



# Quad 1.5 A Sinking High Current Switch

The ULN2068B is a high-voltage, high-current quad Darlington switch array designed for high current loads, both resistive and reactive, up to 300 W.

It is intended for interfacing between low level (TTL, DTL, LS and 5.0 V CMOS) logic families and peripheral loads such as relays, solenoids, dc and stepping motors, multiplexer LED and incandescent displays, heaters, or other high voltage, high current loads.

The Motorola ULN2068B is specified with minimum guaranteed breakdown of 50 V and is 100% tested for safe area using an inductive load. It includes integral transient suppression diodes. Use of a predriver stage reduces input current while still allowing the device to switch 1.5 Amps.

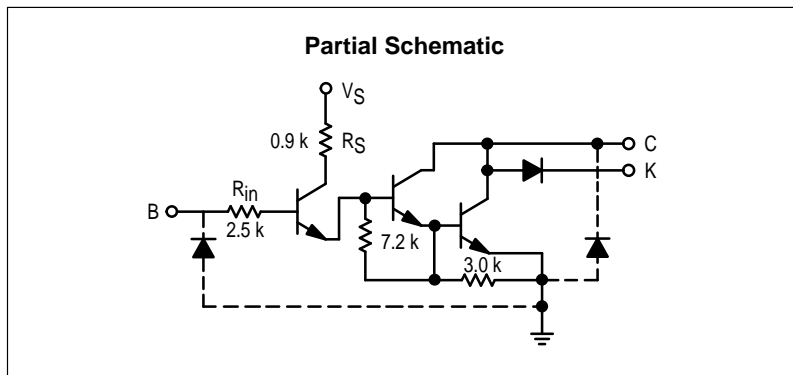
It is supplied in an improved 16-Pin plastic DIP package with heat sink contact tabs (Pins 4, 5, 12 and 13). A copper alloy lead frame allows maximum power dissipation using standard cooling techniques. The use of the contact tab lead frame facilitates attachment of a DIP heat sink while permitting the use of standard layout and mounting practices.

- TTL, DTL, LS, CMOS Compatible Inputs
- 1.5 A Maximum Output Current
- Low Input Current
- Internal Freewheeling Clamp Diodes
- 100% Inductive Load Tested
- Heat Tab Copper Alloy Lead Frame for Increased Dissipation

**MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$  and ratings apply to any one device in the package, unless otherwise noted)

Rating	Symbol	Value	Unit
Output Voltage	$V_O$	50	V
Input Voltage (Note 1)	$V_I$	15	V
Supply Voltage	$V_S$	10	V
Collector Current (Note 2)	$I_C$	1.75	A
Input Current (Note 3)	$I_I$	25	mA
Operating Ambient Temperature Range	$T_A$	0 to +70	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Junction Temperature	$T_J$	150	$^\circ\text{C}$

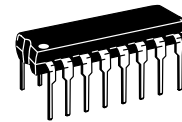
- NOTES:** 1. Input voltage referenced to ground.  
 2. Allowable output conditions shown in Figures 11 and 12.  
 3. May be limited by max input voltage.



# ULN2068

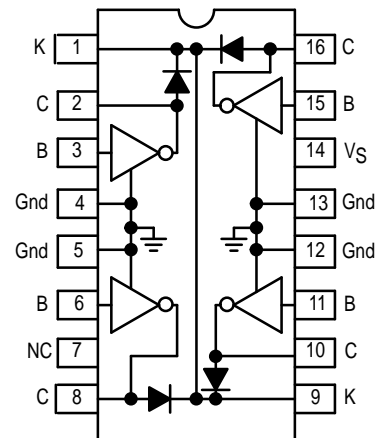
## QUAD 1.5 A DARLINGTON SWITCH

### SEMICONDUCTOR TECHNICAL DATA



**B SUFFIX**  
 PLASTIC PACKAGE  
 CASE 648C

### PIN CONNECTIONS



### ORDERING INFORMATION\*

Device	Operating Temperature Range	Package
ULN2068B	$T_A = 0$ to $+70^\circ\text{C}$	Plastic DIP

\*Other options of this ULN2060/2070 series are available for volume applications. Contact your local Motorola Sales Representative.

