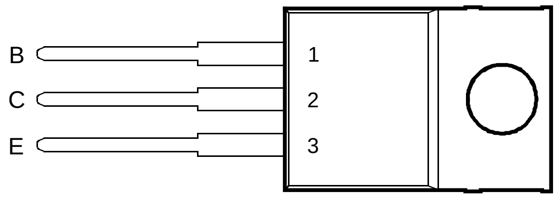
AUGUST 1993 - REVISED MARCH 1997

- **Designed for Complementary Use with BDW24, BDW24A, BDW24B and BDW24C**
- **50 W at 25°C Case Temperature**
- **6 A Continuous Collector Current**
- **Minimum h_{FE} of 750 at 3 V, 2 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)	BDW23	V_{CBO}	45	V
	BDW23A		60	
	BDW23B		80	
	BDW23C		100	
Collector-emitter voltage (I_B = 0)	BDW23	V_{CEO}	45	V
	BDW23A		60	
	BDW23B		80	
	BDW23C		100	
Emitter-base voltage		V_{EBO}	5	V
Continuous collector current		I_C	6	A
Continuous base current		I_B	0.2	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 1)		P_{tot}	50	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 2)		P_{tot}	2	W
Operating junction temperature range		T_j	-65 to +150	°C
Storage temperature range		T_{stg}	-65 to +150	°C
Operating free-air temperature range		T_A	-65 to +150	°C

NOTES: 1. Derate linearly to 150°C case temperature at the rate of 0.4 W/°C.
2. Derate linearly to 150°C free air temperature at the rate of 16 mW/°C.

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 = 100 mA	I_B = 0	(see Note 3)	BDW23	45			V
					BDW23A	60			
					BDW23B	80			
					BDW23C	100			
I_{CEO}	Collector-emitter cut-off current	V_{CE} = 30 V	I_B = 0		BDW23			0.5	mA
		V_{CE} = 30 V	I_B = 0		BDW23A			0.5	
		V_{CE} = 40 V	I_B = 0		BDW23B			0.5	
		V_{CE} = 50 V	I_B = 0		BDW23C			0.5	
I_{CBO}	Collector cut-off current	V_{CB} = 45 V	I_E = 0		BDW23			0.2	mA
		V_{CB} = 60 V	I_E = 0		BDW23A			0.2	
		V_{CB} = 80 V	I_E = 0		BDW23B			0.2	
		V_{CB} = 100 V	I_E = 0		BDW23C			0.2	
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 A	(see Notes 3 and 4)		1000		20000	
		V_{CE} = 3 V	I_C = 2 A			750			
		V_{CE} = 3 V	I_C = 6 A			100			
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_B = 8 mA	I_C = 2 A	(see Notes 3 and 4)				2	V
		I_B = 60 mA	I_C = 6 A					3	
$V_{BE(sat)}$	Base-emitter saturation voltage	I_B = 8 mA	I_C = 2 A	(see Notes 3 and 4)				2.5	
$V_{BE(on)}$	Base-emitter voltage	V_{CE} = 3 V	I_C = 1 A	(see Notes 3 and 4)				2.5	V
		V_{CE} = 3 V	I_C = 6 A					3	
V_{EC}	Parallel diode forward voltage	I_E = 2 A	I_B = 0					1.8	V

NOTES: 3. These parameters must be measured using pulse techniques, t_p = 300 µs, duty cycle ≤ 2%.
4. 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			2.5	°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 = 3 A	$I_{B(on)}$ = 12 mA	$I_{B(off)}$ = -12 mA		1		µs
t_{off}	Turn-off time	$V_{BE(off)}$ = -4.5 V	R_L = 10 Ω	t_p = 20 µs, dc ≤ 2%		5		µs

