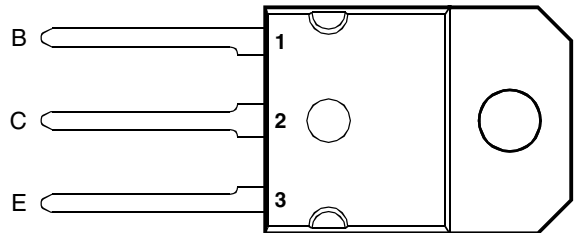


# BDW83, BDW83A, BDW83B, BDW83C, BDW83D NPN SILICON POWER DARLINGTONS

**BOURNS®**

- Designed for Complementary Use with BDW84, BDW84A, BDW84B, BDW84C and BDW84D
- 150 W at 25°C Case Temperature
- 15 A Continuous Collector Current
- Minimum  $h_{FE}$  of 750 at 3V, 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 ( $I_E = 0$ )	BDW83	$V_{CBO}$	45	V
	BDW83A		60	
	BDW83B		80	
	BDW83C		100	
	BDW83D		120	
Collector-emitter voltage ( $I_B = 0$ ) (see Note 1)	BDW83	$V_{CEO}$	45	V
	BDW83A		60	
	BDW83B		80	
	BDW83C		100	
	BDW83D		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)		$P_{tot}$	150	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 1.2 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 SEPTEMBER 2002  
 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)	BDW83 45 BDW83A 60 BDW83B 80 BDW83C 100 BDW83D 120			V
$I_{CEO}$ Collector-emitter cut-off current	$V_{CE} = 30 \text{ V}$	$I_B = 0$		BDW83 BDW83A BDW83B BDW83C BDW83D		1 1 1 1 1	mA
$I_{CBO}$ Collector cut-off current	$V_{CB} = 45 \text{ V}$	$I_E = 0$		BDW83 BDW83A BDW83B BDW83C BDW83D		0.5 0.5 0.5 0.5 0.5	mA
	$V_{CB} = 45 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW83		5	
	$V_{CB} = 60 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW83A		5	
	$V_{CB} = 80 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW83B		5	
	$V_{CB} = 100 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW83C		5	
	$V_{CB} = 120 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW83D		5	
$I_{EBO}$ 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	V
	$I_B = 150 \text{ mA}$	$I_C = 15 \text{ A}$				4	V
$V_{EC}$ 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			0.83	°C/W
$R_{\theta JA}$ Junction to free air thermal resistance			35.7	°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.

**PRODUCT INFORMATION**

TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN  
vs  
COLLECTOR CURRENT

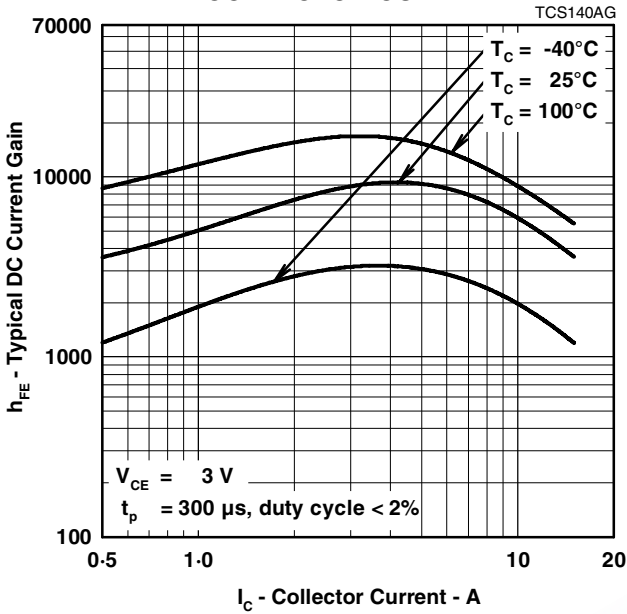


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE  
vs  
COLLECTOR CURRENT

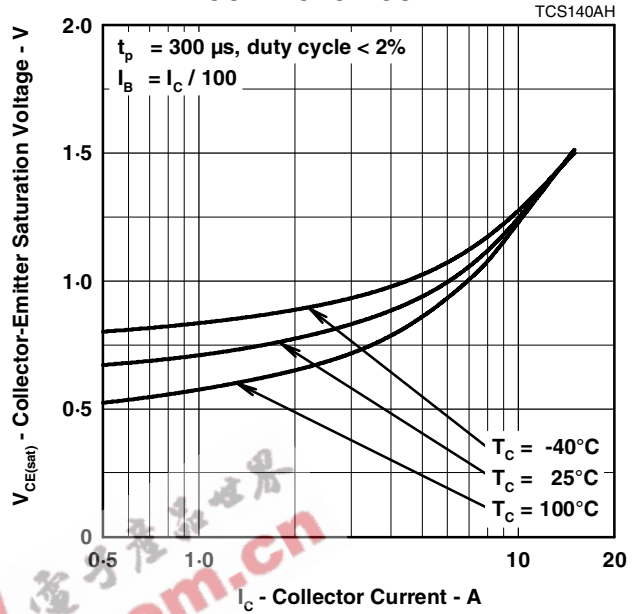


Figure 2.