# ULN2068

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Leakage Current (Figure 1) (V <sub>CE</sub> = 50 V) (V <sub>CE</sub> = 50 V, T <sub>A</sub> = 70°C)	I <sub>CEX</sub>	–	–	100 500	μA
Collector–Emitter Saturation Voltage (Figure 2) (I <sub>C</sub> = 500 mA) (I <sub>C</sub> = 750 mA) (I <sub>C</sub> = 1.0 A) (I <sub>C</sub> = 1.25 A) } V <sub>in</sub> = 2.4 V	V <sub>CE(sat)</sub>	–	–	1.13 1.25 1.40 1.60	V
Input Current – On Condition (Figure 4) (V <sub>I</sub> = 2.4 V) (V <sub>I</sub> = 3.75 V)	I <sub>I(on)</sub>	–	–	0.25 1.0	mA
Input Voltage – On Condition (Figure 5) (V <sub>CE</sub> = 2.0 V, I <sub>C</sub> = 1.5 A)	V <sub>I(on)</sub>	–	–	2.4	V
Inductive Load Test (Figure 3) (V <sub>S</sub> = 5.5 V, V <sub>CC</sub> = 24.5 V, t <sub>PW</sub> = 4.0 ms)	ΔV <sub>out</sub>	–	–	100	mV
Supply Current (Figure 8) (I <sub>C</sub> = 500 mA, V <sub>in</sub> = 2.4 V, V <sub>S</sub> = 5.5 V)	I <sub>S</sub>	–	–	6.0	mA
Turn–On Delay Time (50% E <sub>I</sub> to 50% E <sub>O</sub> )	t <sub>PHL</sub>	–	–	1.0	μs
Turn–Off Delay Time (50% E <sub>I</sub> to 50% E <sub>O</sub> )	t <sub>PLH</sub>	–	–	4.0	μs
Clamp Diode Leakage Current (Figure 6) (V <sub>R</sub> = 50 V) (V <sub>R</sub> = 50 V, T <sub>A</sub> = 70°C)	I <sub>R</sub>	–	–	50 100	μA
Clamp Diode Forward Voltage (Figure 7) (I <sub>F</sub> = 1.0 A) (I <sub>F</sub> = 1.5 A)	V <sub>F</sub>	–	–	1.75 2.0	V

## TEST FIGURES

Figure 1.

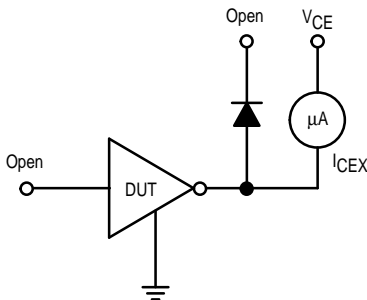


Figure 2.

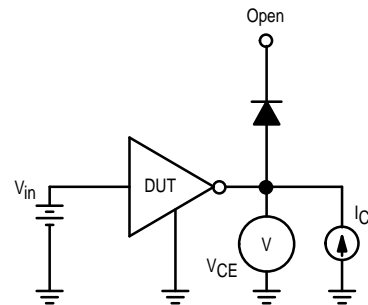


Figure 3.

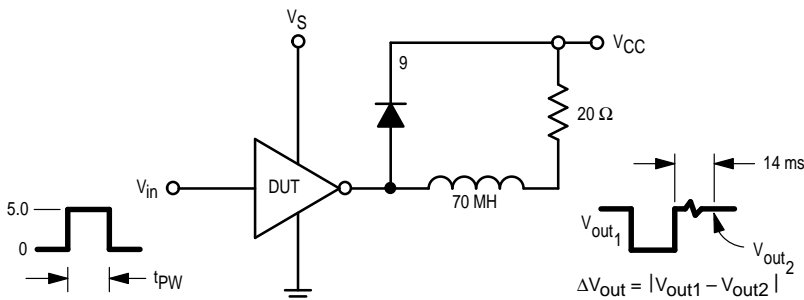
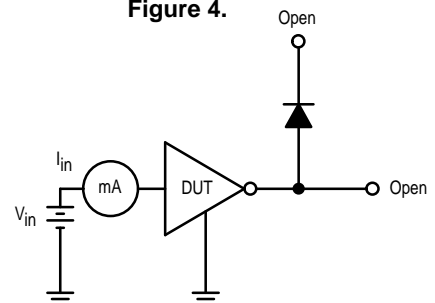


Figure 4.



