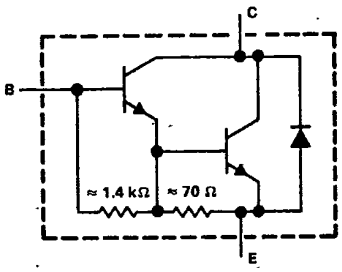
BDX53, BDX53A, BDX53B, BDX53C
N-P-N SILICON POWER DARLINGTONS

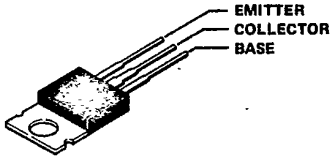
REVISED OCTOBER 1984

- 60 W at 25°C Case Temperature
- 8 A Continuous Collector Current
- Min h_{FE} of 750 at 3 V, 3 A

device schematic



TO-220AB PACKAGE



THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE MOUNTING TAB

absolute maximum ratings at 25°C case temperature (unless otherwise noted)

	BDX53	BDX53A	BDX53B	BDX53C
Collector-base voltage	45 V	60 V	80 V	100 V
Collector-emitter voltage (I_B = 0)	45 V	60 V	80 V	100 V
Emitter-base voltage	5 V			
Continuous collector current	8 A			
Continuous base current	200 mA			
Continuous device dissipation at (or below) 25°C case temperature (see Note 1)	60 W			
Continuous device dissipation at (or below) 25°C free-air temperature (see Note 2)	2 W			
Operating free-air temperature range	−65°C to 150°C			
Operating collector junction and storage temperature range	−65°C to 150°C			

NOTES: 1. Derate linearly to 150°C case temperature at the rate of 0.48 W/°C.
2. Derate linearly to 150°C free-air temperature at the rate of 16 mW/°C.

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electrical characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	BDX53			BDX53A			BDX53B			BDX53C			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$V_{(BR)CEO}$	I_C = 100 mA, I_B = 0, See Note 3	45			60			80			100			V
I_{CEO}	V_{CE} = 30 V, I_B = 0			500			500							μA
	V_{CE} = 40 V, I_B = 0									500				
	V_{CE} = 50 V, I_B = 0												500	
I_{CBO}	V_{CB} = 45 V, V_{BE} = 0			200										μA
	V_{CB} = 60 V, V_{BE} = 0						200							
	V_{CB} = 80 V, V_{BE} = 0									200				
	V_{CB} = 100 V, V_{BE} = 0												200	
I_{EBO}	V_{EB} = 5 V, I_C = 0			2			2			2			2	mA
h_{FE}	V_{CE} = 3 V, I_C = 3 A, See Notes 3 and 4	750			750			750			750			
$V_{BE(sat)}$	I_C = 3 A, I_B = 12 mA, See Notes 3 and 4			2.5			2.5			2.5			2.5	V
$V_{CE(sat)}$	I_C = 3 A, I_B = 12 mA, See Notes 3 and 4			2			2			2			2	V
V_F	I_F = 3 A			2.5			2.5			2.5			2.5	V

NOTES: 3. These parameters must be measured using pulse techniques, t_w = 300 μs, duty cycle ≤ 2%.
4. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts and located within 3,2 mm (0.125 inch) from the device body.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$			2.08	°C/W
$R_{\theta JA}$			62.5	

resistive-load switching characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{on}	I_C = 3 A, I_{B1} = 12 mA, I_{B2} = −12 mA,		1		μs
t_{off}	$V_{BE(off)}$ = −4.5 V, R_L = 10 Ω, See Figure 1		5		

