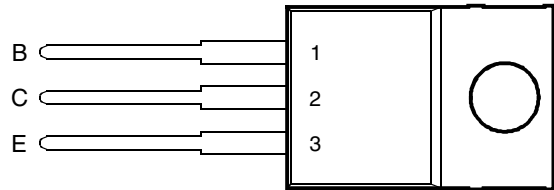


- Designed for Complementary Use with BDW54, BDW54A, BDW54B, BDW54C and BDW54D
- 40 W at 25°C Case Temperature
- 4 A Continuous Collector Current
- Minimum  $h_{FE}$  of 750 at 3V, 1.5 A

TO-220 PACKAGE  
(TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

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**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**

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**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 45 BDW53A 60 BDW53B 80 BDW53C 100 BDW53D 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 BDW53A BDW53B BDW53C BDW53D		0.2 0.2 0.2 0.2 0.2	mA
	$V_{CB} = 60 \text{ V}$	$I_E = 0$		BDW53 BDW53A BDW53B BDW53C BDW53D		5 5 5 5 5	mA
	$V_{CB} = 80 \text{ V}$	$I_E = 0$		BDW53 BDW53A BDW53B BDW53C BDW53D		5 5 5 5 5	mA
	$V_{CB} = 100 \text{ V}$	$I_E = 0$		BDW53 BDW53A BDW53B BDW53C BDW53D		5 5 5 5 5	mA
	$V_{CB} = 120 \text{ V}$	$I_E = 0$		BDW53 BDW53A BDW53B BDW53C BDW53D		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	$V_{CE} = 3 \text{ V}$	$I_C = 1.5 \text{ A}$	(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	$I_B = 30 \text{ mA}$	$I_C = 1.5 \text{ A}$	(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	°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	$I_C = 2 \text{ A}$	$I_{B(on)} = 8 \text{ mA}$	$I_{B(off)} = -8 \text{ mA}$		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		$\mu\text{s}$

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

**PRODUCT INFORMATION**

TYPICAL CHARACTERISTICS

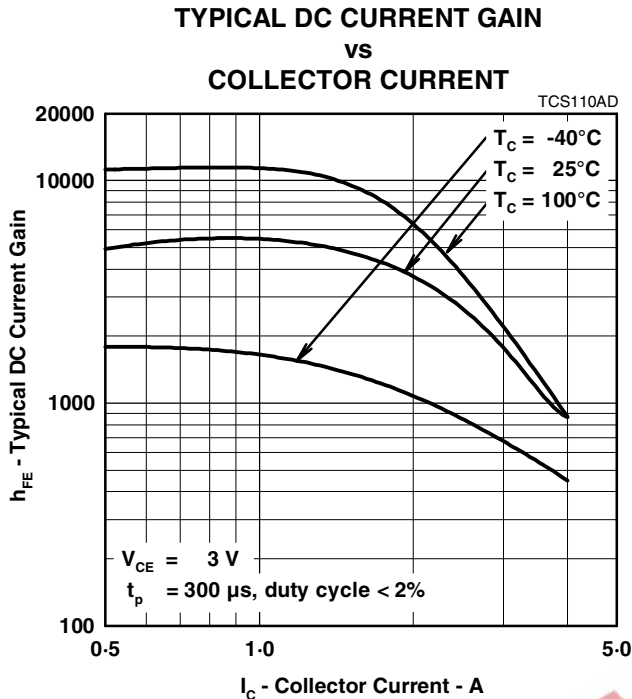


Figure 1.

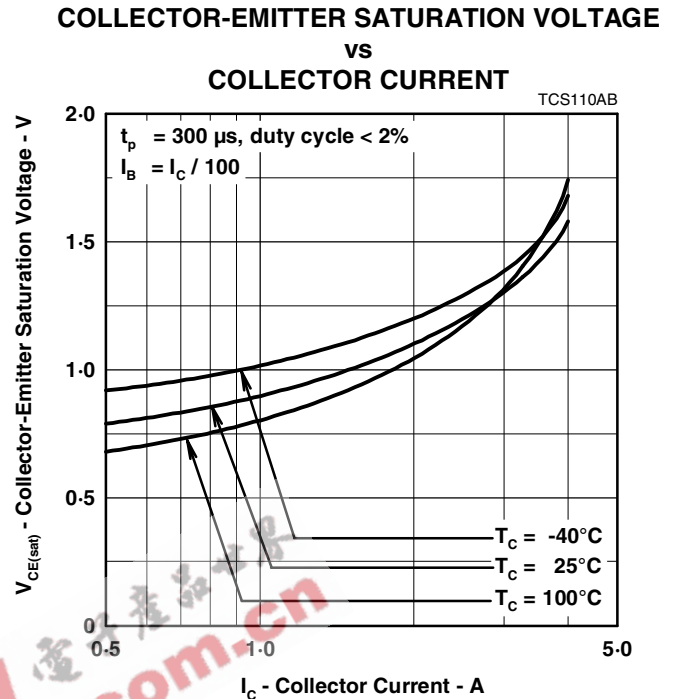


Figure 2.