TEST FIGURES (continued)

Figure 5.

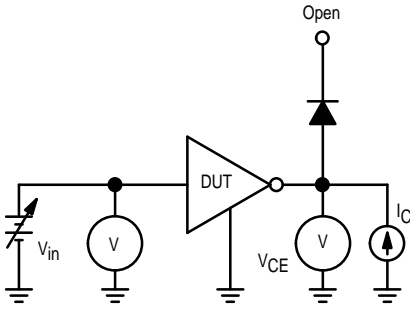


Figure 6.

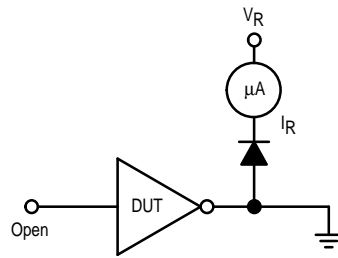


Figure 7.

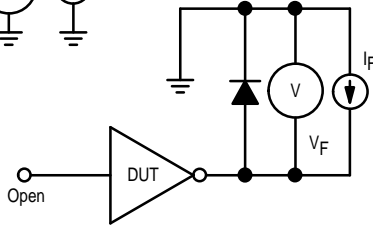
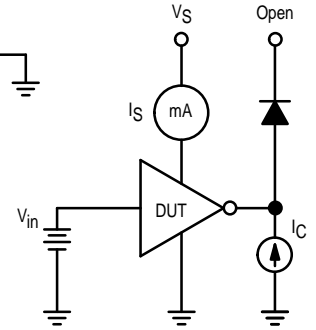


Figure 8.