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

TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN vs COLLECTOR CURRENT

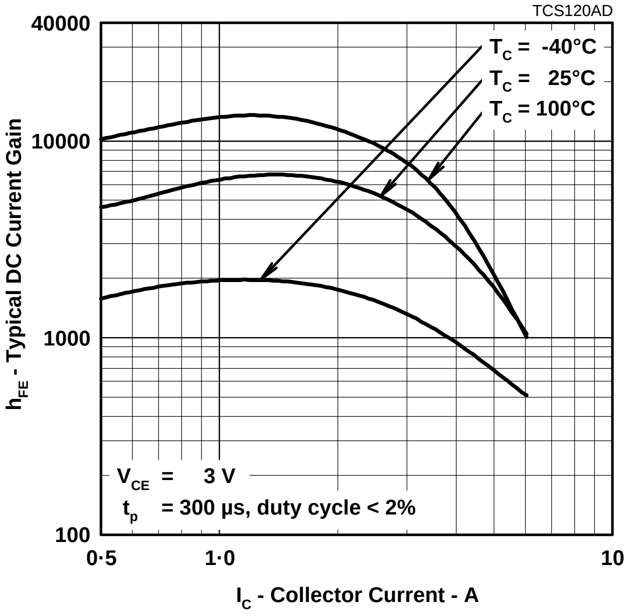


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

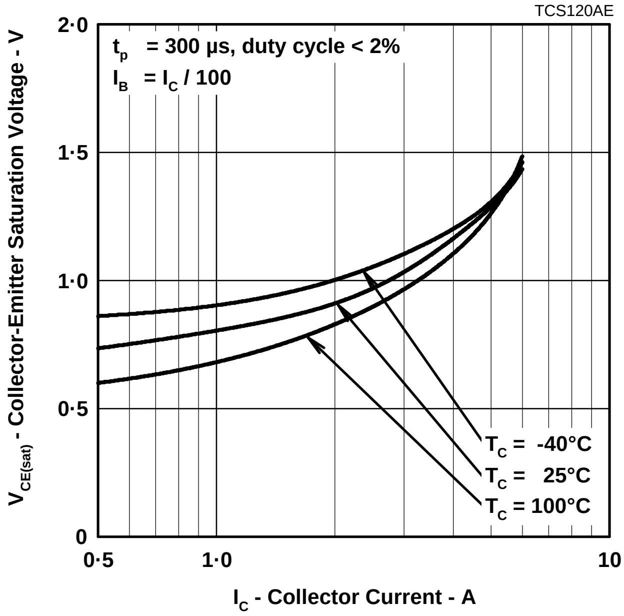


Figure 2.

BASE-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

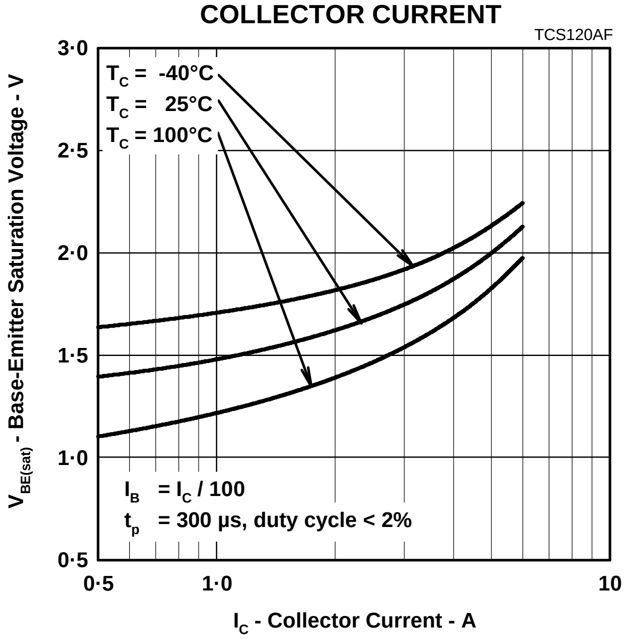


Figure 3.

MAXIMUM SAFE OPERATING REGIONS

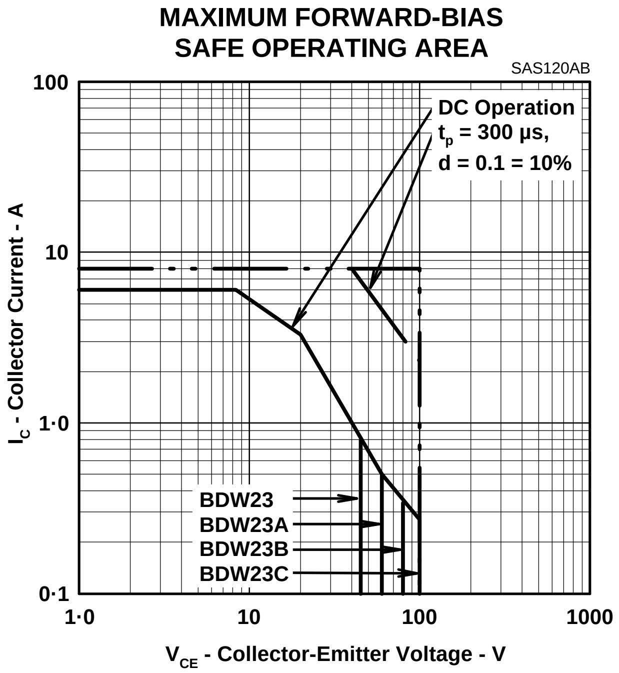


Figure 4.

