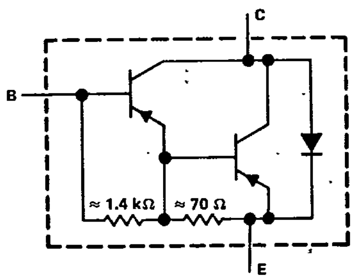
BDX54, BDX54A, BDX54B, BDX54C
P-N-P SILICON POWER DARLINGTONS

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



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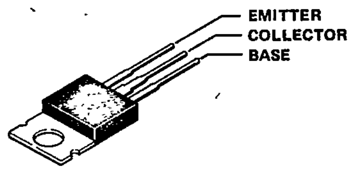

THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE MOUNTING TAB

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

	BDX54	BDX54A	BDX54B	BDX54C
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 25°C case temperature (see Note 1)	60 W			
Continuous device dissipation at 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	BDX54			BDX54A			BDX54B			BDX54C			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				μA
	$V_{CE} = -50$ V, $I_B = 0$												−500	μA
I_{CBO}	$V_{CB} = -45$ V, $I_E = 0$			−200										μA
	$V_{CB} = -60$ V, $I_E = 0$						−200							μA
	$V_{CB} = -80$ V, $I_E = 0$									−200				μA
	$V_{CB} = -100$ V, $I_E = 0$												−200	μA
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	°C/W

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}	$V_{BE(off)} = 4.2$ V, $R_L = 10\ \Omega$, See Figure 1		5		μs

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BD, BDW, BDX, BU, BUX, BUY Devices

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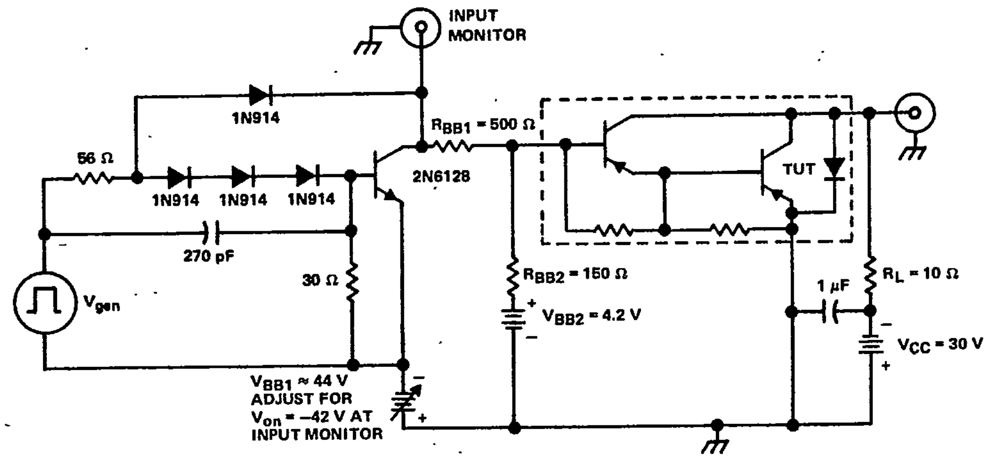
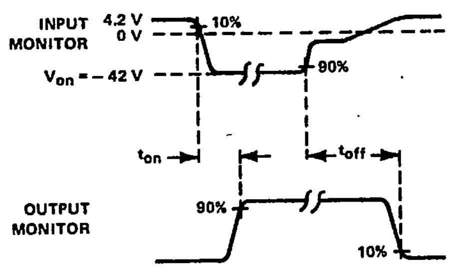
PARAMETER MEASUREMENT INFORMATION



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 Ω, t_w = 20 μs, 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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BD, BDW, BDX, BU, BUX, BUY Devices