TYPICAL CHARACTERISTIC CURVES –  $T_A = 25^\circ\text{C}$

Figure 9. Input Current versus Input Voltage

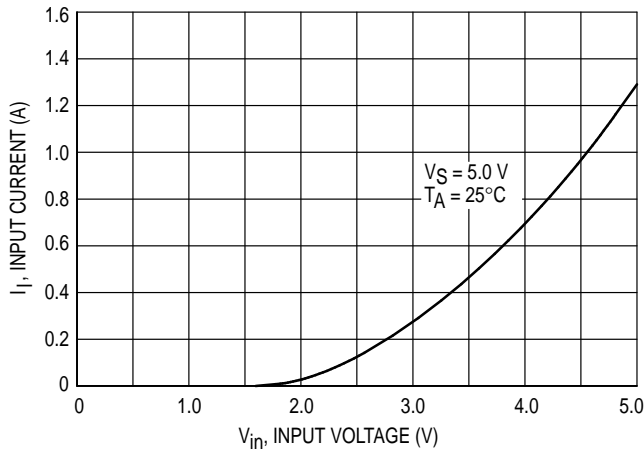


Figure 10. Collector Current versus Input Current

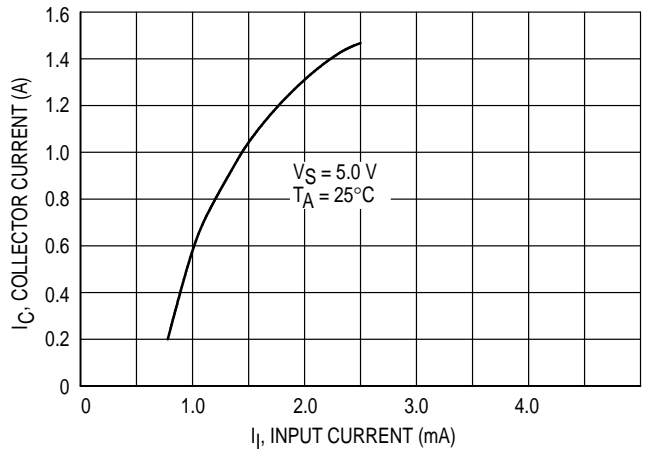


Figure 11.  $T_A = 70^\circ\text{C}$  w/o Heat Sink

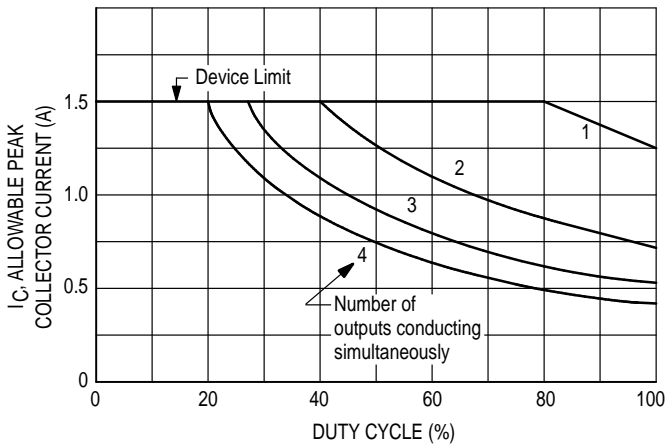


Figure 12.  $T_A = 70^\circ\text{C}$  w/Staver V-8 Heat Sink (37.5°C/W)

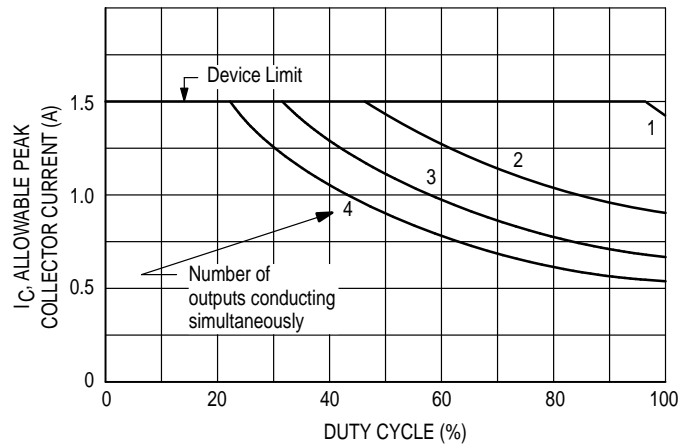


Figure 13.  $T_A = 70^\circ\text{C}$  w/Staver V-7  
Heat Sink (27.5°C/W)

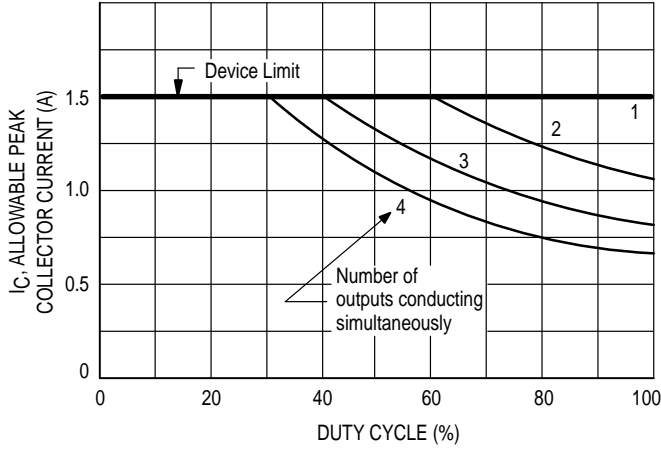


Figure 14.  $T_A = 50^\circ\text{C}$  w/o Heat Sink

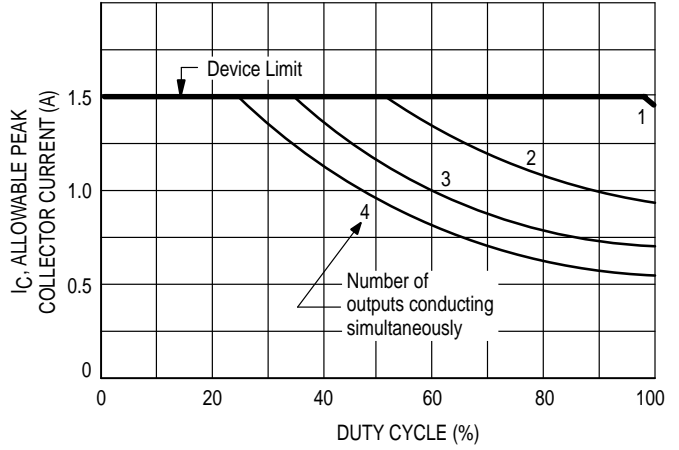


Figure 15.  $T_A = 50^\circ\text{C}$  w/Staver V-8  
Heat Sink (37.5°C/W)

