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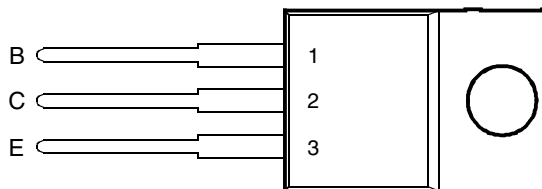
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- Designed for Complementary Use with BDX34, BDX34A, BDX34B, BDX34C and BDX34D
- 70 W at 25°C Case Temperature
- 10 A Continuous Collector Current
- Minimum  $h_{FE}$  of 750 at 3V, 3 A

TO-220 PACKAGE  
(TOP VIEW)



This series is obsolete and not recommended for new designs.

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 ( $I_E = 0$ )	BDX33	$V_{CBO}$	45	V
	BDX33A		60	
	BDX33B		80	
	BDX33C		100	
	BDX33D		120	
Collector-emitter voltage ( $I_B = 0$ )	BDX33	$V_{CEO}$	45	V
	BDX33A		60	
	BDX33B		80	
	BDX33C		100	
	BDX33D		120	
Emitter-base voltage		$V_{EBO}$	5	V
Continuous collector current		$I_C$	10	A
Continuous base current		$I_B$	0.3	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 1)		$P_{tot}$	70	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 2)		$P_{tot}$	2	W
Operating free air 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 0.56 W/°C.  
2. Derate linearly to 150°C free air temperature at the rate of 16 mW/°C.

**PRODUCT INFORMATION**

AUGUST 1993 - REVISED SEPTEMBER 2002  
Specifications are subject to change without notice.

**BDX33, BDX33A, BDX33B, BDX33C, BDX33D**  
**NPN SILICON POWER DARLINGTONS**



**electrical characteristics at 25°C case temperature (unless otherwise noted)**

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$ Collector-emitter breakdown voltage	$I_C = 100 \text{ mA}$	$I_B = 0$ (see Note 3)	BDX33	45		V
			BDX33A	60		
			BDX33B	80		
			BDX33C	100		
			BDX33D	120		
$I_{CEO}$ Collector-emitter cut-off current	$V_{CE} = 30 \text{ V}$	$I_B = 0$	BDX33		0.5	mA
			BDX33A		0.5	
			BDX33B		0.5	
			BDX33C		0.5	
			BDX33D		0.5	
			BDX33	$T_C = 100^\circ\text{C}$	10	
			BDX33A	$T_C = 100^\circ\text{C}$	10	
			BDX33B	$T_C = 100^\circ\text{C}$	10	
			BDX33C	$T_C = 100^\circ\text{C}$	10	
			BDX33D	$T_C = 100^\circ\text{C}$	10	
$I_{CBO}$ Collector cut-off current	$V_{CB} = 45 \text{ V}$	$I_E = 0$	BDX33		1	mA
			BDX33A		1	
			BDX33B		1	
			BDX33C		1	
			BDX33D		1	
			BDX33	$T_C = 100^\circ\text{C}$	5	
			BDX33A	$T_C = 100^\circ\text{C}$	5	
			BDX33B	$T_C = 100^\circ\text{C}$	5	
			BDX33C	$T_C = 100^\circ\text{C}$	5	
			BDX33D	$T_C = 100^\circ\text{C}$	5	
$I_{EBO}$ Emitter cut-off current	$V_{EB} = 5 \text{ V}$	$I_C = 0$			10	mA
$h_{FE}$ Forward current transfer ratio	$V_{CE} = 3 \text{ V}$	$I_C = 4 \text{ A}$	BDX33	750		
			BDX33A	750		
			BDX33B	750		
			BDX33C	750		
			BDX33D	750		
$V_{BE(on)}$ Base-emitter voltage	$V_{CE} = 3 \text{ V}$	$I_C = 4 \text{ A}$	BDX33		2.5	V
			BDX33A		2.5	
			BDX33B	(see Notes 3 and 4)	2.5	
			BDX33C		2.5	
			BDX33D		2.5	
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 8 \text{ mA}$	$I_C = 4 \text{ A}$	BDX33		2.5	V
			BDX33A		2.5	
			BDX33B	(see Notes 3 and 4)	2.5	
			BDX33C		2.5	
			BDX33D		2.5	
$V_{EC}$ Parallel diode forward voltage	$I_E = 8 \text{ A}$	$I_B = 0$			4	V

NOTES: 3. These parameters must be measured using pulse techniques,  $t_p = 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

4. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

**PRODUCT INFORMATION**



**thermal characteristics**

PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to case thermal resistance			1.78	°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	$I_C = 3\text{ A}$	$I_{B(on)} = 12\text{ mA}$	$I_{B(off)} = -12\text{ mA}$		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.

