2 must be electrically isolated).
3. Mounted onto a 2−layer, 50 mm^2 per layer, 1 oz Cu, FR4 PCB. Heat sinking should be spread equally among all pins (caution: pin 2 must be electrically isolated).

NOTE: Normally this device would be mounted on the same copper heat sink and adjacent to the LED(s). If the LED(s) were to go open, then the HBL shunt would now dissipate the power using the same copper heat sink. Since the HBL has a voltage that is lower than that of the LED(s), then the power dissipation would be easily handled by the same heat sink as the LED.

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

Symbol	Characteristics	Min	Min	Typ	Max	Unit
$V_{(BR)}$	Breakdown Voltage: The minimum voltage across the device in or at the breakdown region. Measured at I_{BR} = 1 mA.	HBL1015	8.0			V
		HBL1025	11.5			
I_H	Holding Current: The minimum current required to maintain the device in the on-state.	HBL1015			125	mA
		HBL1025			125	
V_{BO}	Breakover Voltage: The voltage across the device in the breakover region. Measured at I_{BO} = 10 mA.	HBL1015			14.0	V
		HBL1025			16.0	
I_R	Off−State Current: The dc value of current that results from the application of the off-state voltage. This is measured at 8.0 V for HBL1015 and 11.5 V for HBL1025.	HBL1015			0.5	μA
		HBL1025			0.5	
V_T	On−State Voltage	HBL1015	1.2	1.8	2.4	V
		HBL1025	1.2	1.8	2.4	

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)