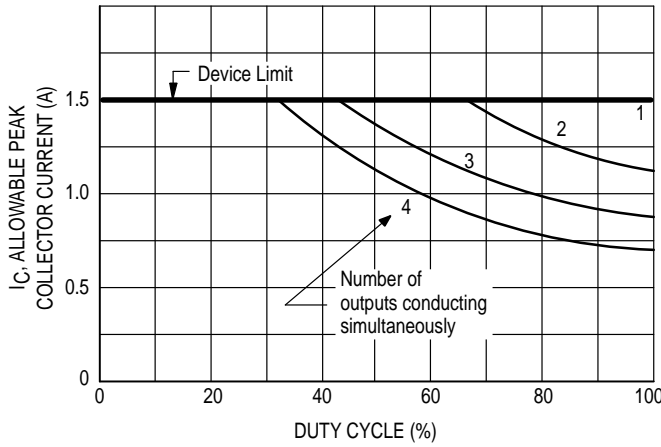
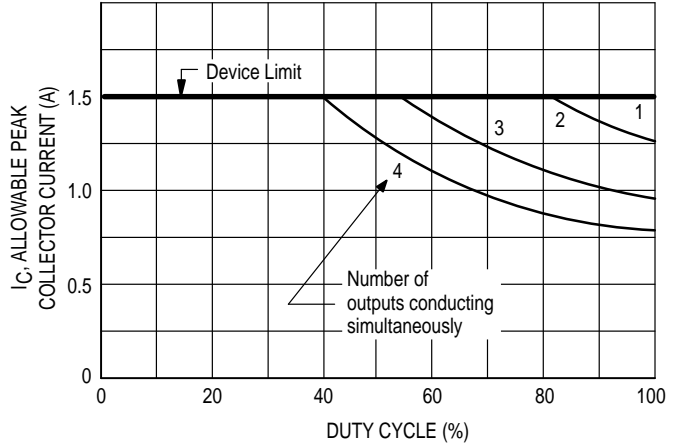


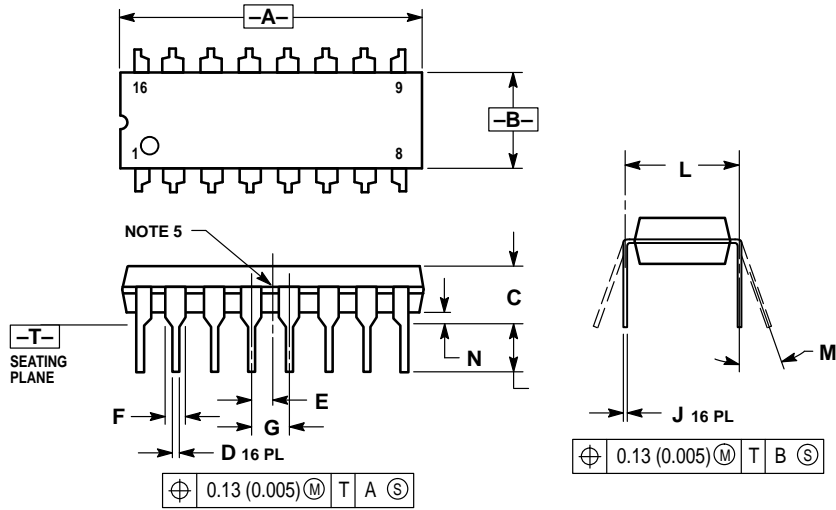
Figure 16.  $T_A = 50^\circ\text{C}$  w/Staver V-7  
Heat Sink (27.5°C/W)



# ULN2068

## OUTLINE DIMENSIONS

**B SUFFIX**  
**PLASTIC PACKAGE**  
**CASE 648C-03**  
**ISSUE C**




**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. INTERNAL LEAD CONNECTION BETWEEN 4 AND 5, 12 AND 13.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.840	18.80	21.34
B	0.240	0.260	6.10	6.60
C	0.145	0.185	3.69	4.69
D	0.015	0.021	0.38	0.53
E	0.050 BSC		1.27 BSC	
F	0.040	0.70	1.02	1.78
G	0.100 BSC		2.54 BSC	
J	0.008	0.015	0.20	0.38
K	0.115	0.135	2.92	3.43
L	0.300 BSC		7.62 BSC	
M	0°		10°	
N	0.015	0.040	0.39	1.01

# ULN2068

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