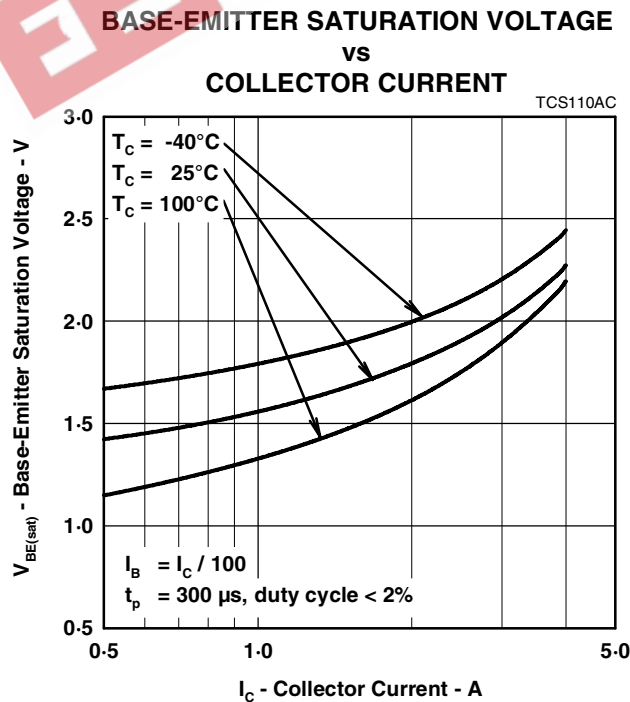


Figure 3.

**PRODUCT INFORMATION**

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## MAXIMUM SAFE OPERATING REGIONS

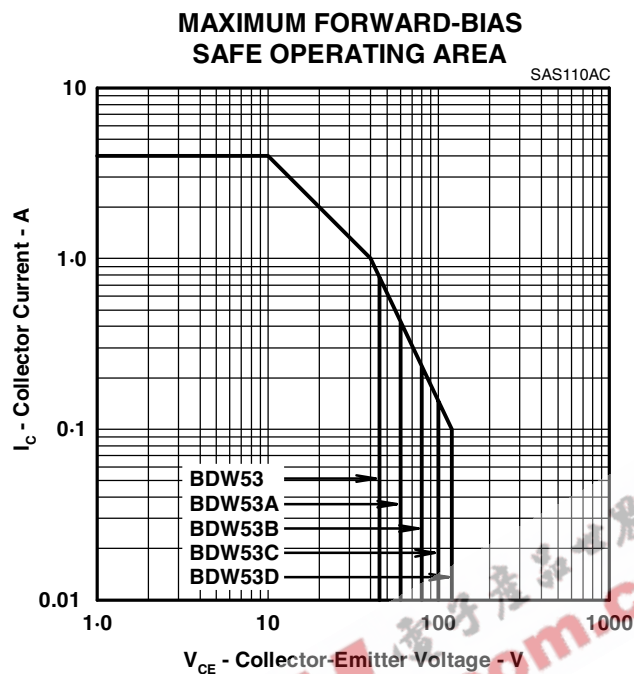


Figure 4.

## THERMAL INFORMATION

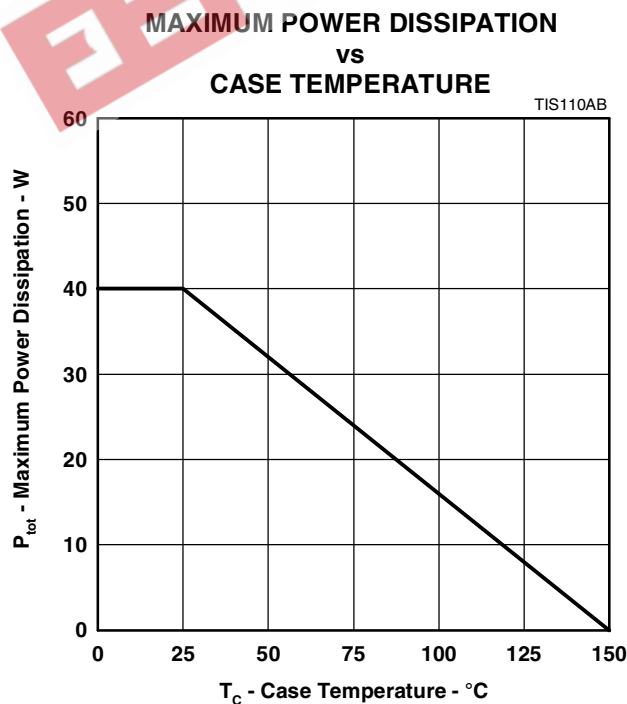


Figure 5.

