



THE DATASHEET OF BDW53C-S

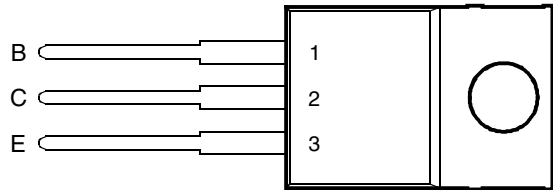


BDW53, BDW53A, BDW53B, BDW53C, BDW53D NPN SILICON POWER DARLINGTONS

BOURNS®

- Designed for Complementary Use with BDW54, BDW54A, BDW54B, BDW54C and BDW54D
- 40 W at 25°C Case Temperature
- 4 A Continuous Collector Current
- Minimum h_{FE} of 750 at 3V, 1.5 A

TO-220 PACKAGE
(TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

MDTRACA



This series is obsolete and not recommended for new designs.

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

RATING		SYMBOL	VALUE	UNIT
Collector-base voltage ($I_E = 0$)	BDW53	V_{CBO}	45	V
	BDW53A		60	
	BDW53B		80	
	BDW53C		100	
	BDW53D		120	
Collector-emitter voltage ($I_B = 0$) (see Note 1)	BDW53	V_{CEO}	45	V
	BDW53A		60	
	BDW53B		80	
	BDW53C		100	
	BDW53D		120	
Emitter-base voltage		V_{EBO}	5	V
Continuous collector current		I_C	4	A
Continuous base current		I_B	50	mA
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		P_{tot}	40	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 3)		P_{tot}	2	W
Unclamped inductive load energy (see Note 4)		$\frac{1}{2}LI_C^2$	25	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 0.32 W/°C.
 3. Derate linearly to 150°C free air temperature at the rate of 16 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, $R_{BE} = 100$ Ω , $V_{BE(off)} = 0$, $R_S = 0.1$ Ω , $V_{CC} = 20$ 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)	BDW53 BDW53A BDW53B BDW53C BDW53D	45 60 80 100 120		V
I_{CEO} Collector-emitter cut-off current	$V_{CE} = 30 \text{ V}$	$I_B = 0$		BDW53 BDW53A BDW53B BDW53C BDW53D		0.5 0.5 0.5 0.5 0.5	mA
I_{CBO} Collector cut-off current	$V_{CB} = 45 \text{ V}$	$I_E = 0$		BDW53		0.2	mA
	$V_{CB} = 60 \text{ V}$	$I_E = 0$		BDW53A		0.2	
	$V_{CB} = 80 \text{ V}$	$I_E = 0$		BDW53B		0.2	
	$V_{CB} = 100 \text{ V}$	$I_E = 0$		BDW53C		0.2	
	$V_{CB} = 120 \text{ V}$	$I_E = 0$		BDW53D		0.2	
	$V_{CB} = 45 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW53		5	
	$V_{CB} = 60 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW53A		5	
	$V_{CB} = 80 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW53B		5	
I_{EBO} Emitter cut-off current	$V_{EB} = 5 \text{ V}$	$I_C = 0$				2	mA
	$V_{CE} = 3 \text{ V}$	$I_C = 1.5 \text{ A}$	(see Notes 5 and 6)		750	20000	
h_{FE} Forward current transfer ratio	$V_{CE} = 3 \text{ V}$	$I_C = 4 \text{ A}$			100		
$V_{BE(on)}$ Base-emitter voltage	$V_{CE} = 3 \text{ V}$	$I_C = 1.5 \text{ A}$	(see Notes 5 and 6)			2.5	V
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 30 \text{ mA}$	$I_C = 1.5 \text{ A}$	(see Notes 5 and 6)			2.5	V
	$I_B = 40 \text{ mA}$	$I_C = 4 \text{ A}$				4	
V_{EC} Parallel diode forward voltage	$I_E = 4 \text{ A}$	$I_B = 0$				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			3.125	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$ Junction to free air thermal resistance			62.5	$^\circ\text{C}/\text{W}$

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

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
t_{on} Turn-on time	$I_C = 2 \text{ A}$	$I_{B(on)} = 8 \text{ mA}$	$I_{B(off)} = -8 \text{ mA}$		1		μs
t_{off} Turn-off time	$V_{BE(off)} = -5 \text{ V}$	$R_L = 15 \Omega$	$t_p = 20 \mu\text{s}$, dc $\leq 2\%$		4.5		μs