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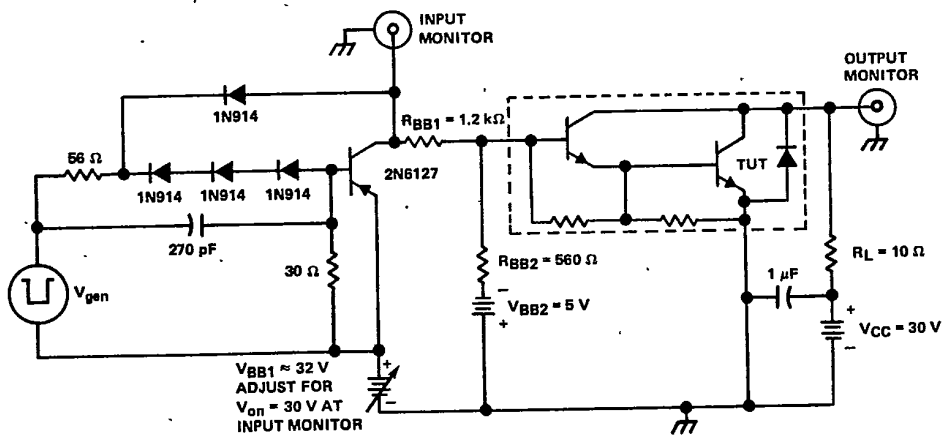
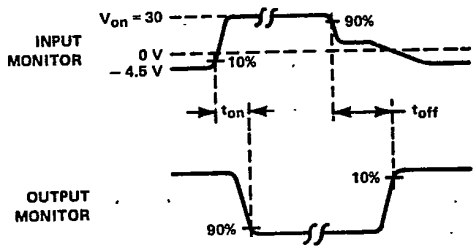
PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

NOTES: A. V_{gen} is a − 30-V pulse into a 50 Ω termination.
B. The V_{gen} waveform is supplied by a generator with the following characteristics: $t_r \leq 15$ ns, $t_f \leq 15$ ns, $Z_{out} = 50\ \Omega$, $t_w = 20\ \mu s$, duty cycle ≤ 2 %.
C. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{in} \geq 10$ MΩ, $C_{in} \leq 11.5$ pF.
D. Resistors must be noninductive types.
E. The d-c power supplies may require additional bypassing in order to minimize ringing.

FIGURE 1. RESISTIVE-LOAD SWITCHING

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N-P-N SILICON POWER DARLINGTONS