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TYPICAL CHARACTERISTICS

STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

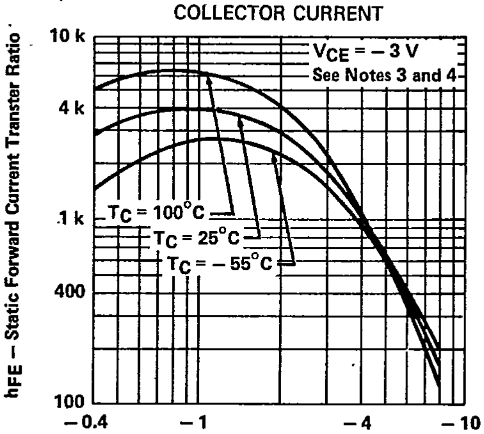

FIGURE 2

BASE-EMITTER VOLTAGE
vs
CASE TEMPERATURE

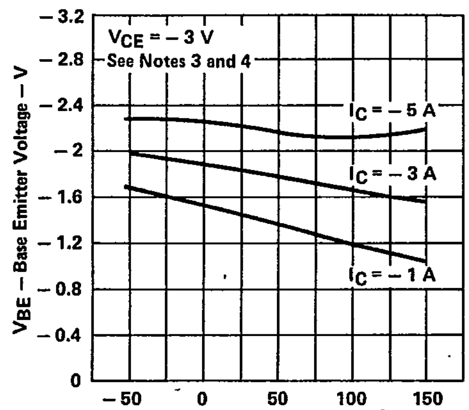

FIGURE 3

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
CASE TEMPERATURE

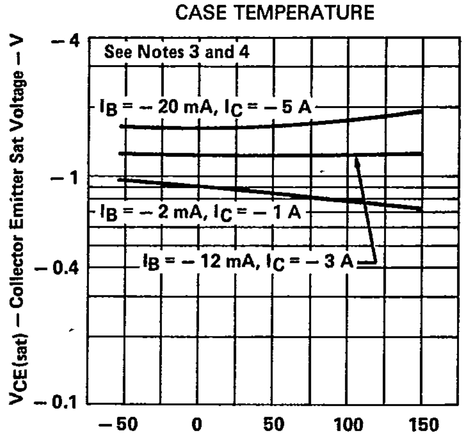

FIGURE 4

SMALL SIGNAL COMMON EMITTER
FORWARD CURRENT TRANSFER RATIO
vs
FREQUENCY

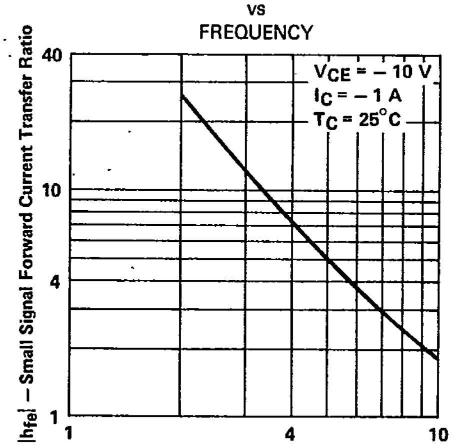

FIGURE 5

NOTES: 3. These parameters must be measured using pulse techniques, t_w = 300 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.

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MAXIMUM SAFE OPERATING AREA

MAXIMUM COLLECTOR CURRENT
vs
COLLECTOR-EMITTER VOLTAGE

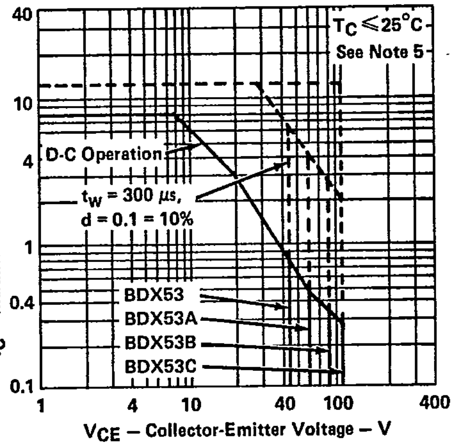

FIGURE 6

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

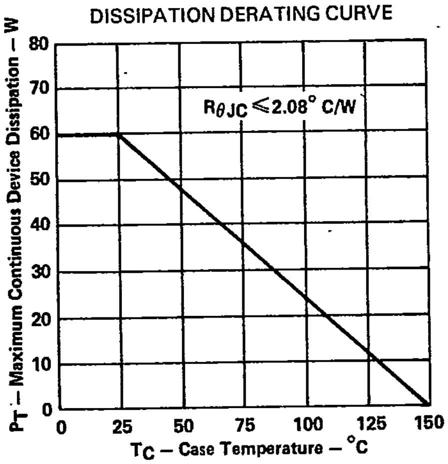

FIGURE 7

FREE-AIR TEMPERATURE
DISSIPATION DERATING CURVE

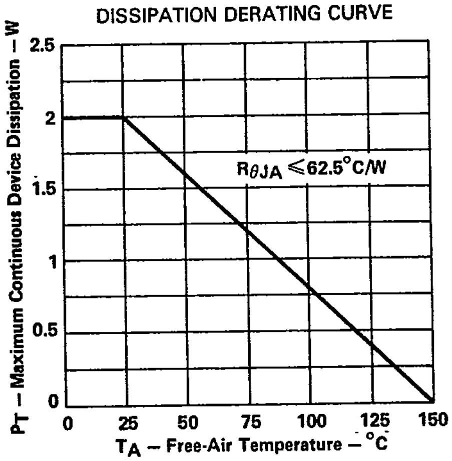

FIGURE 8