THERMAL INFORMATION

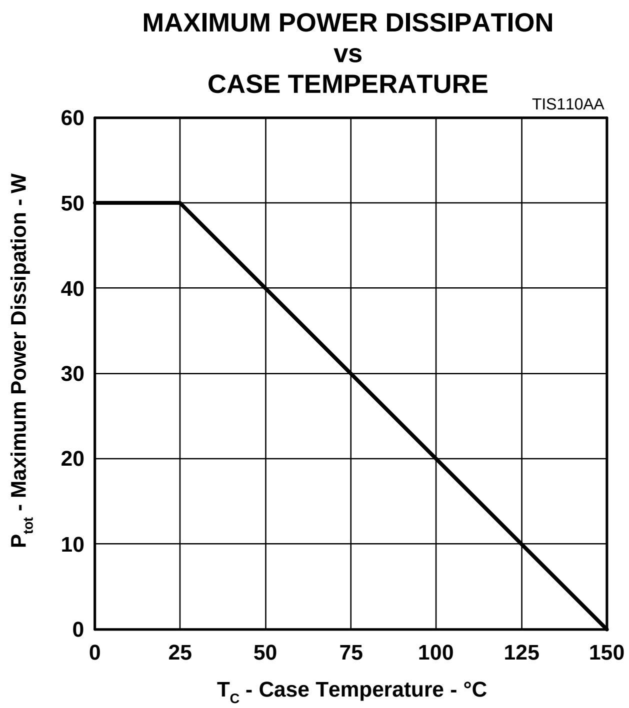
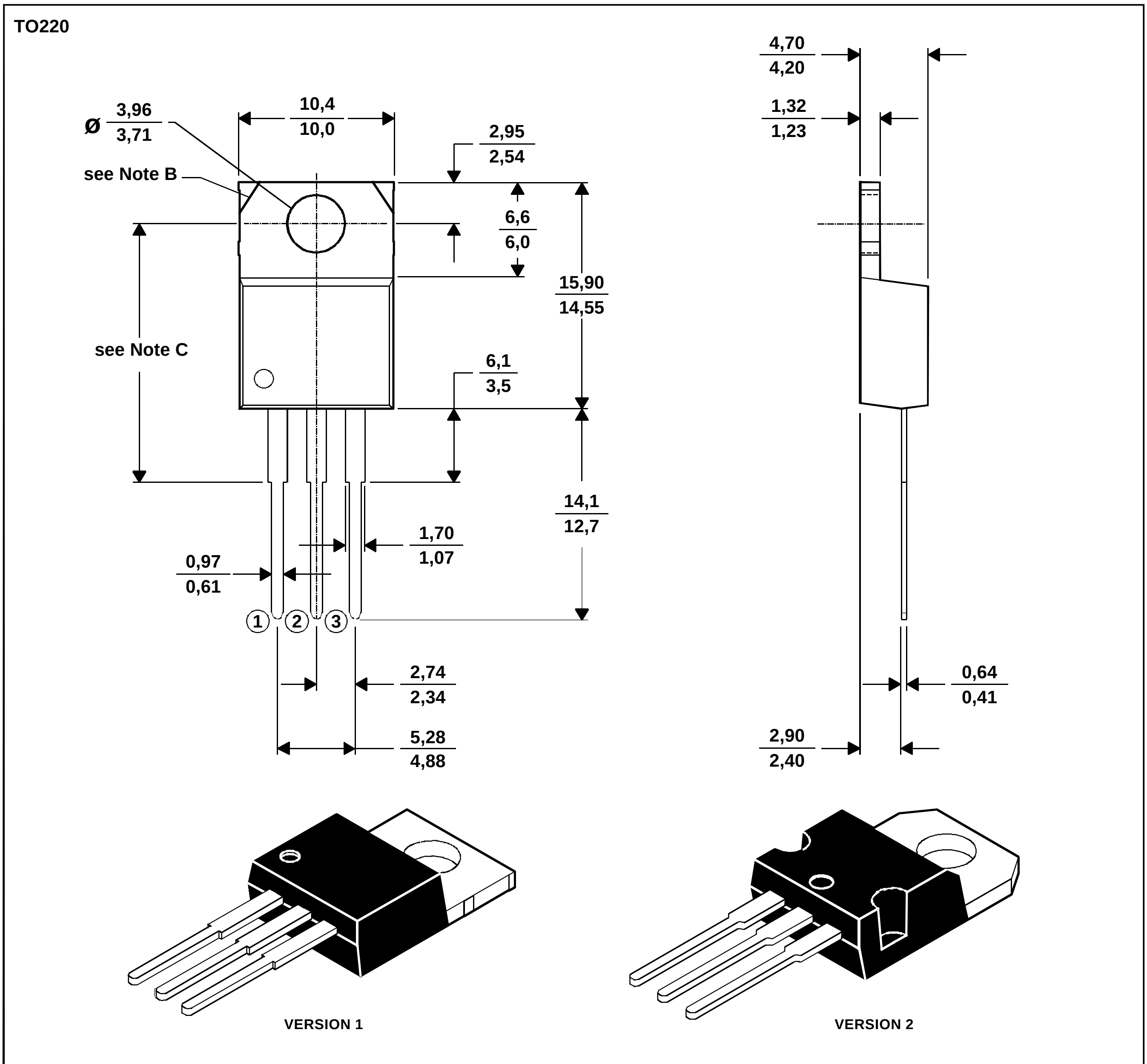


Figure 5.

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.



ALL LINEAR DIMENSIONS IN MILLIMETERS

MDXXBE

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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