† 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

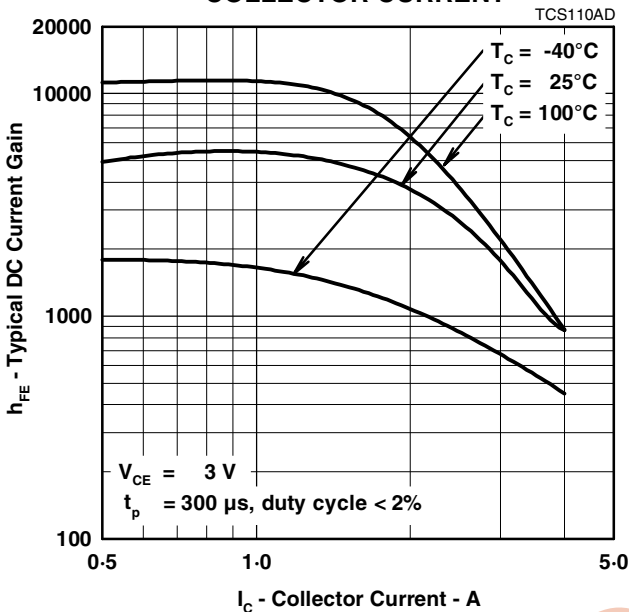


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
COLLECTOR CURRENT

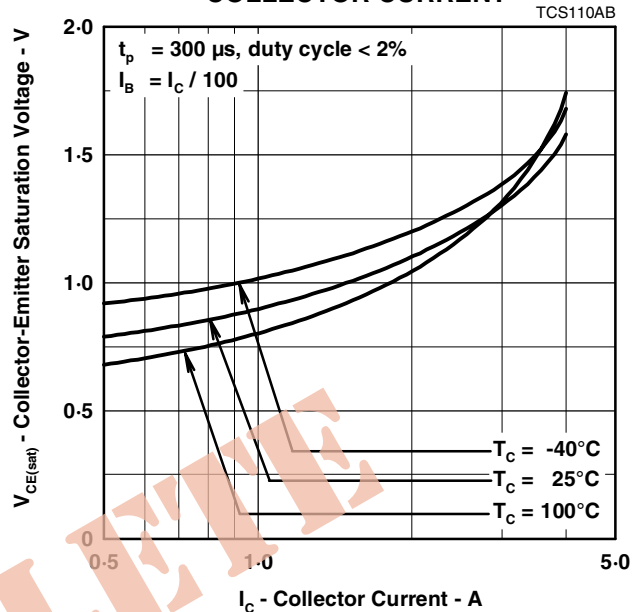


Figure 2.

BASE-EMITTER SATURATION VOLTAGE
vs
COLLECTOR CURRENT

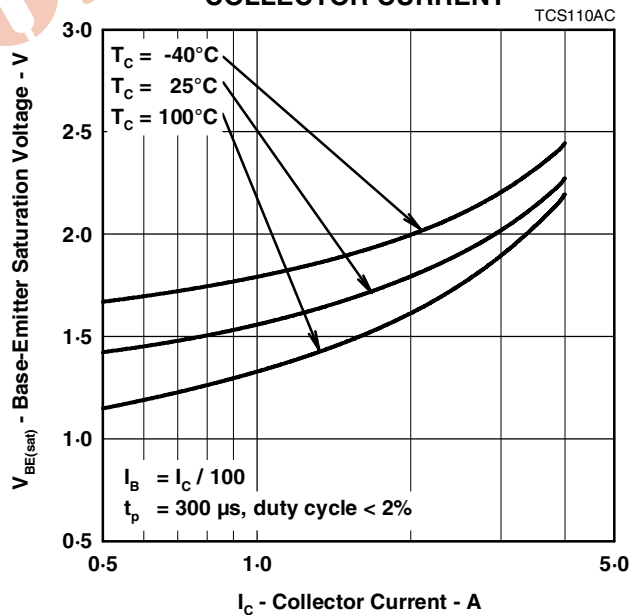


Figure 3.

PRODUCT INFORMATION

MAXIMUM SAFE OPERATING REGIONS

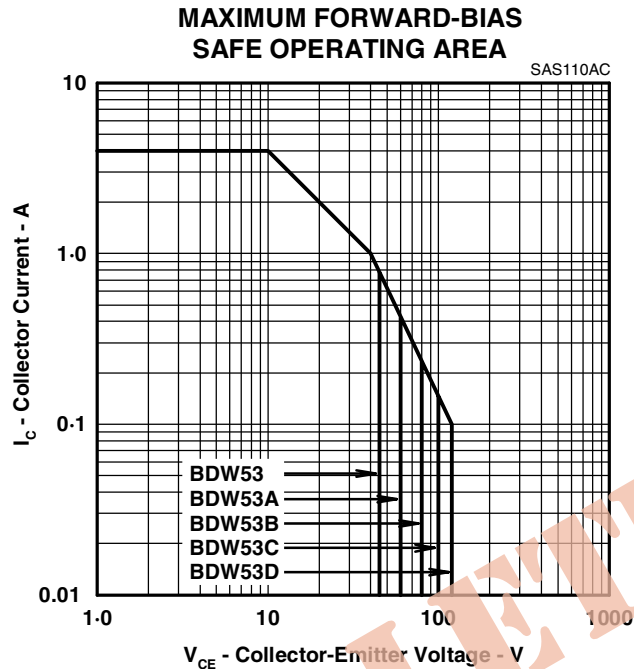


Figure 4.

THERMAL INFORMATION

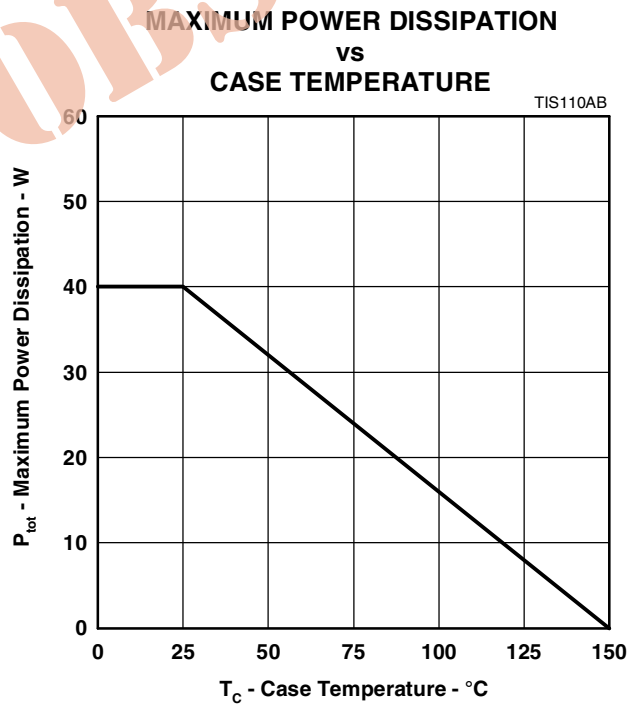


Figure 5.

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