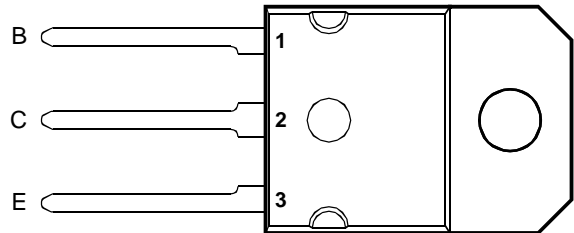


# BDW84, BDW84A, BDW84B, BDW84C, BDW84D PNP SILICON POWER DARLINGTONS

**BOURNS®**

- Designed for Complementary Use with BDW83, BDW83A, BDW83B, BDW83C and BDW83D
- 125 W at 25°C Case Temperature
- 15 A Continuous Collector Current
- Minimum  $h_{FE}$  of 750 at 3 V, 6 A

SOT-93 PACKAGE  
(TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

MDTRAAA

## absolute maximum ratings at 25°C case temperature (unless otherwise noted)

RATING		SYMBOL	VALUE	UNIT
Collector-base voltage ( $I_E = 0$ )	BDW84	$V_{CBO}$	-45	V
	BDW84A		-60	
	BDW84B		-80	
	BDW84C		-100	
	BDW84D		-120	
Collector-emitter voltage ( $I_B = 0$ ) (see Note 1)	BDW84	$V_{CEO}$	-45	V
	BDW84A		-60	
	BDW84B		-80	
	BDW84C		-100	
	BDW84D		-120	
Emitter-base voltage		$V_{EBO}$	-5	V
Continuous collector current		$I_C$	-15	A
Continuous base current		$I_B$	-0.5	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		$P_{tot}$	125	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 3)		$P_{tot}$	3.5	W
Unclamped inductive load energy (see Note 4)		$\frac{1}{2}LI_C^2$	100	mJ
Operating junction temperature range		$T_j$	-65 to +150	°C
Operating temperature range		$T_{stg}$	-65 to +150	°C
Operating free-air temperature range		$T_A$	-65 to +150	°C

- NOTES: 1. These values apply when the base-emitter diode is open circuited.  
 2. Derate linearly to 150°C case temperature at the rate of 1 W/°C.  
 3. Derate linearly to 150°C free air temperature at the rate of 28 mW/°C.  
 4. This rating is based on the capability of the transistor to operate safely in a circuit of:  $L = 20$  mH,  $I_{B(on)} = -5$  mA,  $R_{BE} = 100 \Omega$ ,  $V_{BE(off)} = 0$ ,  $R_S = 0.1 \Omega$ ,  $V_{CC} = -20$  V.

## PRODUCT INFORMATION

AUGUST 1978 - REVISED JUNE 2011  
 Specifications are subject to change without notice.

**electrical characteristics at 25°C case temperature (unless otherwise noted)**

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$ Collector-emitter breakdown voltage	$I_C = -30 \text{ mA}$	$I_B = 0$	(see Note 5)	BDW84 BDW84A BDW84B BDW84C BDW84D			V
$I_{CEO}$ Collector-emitter cut-off current	$V_{CE} = -30 \text{ V}$	$I_B = 0$		BDW84 BDW84A BDW84B BDW84C BDW84D		-1 -1 -1 -1 -1	mA
$I_{CBO}$ Collector cut-off current	$V_{CB} = -45 \text{ V}$	$I_E = 0$		BDW84 BDW84A BDW84B BDW84C BDW84D		-0.5 -0.5 -0.5 -0.5 -0.5	mA
	$V_{CB} = -60 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW84 BDW84A BDW84B BDW84C BDW84D		-5 -5 -5 -5 -5	mA
	$V_{CB} = -80 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW84 BDW84A BDW84B BDW84C BDW84D		-5 -5 -5 -5 -5	mA
	$V_{CB} = -100 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW84 BDW84A BDW84B BDW84C BDW84D		-5 -5 -5 -5 -5	mA
	$V_{CB} = -120 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW84 BDW84A BDW84B BDW84C BDW84D		-5 -5 -5 -5 -5	mA
$I_{EBO}$ Emitter cut-off current	$V_{EB} = -5 \text{ V}$	$I_C = 0$				-2	mA
$h_{FE}$ Forward current transfer ratio	$V_{CE} = -3 \text{ V}$	$I_C = -6 \text{ A}$	(see Notes 5 and 6)	750		20000	
	$V_{CE} = -3 \text{ V}$	$I_C = -15 \text{ A}$		100			
$V_{BE(on)}$ Base-emitter voltage	$V_{CE} = -3 \text{ V}$	$I_C = -6 \text{ A}$	(see Notes 5 and 6)			-2.5	V
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = -12 \text{ mA}$	$I_C = -6 \text{ A}$	(see Notes 5 and 6)			-2.5 -4	V
	$I_B = -150 \text{ mA}$	$I_C = -15 \text{ A}$					
$V_{EC}$ Parallel diode forward voltage	$I_E = -15 \text{ A}$	$I_B = 0$				-3.5	V

