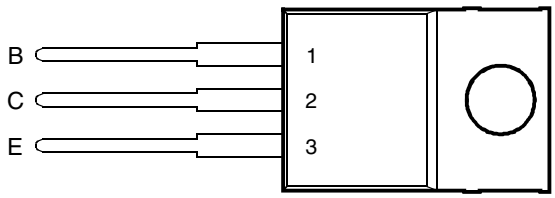
BOURNS®

- **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**

This series is obsolete and not recommended for new designs.

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)		$½LI_C^2$	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.

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 mA	I_B = 0	(see Note 5)	BDW53	45			V
					BDW53A	60			
					BDW53B	80			
					BDW53C	100			
					BDW53D	120			
I_{CEO}	Collector-emitter cut-off current	V_{CE} = 30 V	I_B = 0		BDW53			0.5	mA
		V_{CE} = 30 V	I_B = 0		BDW53A			0.5	
		V_{CE} = 40 V	I_B = 0		BDW53B			0.5	
		V_{CE} = 50 V	I_B = 0		BDW53C			0.5	
		V_{CE} = 60 V	I_B = 0		BDW53D			0.5	
I_{CBO}	Collector cut-off current	V_{CB} = 45 V	I_E = 0		BDW53			0.2	mA
		V_{CB} = 60 V	I_E = 0		BDW53A			0.2	
		V_{CB} = 80 V	I_E = 0		BDW53B			0.2	
		V_{CB} = 100 V	I_E = 0		BDW53C			0.2	
		V_{CB} = 120 V	I_E = 0		BDW53D			0.2	
		V_{CB} = 45 V	I_E = 0	T_C = 150°C	BDW53			5	
		V_{CB} = 60 V	I_E = 0	T_C = 150°C	BDW53A			5	
		V_{CB} = 80 V	I_E = 0	T_C = 150°C	BDW53B			5	
		V_{CB} = 100 V	I_E = 0	T_C = 150°C	BDW53C			5	
		V_{CB} = 120 V	I_E = 0	T_C = 150°C	BDW53D			5	
I_{EBO}	Emitter cut-off current	V_{EB} = 5 V	I_C = 0					2	mA
h_{FE}	Forward current transfer ratio	V_{CE} = 3 V	I_C = 1.5 A	(see Notes 5 and 6)		750		20000	
		V_{CE} = 3 V	I_C = 4 A			100			
$V_{BE(on)}$	Base-emitter voltage	V_{CE} = 3 V	I_C = 1.5 A	(see Notes 5 and 6)				2.5	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_B = 30 mA	I_C = 1.5 A	(see Notes 5 and 6)				2.5	V
		I_B = 40 mA	I_C = 4 A					4	
V_{EC}	Parallel diode forward voltage	I_E = 4 A	I_B = 0					3.5	V

NOTES: 5. These parameters must be measured using pulse techniques, t_p = 300 µs, duty cycle ≤ 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	°C/W
$R_{\theta JA}$	Junction to free air thermal resistance			62.5	°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 = 2 A	$I_{B(on)}$ = 8 mA	$I_{B(off)}$ = -8 mA		1		µs
t_{off}	Turn-off time	$V_{BE(off)}$ = -5 V	R_L = 15 Ω	t_p = 20 µs, dc ≤ 2%		4.5		µs

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

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TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN vs COLLECTOR CURRENT

