

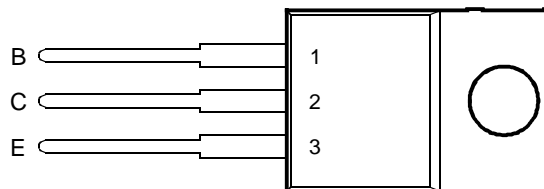
# BDW73, BDW73A, BDW73B, BDW73C, BDW73D NPN SILICON POWER DARLINGTONS

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AUGUST 1978 - REVISED MARCH 1997

- **Designed for Complementary Use with BDW74, BDW74A, BDW74B, BDW74C and BDW74D**
- **80 W at 25°C Case Temperature**
- **8 A Continuous Collector Current**
- **Minimum  $h_{FE}$  of 750 at 3 V, 3 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 ( $I_E = 0$ )	BDW73	$V_{CBO}$	45	V
	BDW73A		60	
	BDW73B		80	
	BDW73C		100	
	BDW73D		120	
Collector-emitter voltage ( $I_B = 0$ ) (see Note 1)	BDW73	$V_{CEO}$	45	V
	BDW73A		60	
	BDW73B		80	
	BDW73C		100	
	BDW73D		120	
Emitter-base voltage		$V_{EBO}$	5	V
Continuous collector current		$I_C$	8	A
Continuous base current		$I_B$	0.3	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		$P_{tot}$	80	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)		$\frac{1}{2}LI_C^2$	75	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 0.64 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

Information is current as of publication date. Products conform to specifications in accordance with the terms of Power Innovations standard warranty. Production processing does not necessarily include testing of all parameters.

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## NPN SILICON POWER DARLINGTONS

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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)	BDW73 45 BDW73A 60 BDW73B 80 BDW73C 100 BDW73D 120			V
$I_{CEO}$ Collector-emitter cut-off current	$V_{CE} = 30 \text{ V}$	$I_B = 0$		BDW73 BDW73A BDW73B BDW73C BDW73D		0.5 0.5 0.5 0.5 0.5	mA
$I_{CBO}$ Collector cut-off current	$V_{CB} = 45 \text{ V}$	$I_E = 0$		BDW73 BDW73A BDW73B BDW73C BDW73D		0.2 0.2 0.2 0.2 0.2	mA
	$V_{CB} = 45 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW73		5	
	$V_{CB} = 60 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW73A		5	
	$V_{CB} = 80 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW73B		5	
	$V_{CB} = 100 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW73C		5	
	$V_{CB} = 120 \text{ V}$	$I_E = 0$	$T_C = 150^\circ\text{C}$	BDW73D		5	
$I_{EBO}$ Emitter cut-off current	$V_{EB} = 5 \text{ V}$	$I_C = 0$				2	mA
$h_{FE}$ Forward current transfer ratio	$V_{CE} = 3 \text{ V}$	$I_C = 3 \text{ A}$	(see Notes 5 and 6)	750		20000	
	$V_{CE} = 3 \text{ V}$	$I_C = 8 \text{ A}$		100			
$V_{BE(on)}$ Base-emitter voltage	$V_{CE} = 3 \text{ V}$	$I_C = 3 \text{ A}$	(see Notes 5 and 6)			2.5	V
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 12 \text{ mA}$	$I_C = 3 \text{ A}$	(see Notes 5 and 6)			2.5	V
	$I_B = 80 \text{ mA}$	$I_C = 8 \text{ A}$				4	V
$V_{EC}$ Parallel diode forward voltage	$I_E = 8 \text{ A}$	$I_B = 0$				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			1.56	$^\circ\text{C/W}$
$R_{\theta JA}$ Junction to free air thermal resistance			62.5	$^\circ\text{C/W}$