NOTES: 5. These parameters must be measured using pulse techniques,  $t_p = 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

6. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

**thermal characteristics**

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$ Junction to case thermal resistance			1	$^\circ\text{C/W}$
$R_{\theta JA}$ Junction to free air thermal resistance			35.7	$^\circ\text{C/W}$

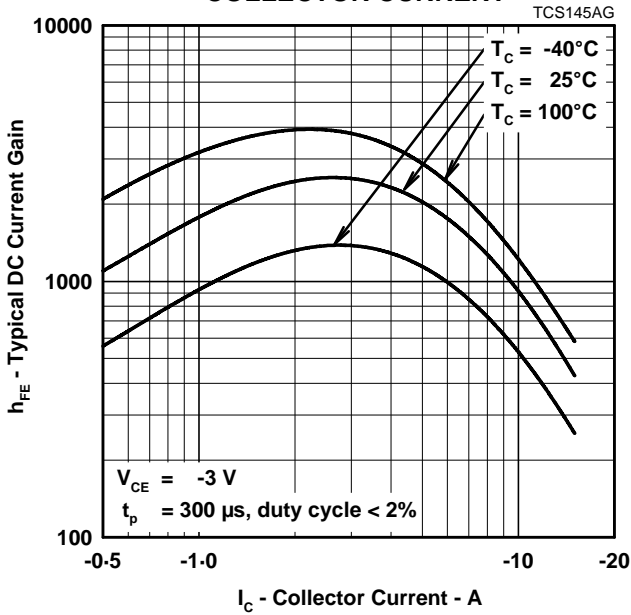
**resistive-load-switching characteristics at 25°C case temperature**

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
$t_{on}$ Turn-on time	$I_C = -10 \text{ A}$	$I_{B(on)} = -40 \text{ mA}$	$I_{B(off)} = 40 \text{ mA}$		0.9		$\mu\text{s}$
$t_{off}$ Turn-off time	$V_{BE(off)} = 4.2 \text{ V}$	$R_L = 3 \Omega$	$t_p = 20 \mu\text{s}$ , dc $\leq 2\%$		7		$\mu\text{s}$

† Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

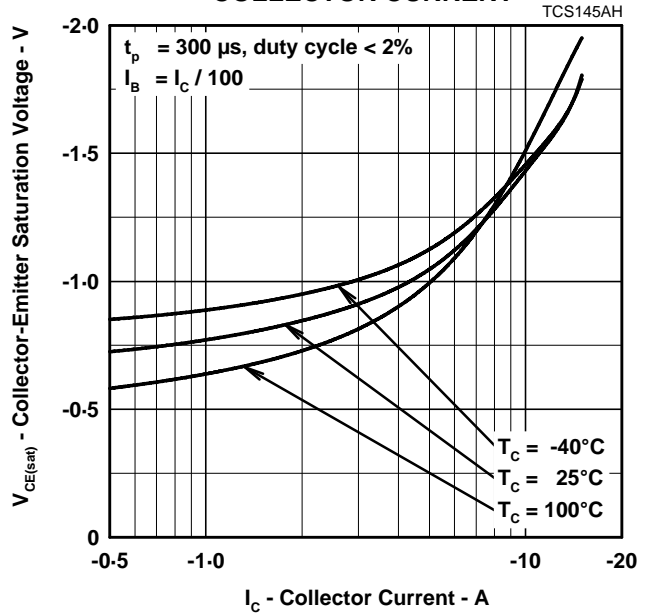
**TYPICAL CHARACTERISTICS**

**TYPICAL DC CURRENT GAIN**  
**VS**  
**COLLECTOR CURRENT**



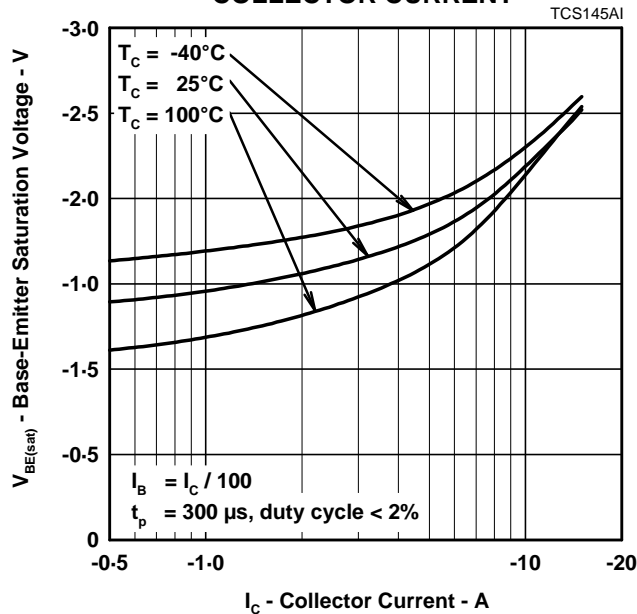
**Figure 1.**

**COLLECTOR-EMITTER SATURATION VOLTAGE**  
**VS**  
**COLLECTOR CURRENT**



**Figure 2.**

**BASE-EMITTER SATURATION VOLTAGE**  
**VS**  
**COLLECTOR CURRENT**

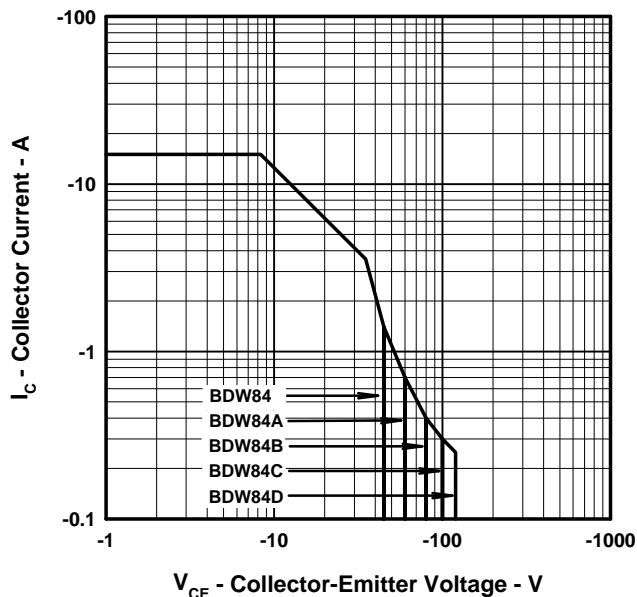


**Figure 3.**

**PRODUCT INFORMATION**

**MAXIMUM SAFE OPERATING REGIONS**

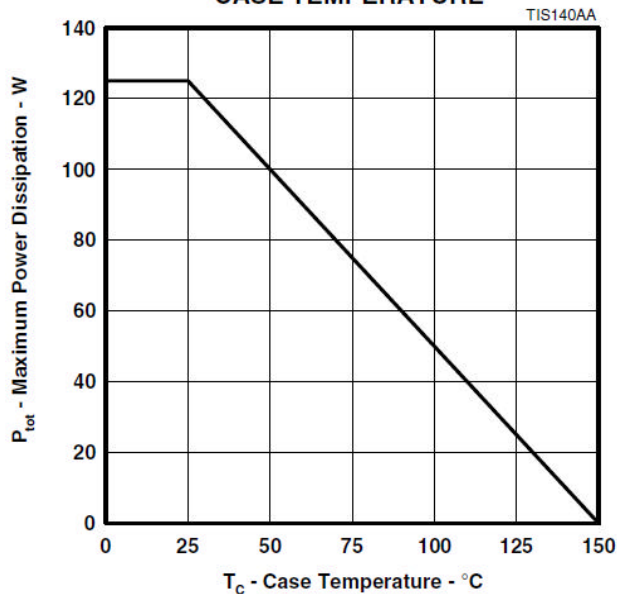
**MAXIMUM FORWARD-BIAS  
 SAFE OPERATING AREA**