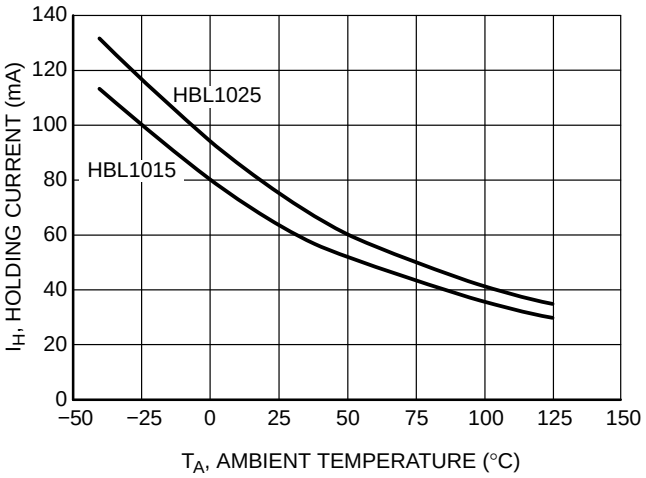


Figure 2. Holding Current vs Temperature

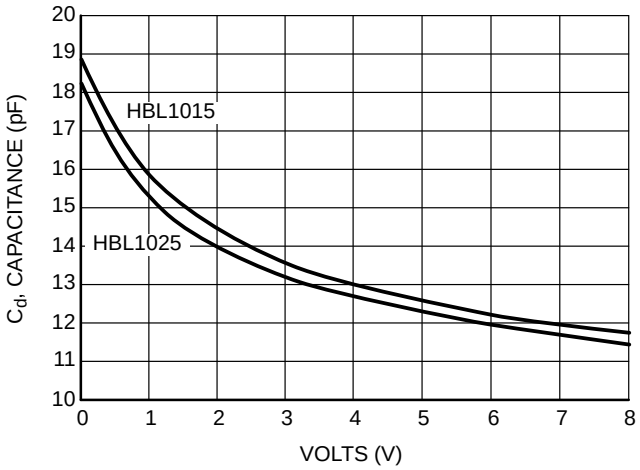


Figure 3. Capacitance vs Voltage

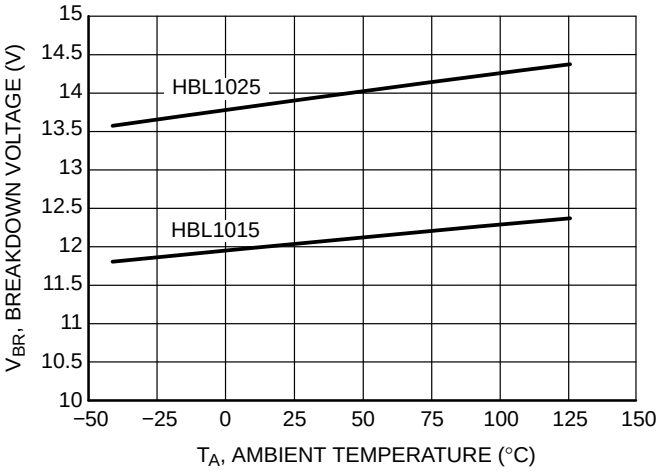


Figure 4. Breakover Voltage vs Temperature

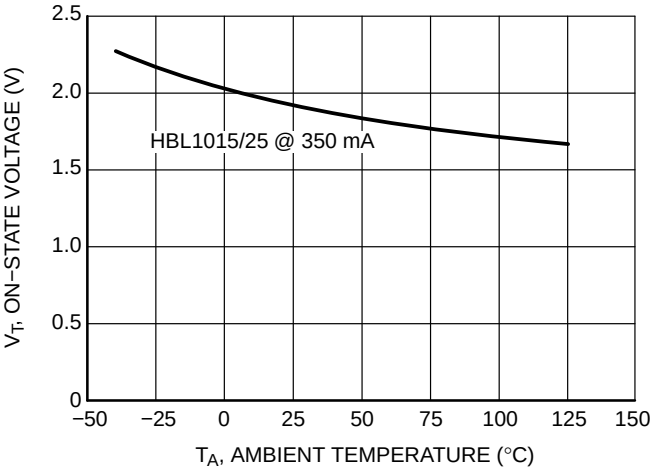


Figure 5. On−State Voltage vs Temperature

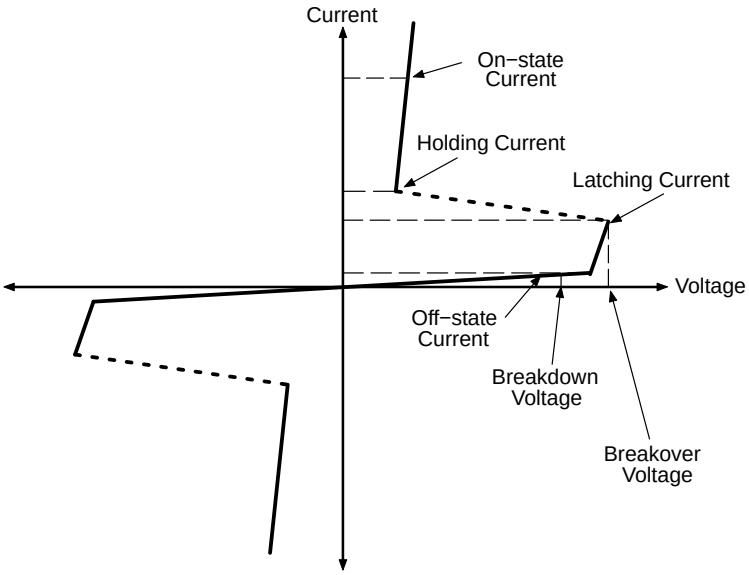


Figure 6. I−V Characteristics

TYPICAL APPLICATION CIRCUIT

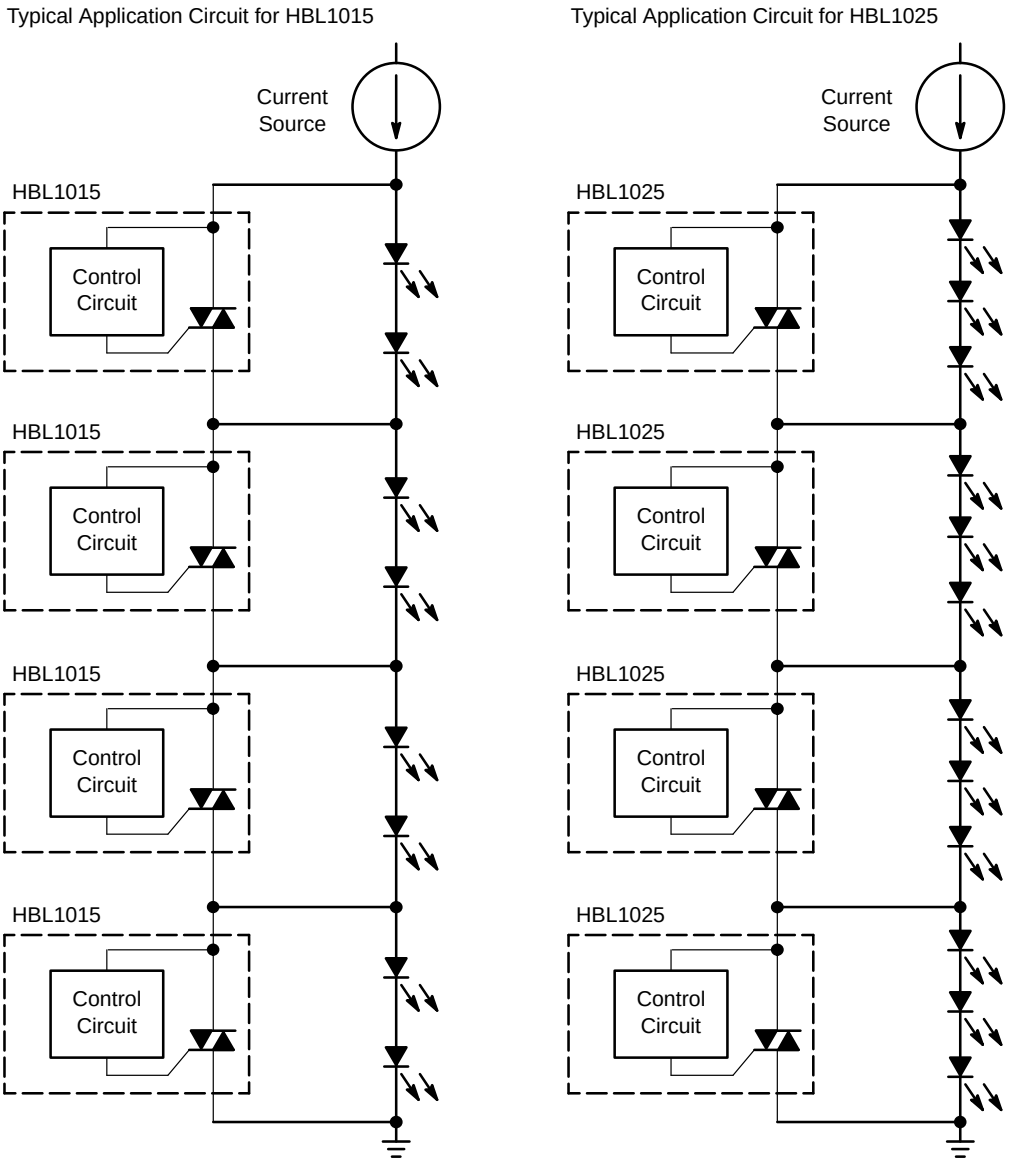


Figure 7. Typical Application Circuit

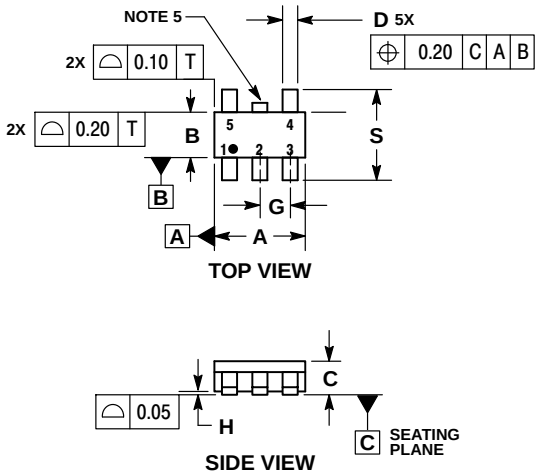
DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping†
HBL1015T1G	015	TSOP−5 (Pb−Free)	3000 / Tape & Reel