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

PARAMETER	TEST CONDITIONS †			MIN	TYP	MAX	UNIT
$t_{on}$ Turn-on time	$I_C = 3 \text{ A}$	$I_{B(on)} = 12 \text{ mA}$	$I_{B(off)} = -12 \text{ mA}$		1		$\mu\text{s}$
$t_{off}$ Turn-off time	$V_{BE(off)} = -3.5 \text{ V}$	$R_L = 10 \Omega$	$t_p = 20 \mu\text{s}$ , dc $\leq 2\%$		5		$\mu\text{s}$

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

TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN  
VS  
COLLECTOR CURRENT

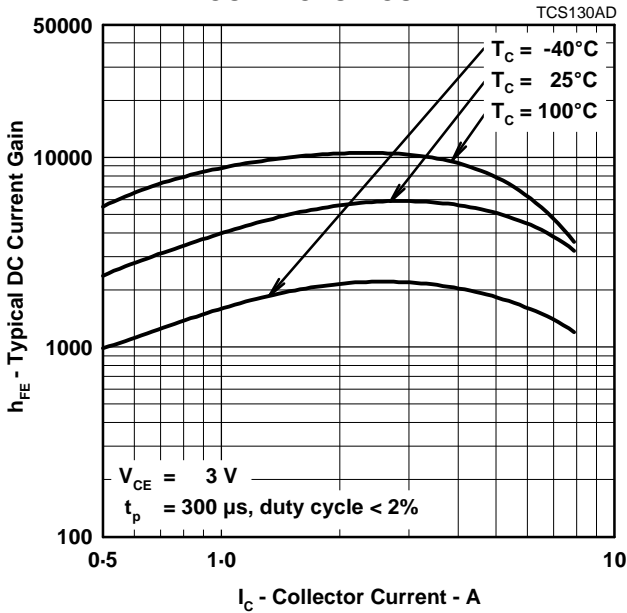


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE  
VS  
COLLECTOR CURRENT

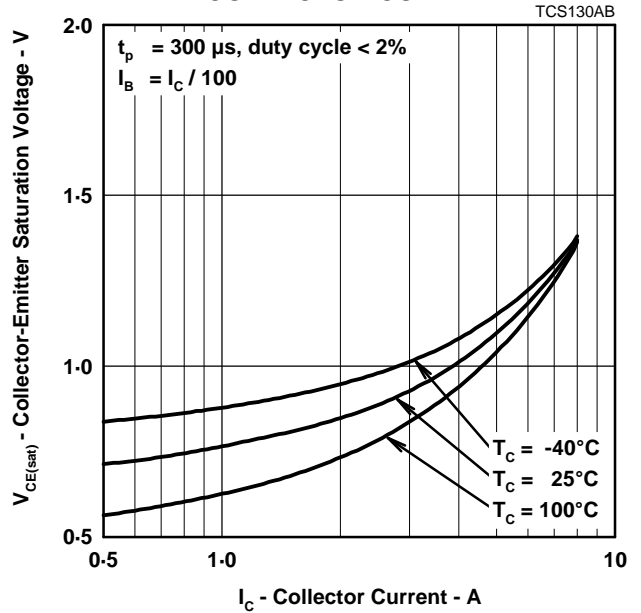


Figure 2.

BASE-EMITTER SATURATION VOLTAGE  
VS  
COLLECTOR CURRENT

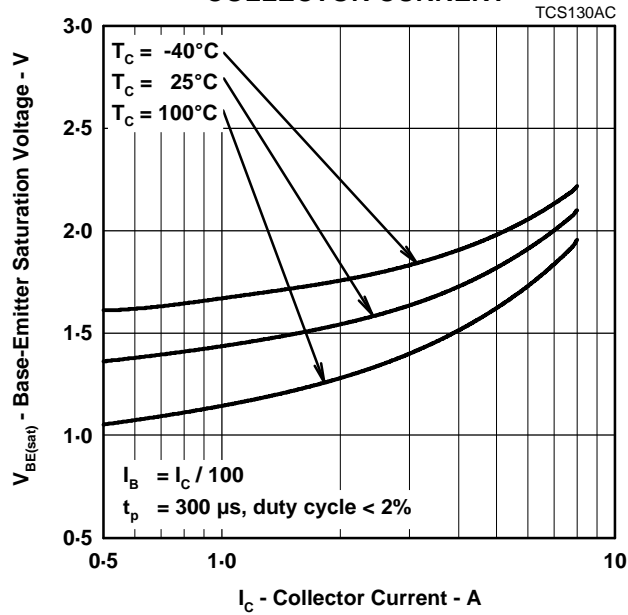


Figure 3.