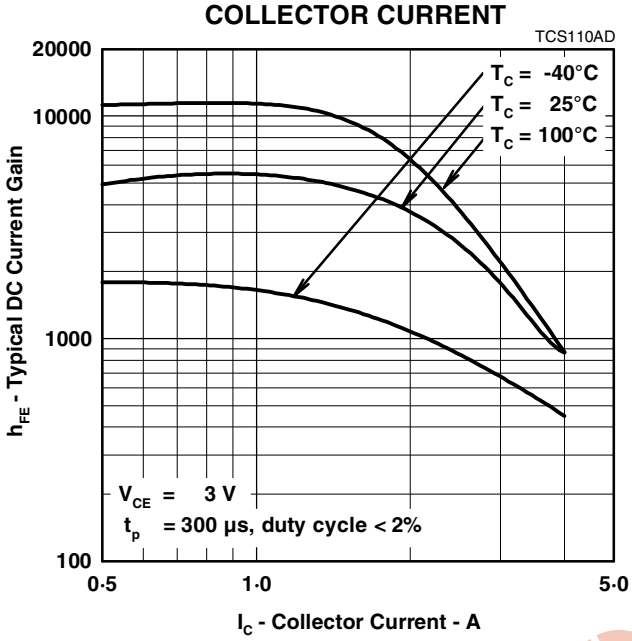

Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

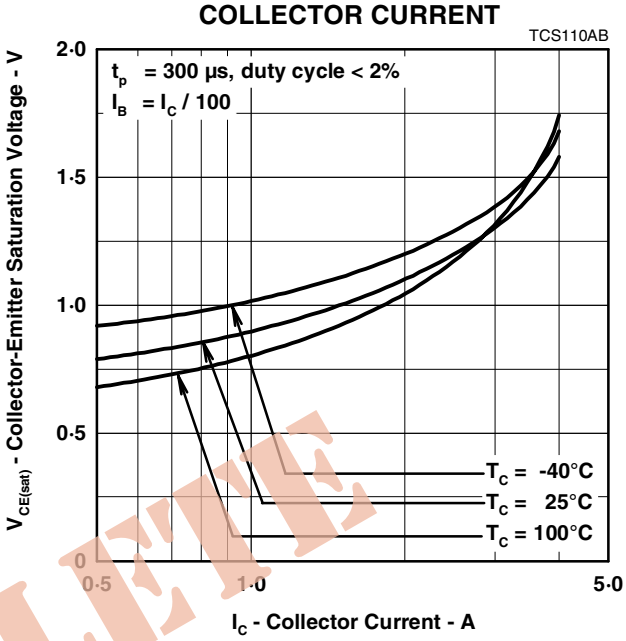

Figure 2.

BASE-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

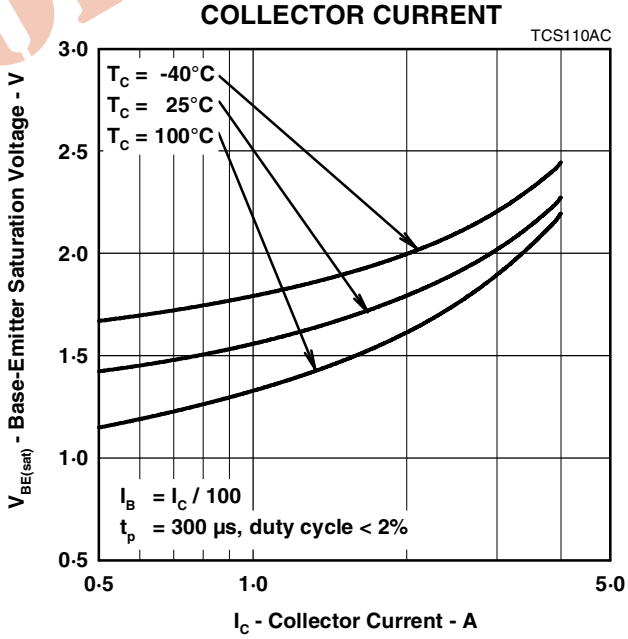

Figure 3.

MAXIMUM SAFE OPERATING REGIONS

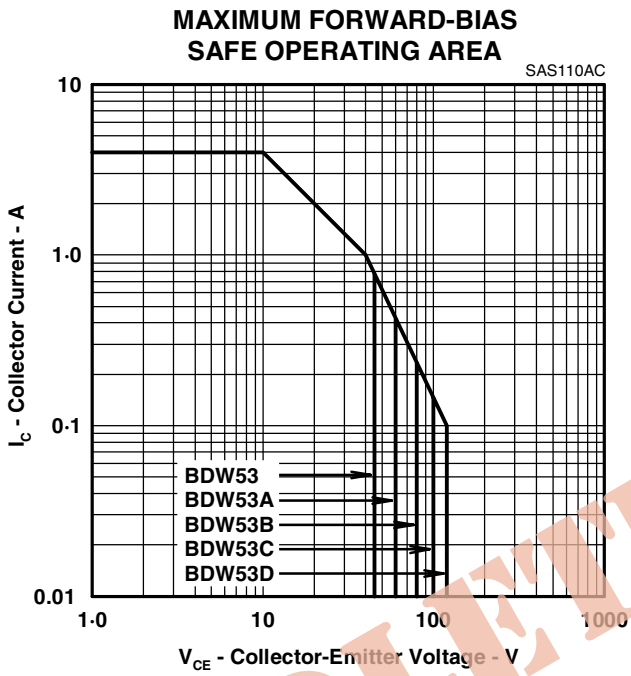

Figure 4.

THERMAL INFORMATION

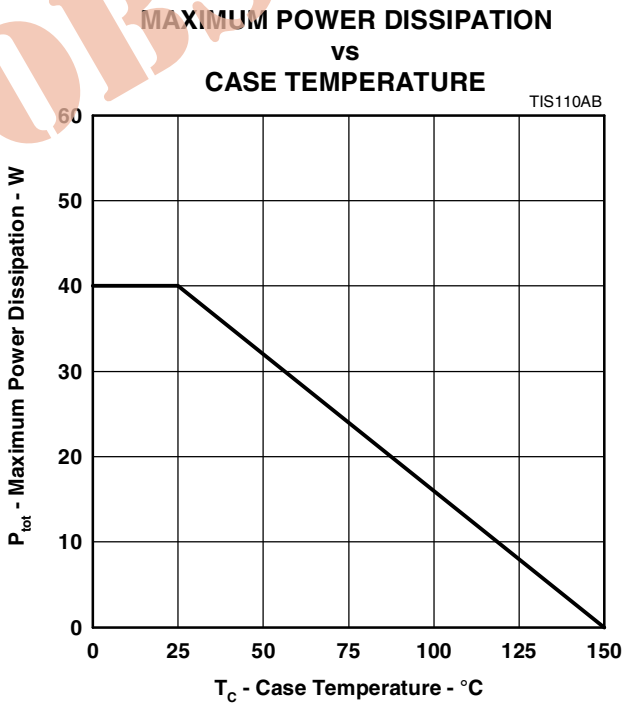

Figure 5.