HBL1025T1G	025	TSOP−5 (Pb−Free)	3000 / Tape & Reel

†For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PACKAGE DIMENSIONS

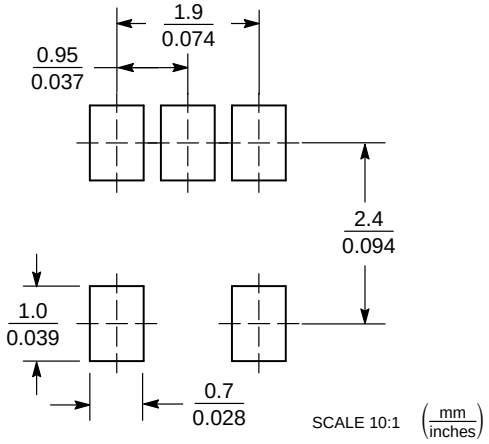
TSOP−5
CASE 483−02
ISSUE K



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSION A.
5. OPTIONAL CONSTRUCTION: AN ADDITIONAL TRIMMED LEAD IS ALLOWED IN THIS LOCATION. TRIMMED LEAD NOT TO EXTEND MORE THAN 0.2 FROM BODY.

	MILLIMETERS	
DIM	MIN	MAX
A	3.00 BSC	
B	1.50 BSC	
C	0.90	1.10
D	0.25	0.50
G	0.95 BSC	
H	0.01	0.10
J	0.10	0.26
K	0.20	0.60
M	0 °	10 °
S	2.50	3.00

SOLDERING FOOTPRINT*



*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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