BASE-EMITTER SATURATION VOLTAGE  
vs  
COLLECTOR CURRENT

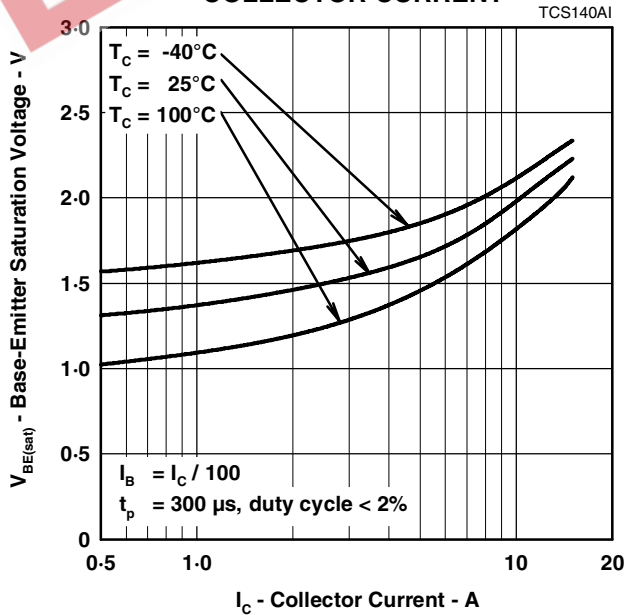


Figure 3.

**PRODUCT INFORMATION**

**MAXIMUM SAFE OPERATING REGIONS**

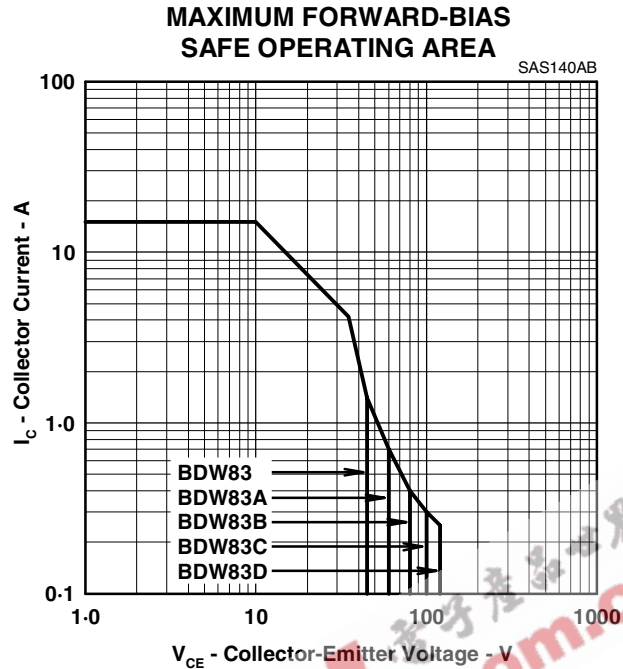


Figure 4.

**THERMAL INFORMATION**

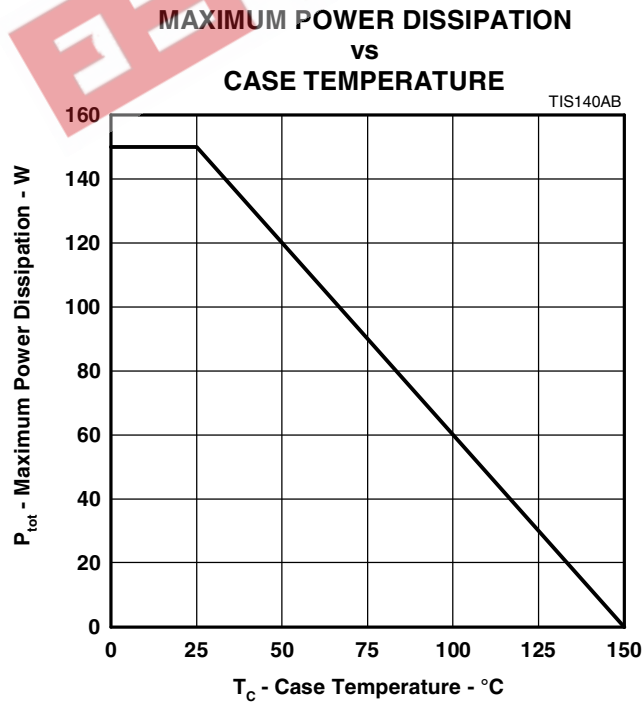


Figure 5.

**PRODUCT INFORMATION**

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