# BDW73, BDW73A, BDW73B, BDW73C, BDW73D NPN SILICON POWER DARLINGTONS

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## MAXIMUM SAFE OPERATING REGIONS

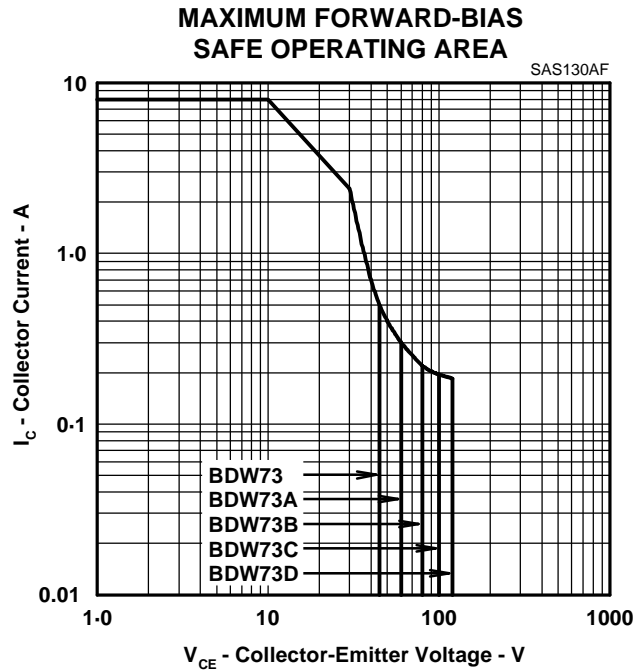


Figure 4.

## THERMAL INFORMATION

### MAXIMUM POWER DISSIPATION vs CASE TEMPERATURE

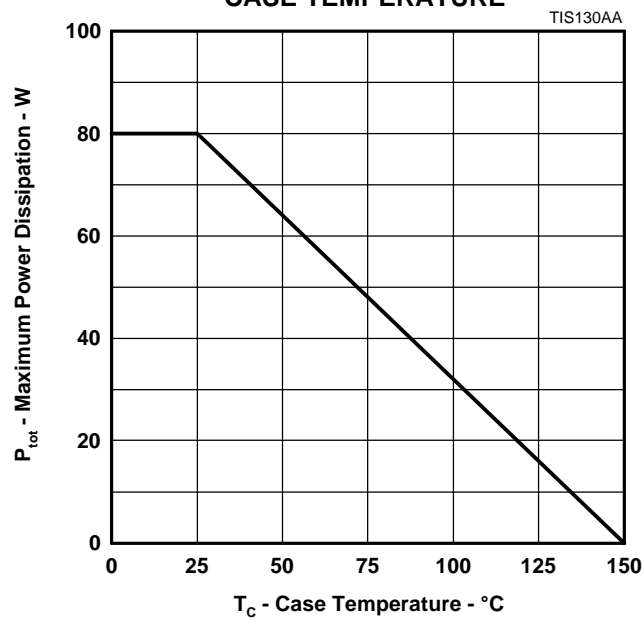


Figure 5.