TYPICAL CHARACTERISTICS

STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

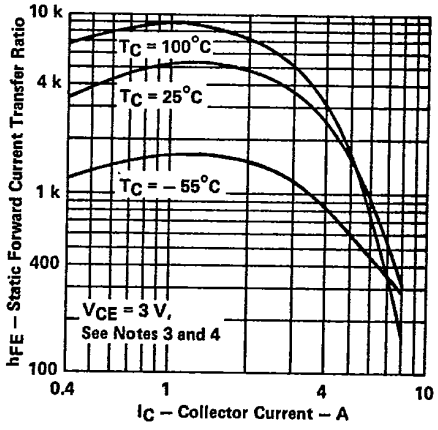

FIGURE 2

BASE-EMITTER VOLTAGE
vs
CASE TEMPERATURE

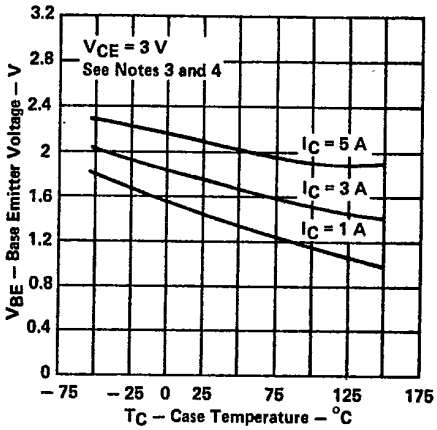

FIGURE 3

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
CASE TEMPERATURE

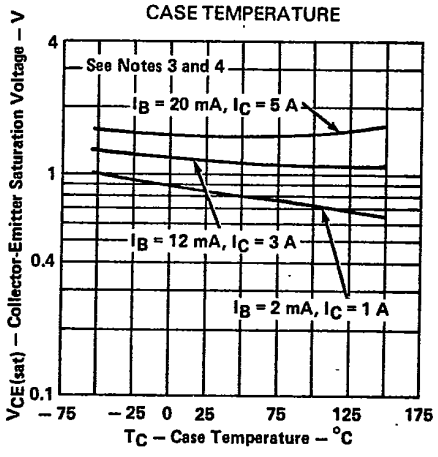

FIGURE 4

SMALL SIGNAL COMMON-EMITTER
FORWARD CURRENT TRANSFER RATIO
vs
FREQUENCY

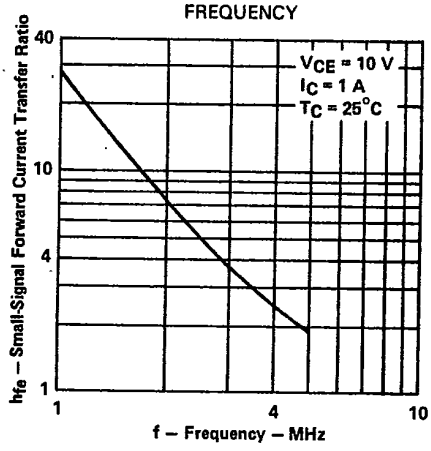

FIGURE 5

NOTES: 3. These parameters must be measured using pulse techniques, $t_w = 300\,\mu s$, duty cycle ≤ 2%.
4. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts and located within 3,2 mm (0.125 inch) from the device body.

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MAXIMUM SAFE OPERATING AREA

MAXIMUM COLLECTOR CURRENT
vs
COLLECTOR-EMITTER VOLTAGE

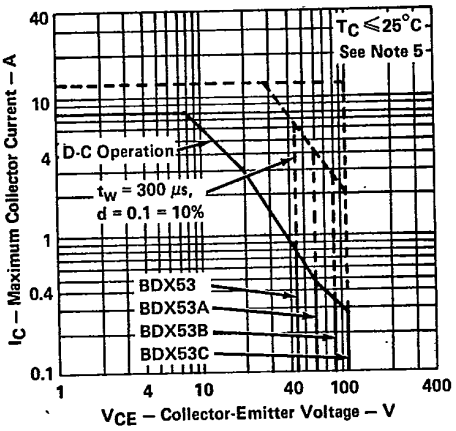

FIGURE 6

NOTE 5: This combination of maximum voltage and current may be achieved only when switching from saturation to cutoff with a clamped inductive load.

THERMAL INFORMATION

CASE TEMPERATURE
DISSIPATION DERATING CURVE

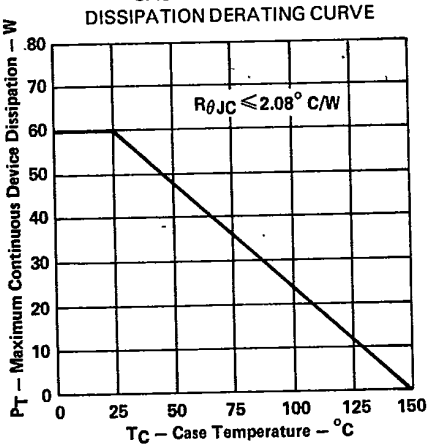

FIGURE 7

FREE-AIR TEMPERATURE
DISSIPATION DERATING CURVE

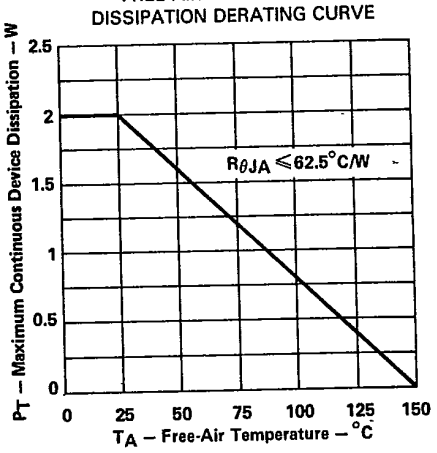

FIGURE 8