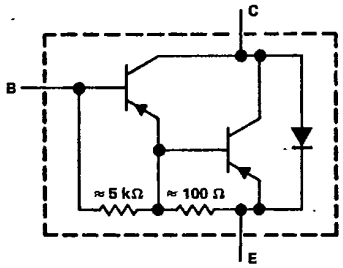
BD896, BD896A, BD898, BD898A, BD900, BD900A, BD902
P-N-P SILICON POWER DARLINGTONS

REVISED OCTOBER 1984

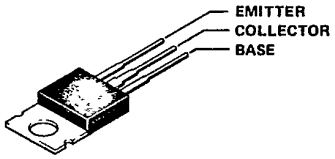
T-33-31

- 70 W at 25°C Case Temperature
- 8 A Continuous Collector Current
- Min h_{FE} of 750 at 3 A or 4 A
- Designed for Power Amplifier and High-Speed Switching Applications

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)

	BD896 BD896A	BD898 BD898A	BD900 BD900A	BD902
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	−0.3 A			
Continuous device dissipation at 25°C case temperature (see Note 1)	70 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 of the rate of 0.56 W/°C or refer to Dissipation Derating Curve, Figure 7.
2. Derate linearly to 150°C free-air temperature of the rate of 16 mW/°C or refer to Dissipation Derating Curve, Figure 8.

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

PARAMETER	TEST CONDITIONS		BD896, BD896A			BD898, BD898A			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
$V_{(BR)CEO}$	$I_C = -100$ mA, $I_B = 0$, See Note 3		−45			−60			V
I_{CEO}	$V_{CE} = -30$ V, $I_B = 0$				−500			−500	μA
I_{CBO}	$V_{CB} = -45$ V, $I_E = 0$				−200				μA
	$V_{CB} = -60$ V, $I_E = 0$							−200	μA
	$V_{CB} = -45$ V, $I_E = 0$, $T_C = 100°C$				−2				mA
	$V_{CB} = -60$ V, $I_E = 0$, $T_C = 100°C$							−2	mA
I_{EBO}	$V_{EB} = -5$ V, $I_C = 0$				−2			−2	mA
h_{FE}	$V_{CE} = -3$ V, $I_C = -3$ A, See Notes 3 and 4	BD896, BD898	750			750			
	$V_{CE} = -3$ V, $I_C = -4$ A, See Notes 3 and 4	BD896A, BD898A	750			750			
$V_{BE(on)}$	$V_{CE} = -3$ V, $I_C = -3$ A, See Notes 3 and 4	BD896, BD898			−2.5			−2.5	V
	$V_{CE} = -3$ V, $I_C = -4$ A, See Notes 3 and 4	BD896A, BD898A			−2.5			−2.5	V
$V_{CE(sat)}$	$I_C = -3$ A, $I_B = -12$ mA, See Notes 3 and 4	BD896, BD898			−2.5			−2.5	V
	$I_C = -4$ A, $I_B = -16$ mA, See Notes 3 and 4	BD896A, BD898A			−2.8			−2.8	V
V_F	$I_F = 8$ A				3.5			3.5	V

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

PARAMETER	TEST CONDITIONS		BD900, BD900A			BD902			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
$V_{(BR)CEO}$	$I_C = -100$ mA, $I_B = 0$, See Note 3		−80			−100			V
I_{CEO}	$V_{CE} = -40$ V, $I_B = 0$				−500				μA
	$V_{CE} = -50$ V, $I_B = 0$							−500	μA
I_{CBO}	$V_{CB} = -80$ V, $I_E = 0$				−200				μA
	$V_{CB} = -100$ V, $I_E = 0$							−200	μA
	$V_{CB} = -80$ V, $I_E = 0$, $T_C = 100°C$				−2				mA
	$V_{CB} = -100$ V, $I_E = 0$, $T_C = 100°C$							−2	mA
I_{EBO}	$V_{EB} = -5$ V, $I_C = 0$				−2			−2	mA
h_{FE}	$V_{CE} = -3$ V, $I_C = -3$ A, See Notes 3 and 4	BD900, BD902	750			750			
	$V_{CE} = -3$ V, $I_C = -4$ A, See Notes 3 and 4	BD900A	750						
$V_{BE(on)}$	$V_{CE} = -3$ V, $I_C = -3$ A, See Notes 3 and 4	BD900, BD902			−2.5			−2.5	V
	$V_{CE} = -3$ V, $I_C = -4$ A, See Notes 3 and 4	BD900A			−2.5				V
$V_{CE(sat)}$	$I_C = -3$ A, $I_B = -12$ mA, See Notes 3 and 4	BD900, BD902			−2.5			−2.5	V
	$I_C = -4$ A, $I_B = -16$ mA, See Notes 3 and 4	BD900A			−2.8				V
V_F	$I_F = 8$ A				3.5			3.5	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.

