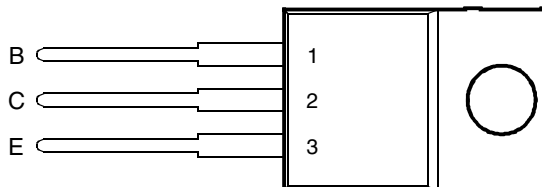


- Designed for Complementary Use with BDW54, BDW54A, BDW54B, BDW54C and BDW54D
- 40 W at 25°C Case Temperature
- 4 A Continuous Collector Current
- Minimum  $h_{FE}$  of 750 at 3V, 1.5 A

TO-220 PACKAGE  
(TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

MDTRACA

**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,  $R_{BE} = 100 \Omega$ ,  $V_{BE(off)} = 0$ ,  $R_S = 0.1 \Omega$ ,  $V_{CC} = 20$  V.

**PRODUCT INFORMATION**

**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	$V_{CE} = 30 \text{ V}$ $V_{CE} = 30 \text{ V}$ $V_{CE} = 40 \text{ V}$ $V_{CE} = 50 \text{ V}$ $V_{CE} = 60 \text{ V}$	$I_B = 0$ $I_B = 0$ $I_B = 0$ $I_B = 0$ $I_B = 0$		BDW53 BDW53A BDW53B BDW53C BDW53D			0.5 0.5 0.5 0.5 0.5	mA
$I_{CBO}$ Collector cut-off current	$V_{CB} = 45 \text{ V}$ $V_{CB} = 60 \text{ V}$ $V_{CB} = 80 \text{ V}$ $V_{CB} = 100 \text{ V}$ $V_{CB} = 120 \text{ V}$ $V_{CB} = 45 \text{ V}$ $V_{CB} = 60 \text{ V}$ $V_{CB} = 80 \text{ V}$ $V_{CB} = 100 \text{ V}$ $V_{CB} = 120 \text{ V}$	$I_E = 0$ $I_E = 0$ $I_E = 0$ $I_E = 0$ $I_E = 0$ $I_E = 0$ $I_E = 0$ $I_E = 0$ $I_E = 0$ $I_E = 0$	$T_C = 150^\circ\text{C}$ $T_C = 150^\circ\text{C}$ $T_C = 150^\circ\text{C}$ $T_C = 150^\circ\text{C}$ $T_C = 150^\circ\text{C}$	BDW53 BDW53A BDW53B BDW53C BDW53D BDW53 BDW53A BDW53B BDW53C BDW53D			0.2 0.2 0.2 0.2 0.2 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	$V_{CE} = 3 \text{ V}$ $V_{CE} = 3 \text{ V}$	$I_C = 1.5 \text{ A}$ $I_C = 4 \text{ A}$	(see Notes 5 and 6)		750 100		20000	
$V_{BE(on)}$ 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	$I_B = 30 \text{ mA}$ $I_B = 40 \text{ mA}$	$I_C = 1.5 \text{ A}$ $I_C = 4 \text{ A}$	(see Notes 5 and 6)				2.5 4	V
$V_{EC}$ 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	$^\circ\text{C/W}$
$R_{\theta JA}$ Junction to free air thermal resistance			62.5	$^\circ\text{C/W}$

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

PARAMETER	TEST CONDITIONS <sup>†</sup>			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		$\mu\text{s}$
$t_{off}$ Turn-off time	$V_{BE(off)} = -5 \text{ V}$	$R_L = 15 \Omega$	$t_p = 20 \mu\text{s}$ , dc $\leq 2\%$		4.5		$\mu\text{s}$

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

**PRODUCT INFORMATION**

TYPICAL CHARACTERISTICS

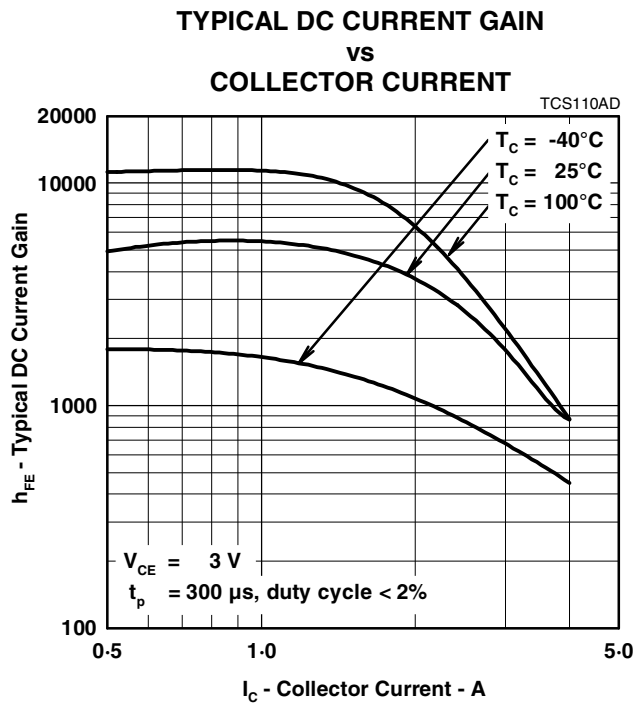


Figure 1.