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TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN  
VS  
COLLECTOR CURRENT

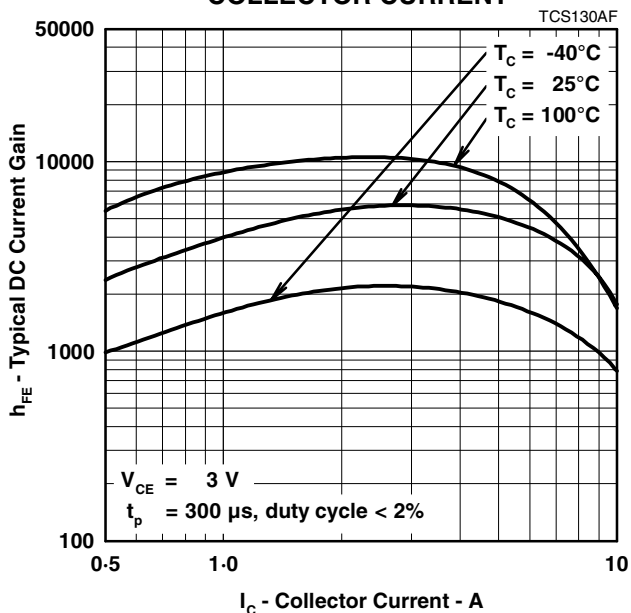


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE  
VS  
COLLECTOR CURRENT

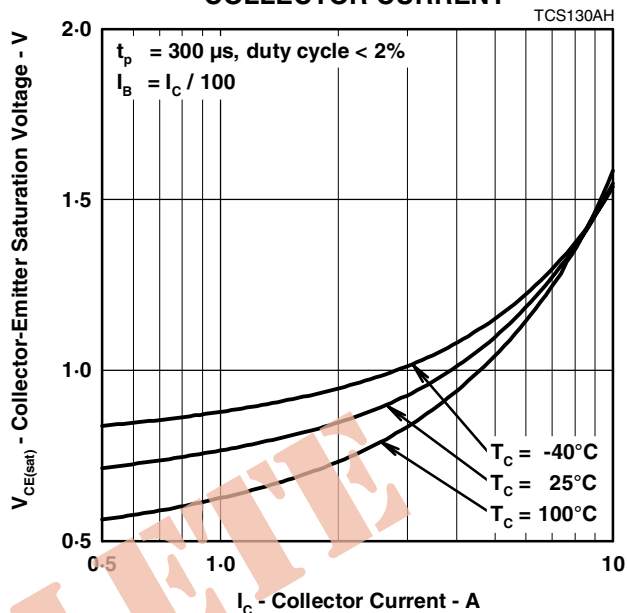


Figure 2.

BASE-EMITTER SATURATION VOLTAGE  
VS  
COLLECTOR CURRENT

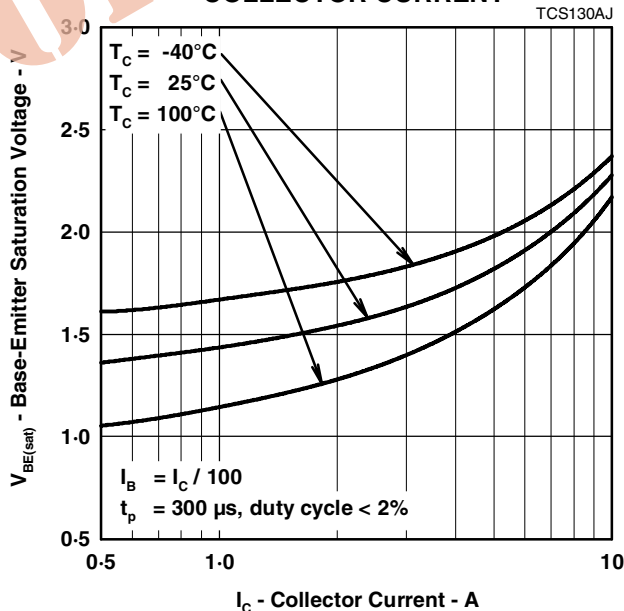


Figure 3.

**PRODUCT INFORMATION**

**THERMAL INFORMATION**

**MAXIMUM POWER DISSIPATION  
vs  
CASE TEMPERATURE**

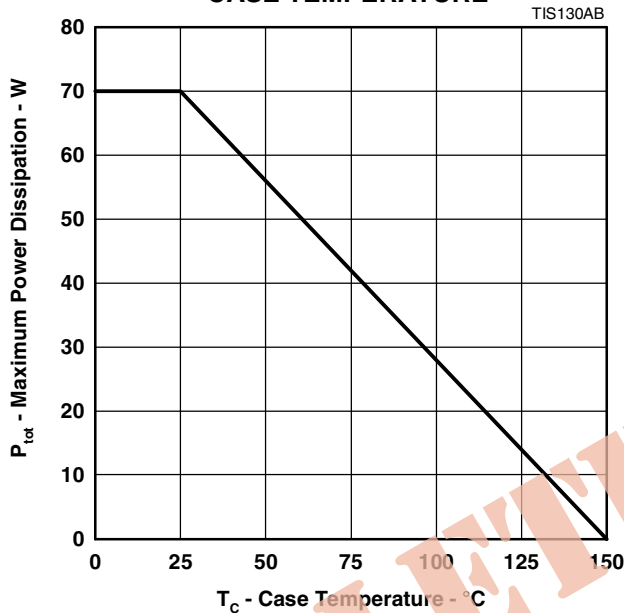


Figure 4.

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