# BDW73, BDW73A, BDW73B, BDW73C, BDW73D NPN SILICON POWER DARLINGTONS

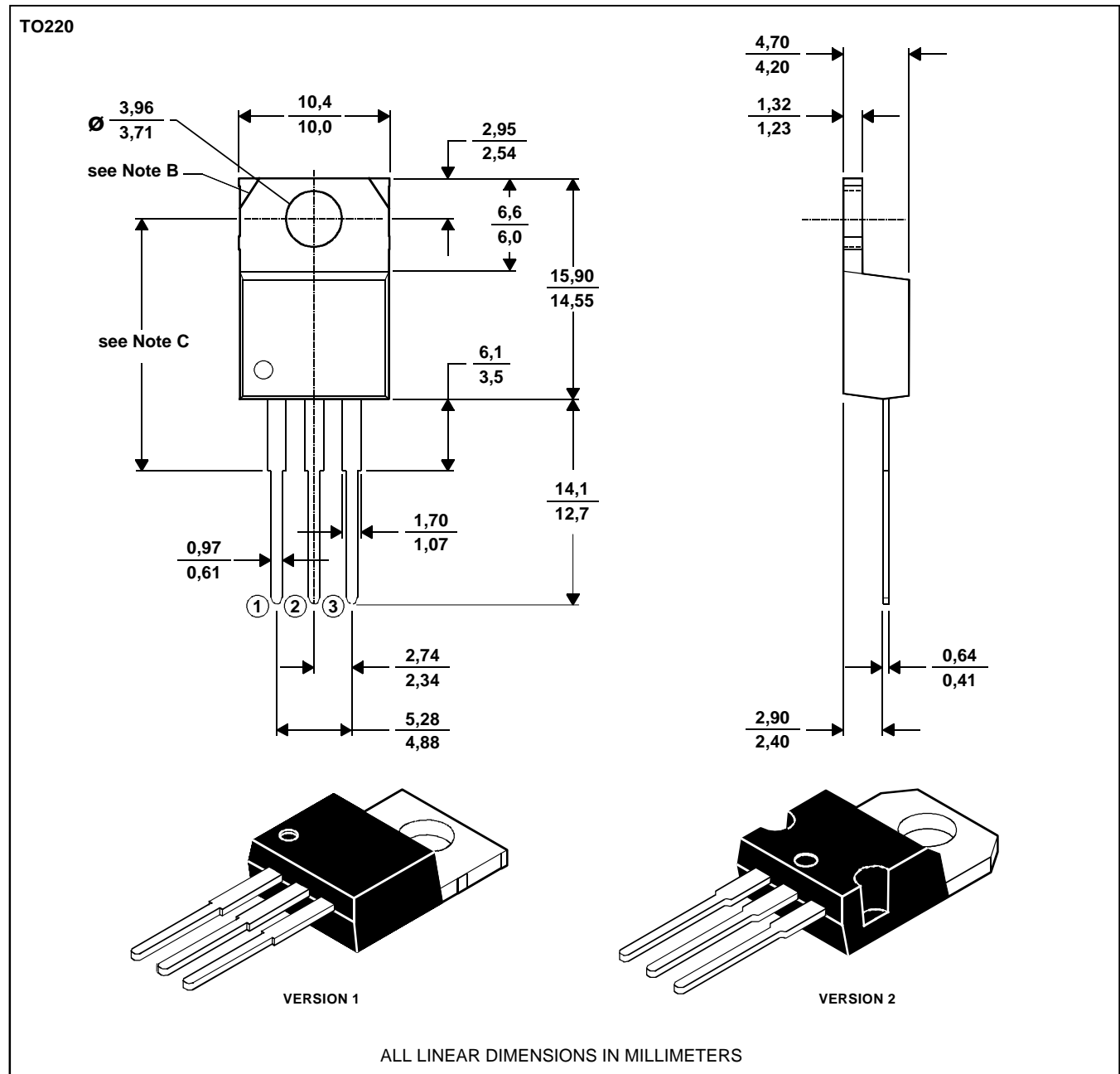
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## MECHANICAL DATA

### 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.

MDXXBE

## PRODUCT INFORMATION

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## **NPN SILICON POWER DARLINGTONS**

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