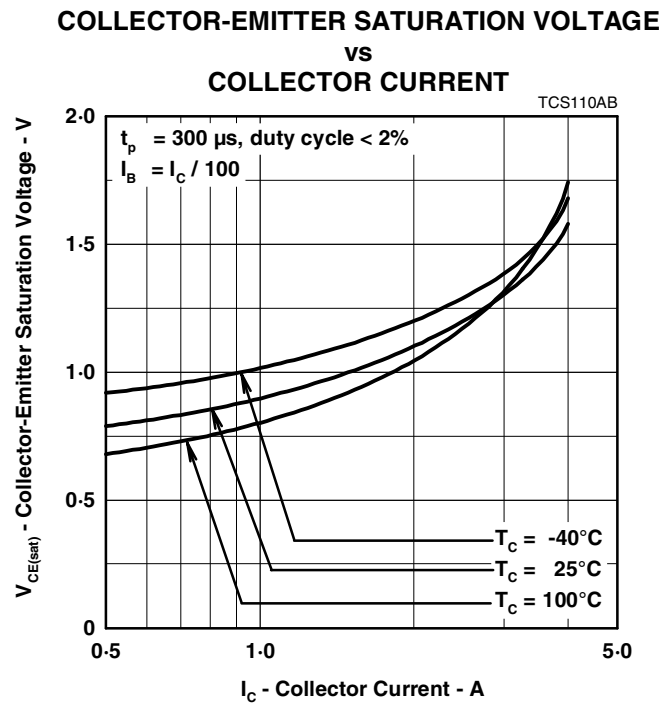


Figure 2.

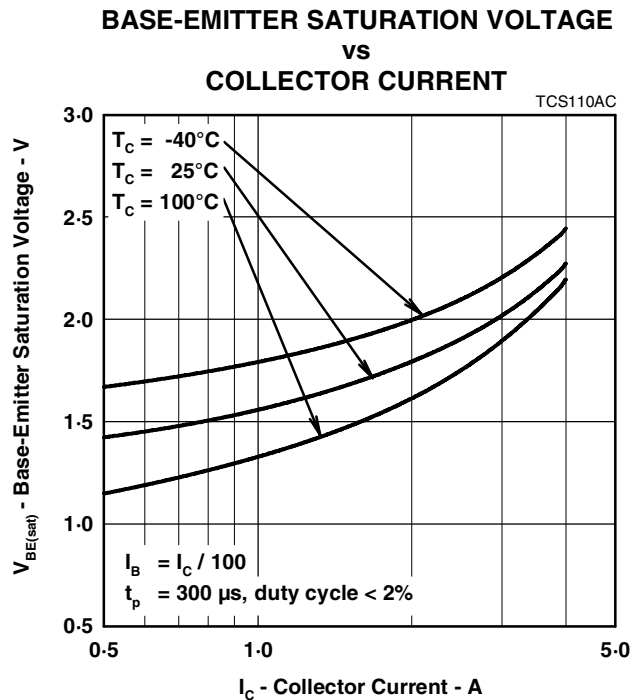


Figure 3.

**PRODUCT INFORMATION**

## MAXIMUM SAFE OPERATING REGIONS

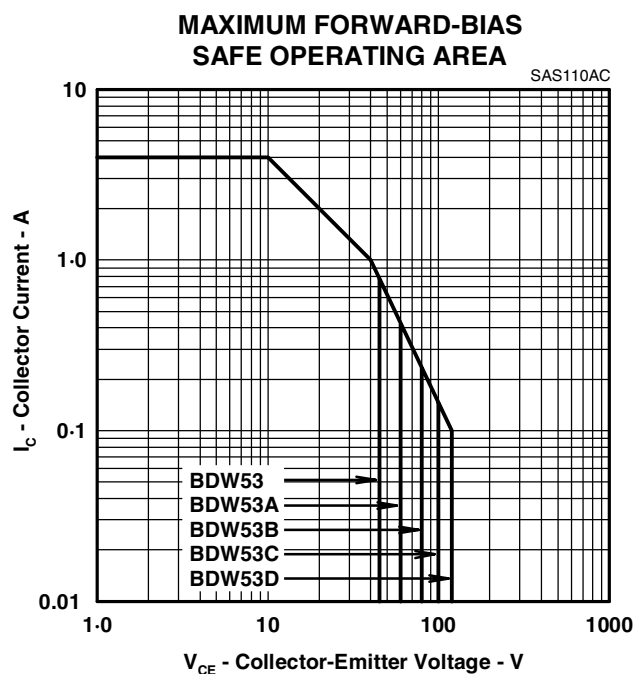


Figure 4.

## THERMAL INFORMATION

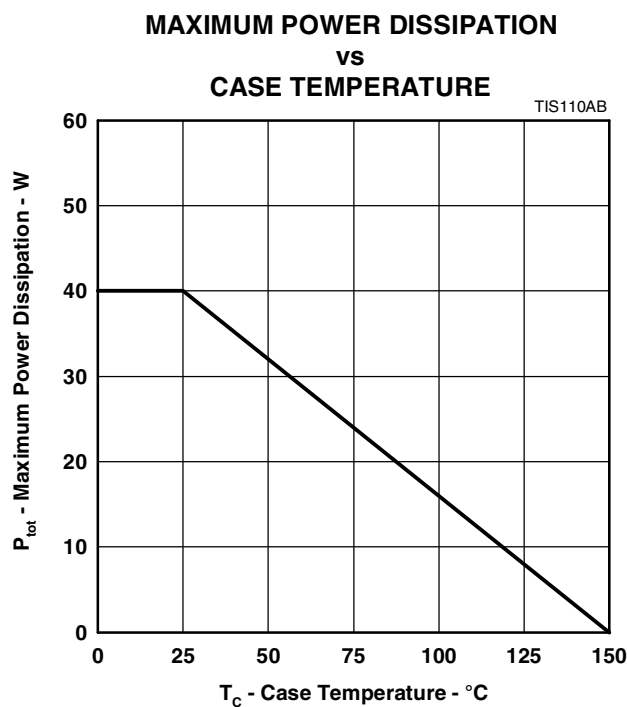


Figure 5.

## PRODUCT INFORMATION

AUGUST 1978 - REVISED SEPTEMBER 2002  
Specifications are subject to change without notice.