## PRODUCT INFORMATION

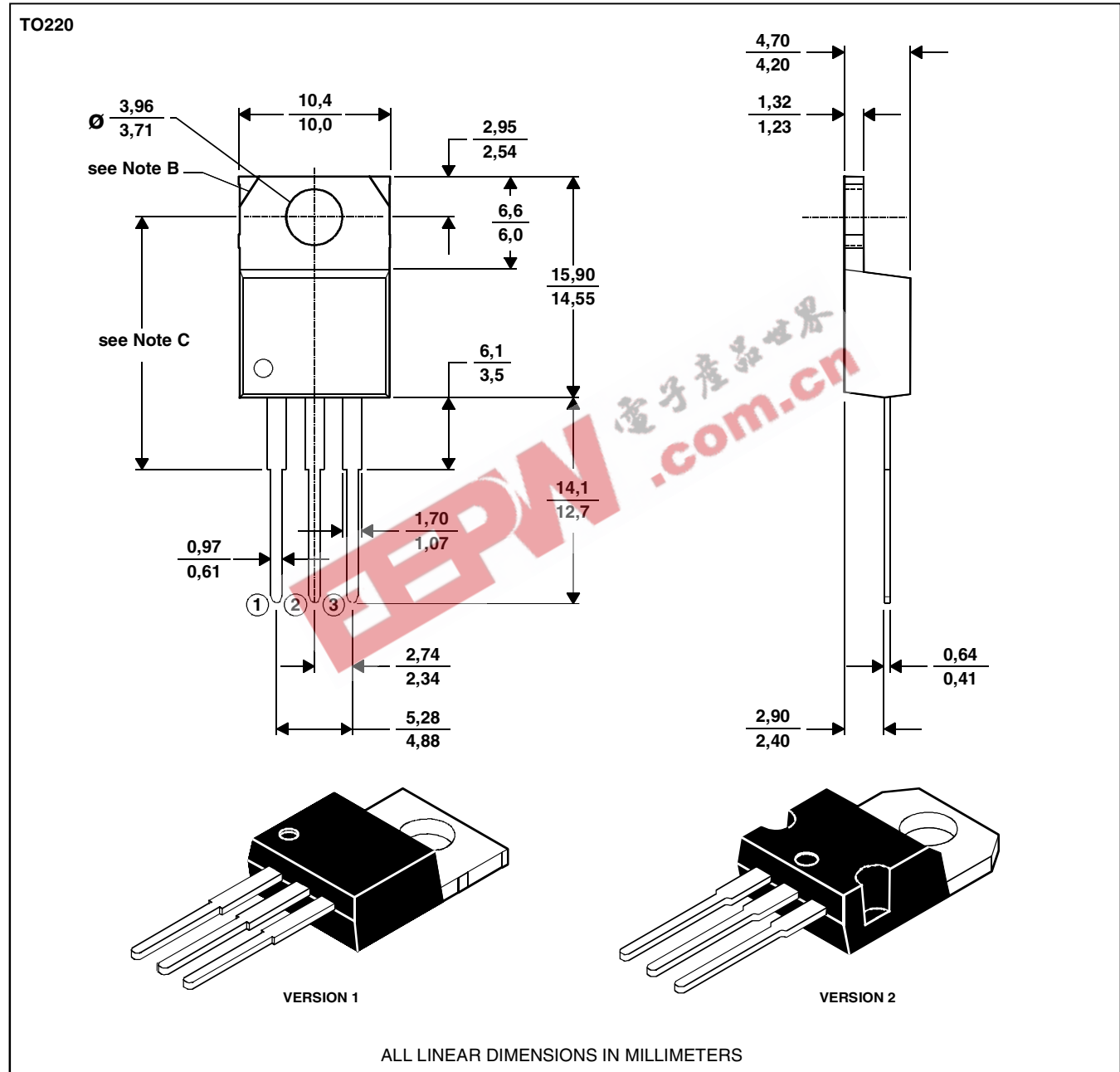
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## MECHANICAL DATA

### TO-220

#### 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.



NOTES: A. The centre pin is in electrical contact with the mounting tab.  
B. Mounting tab corner profile according to package version.  
C. Typical fixing hole centre stand off height according to package version.  
Version 1, 18.0 mm. Version 2, 17.6 mm.

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