**Figure 4.**

**THERMAL INFORMATION**

**MAXIMUM POWER DISSIPATION  
 vs  
 CASE TEMPERATURE**



**Figure 5.**

**PRODUCT INFORMATION**

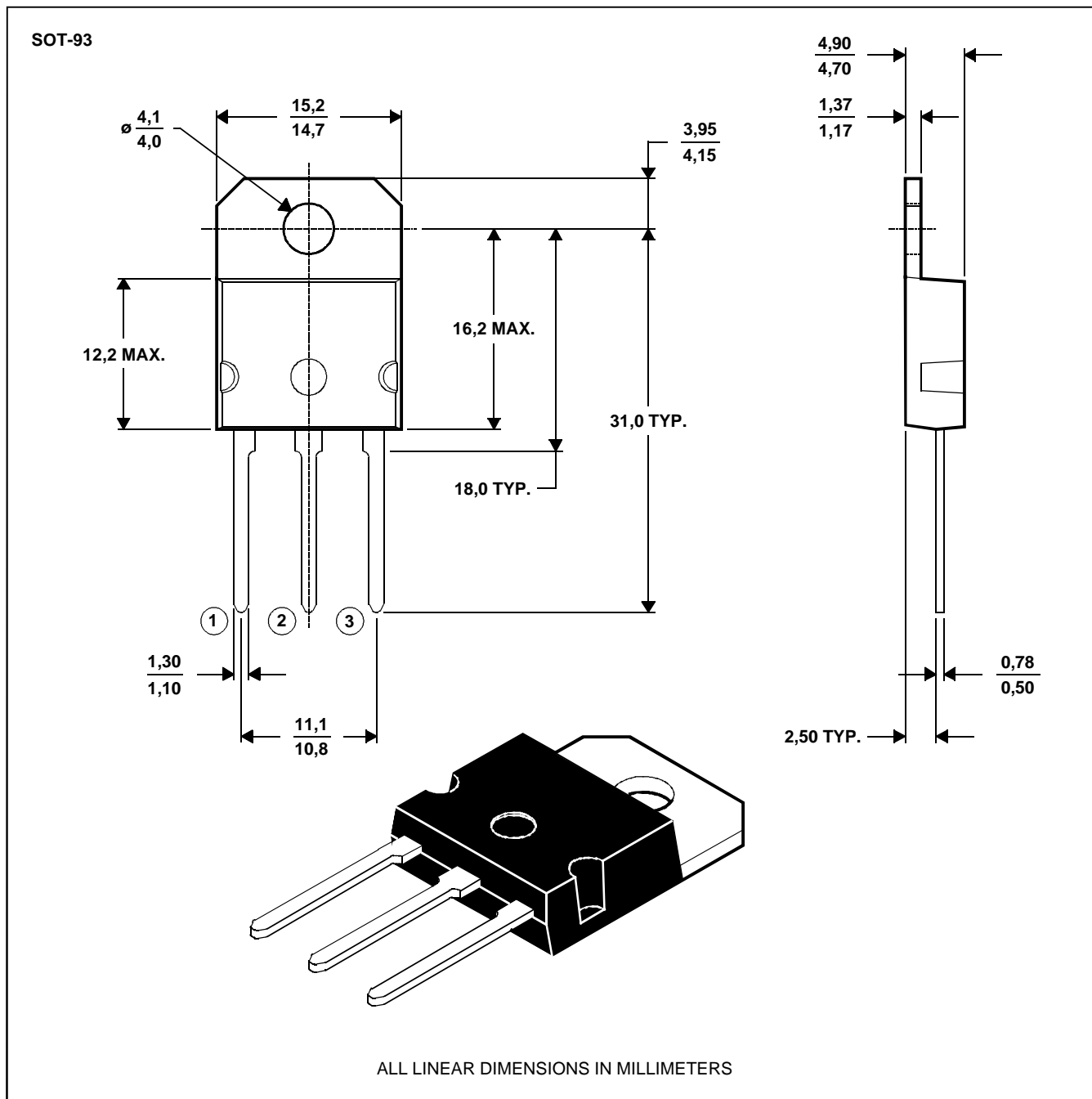
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**MECHANICAL DATA**

**SOT-93**

**3-pin plastic flange-mount package**

This single-in-line package consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high humidity conditions. Leads require no additional cleaning or processing when used in soldered assembly.



NOTE A: The centre pin is in electrical contact with the mounting tab.

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**PRODUCT INFORMATION**