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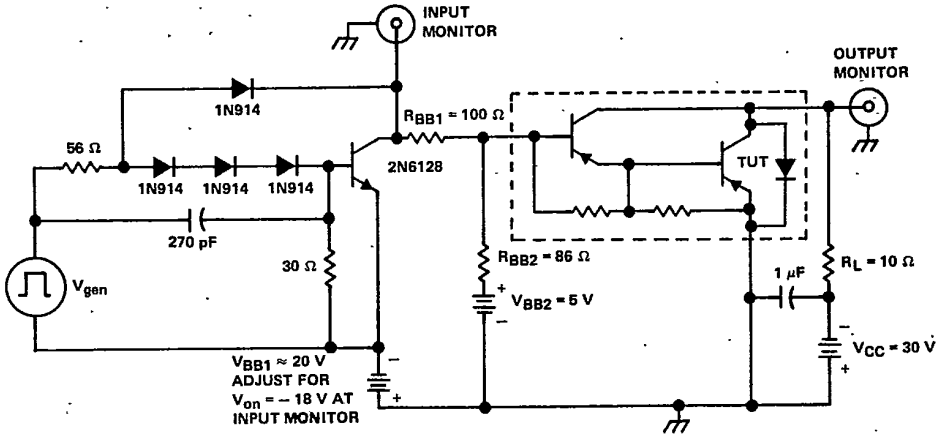
thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$			1.79	°C/W
$R_{\theta JA}$			62.5	

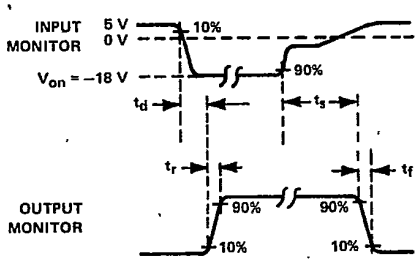
resistive-load switching characteristics

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}	$V_{BE(off)} = 3.5$ V,	$R_L = 10\,\Omega$,	See Figure 1			5	

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 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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TYPICAL CHARACTERISTICS

STATIC FORWARD CURRENT TRANSFER RATIO vs COLLECTOR CURRENT

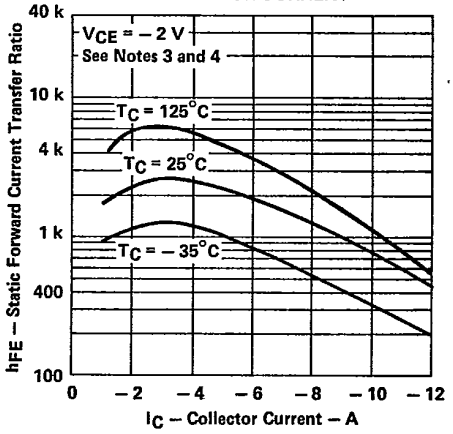

FIGURE 2

STATIC FORWARD CURRENT TRANSFER RATIO vs COLLECTOR CURRENT

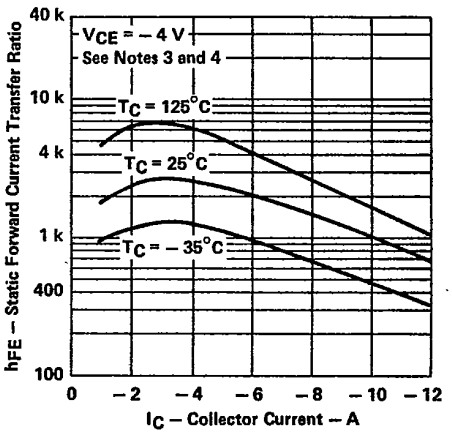

FIGURE 3

COLLECTOR-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

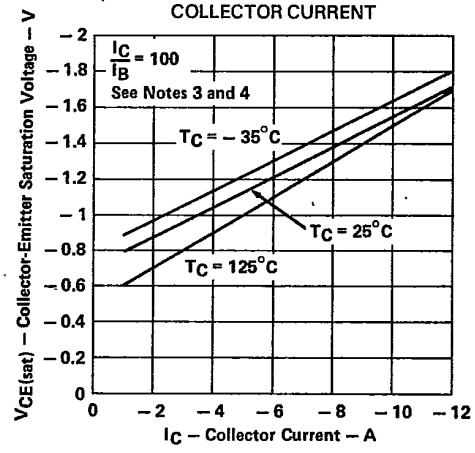

FIGURE 4

BASE-EMITTER VOLTAGE vs COLLECTOR CURRENT

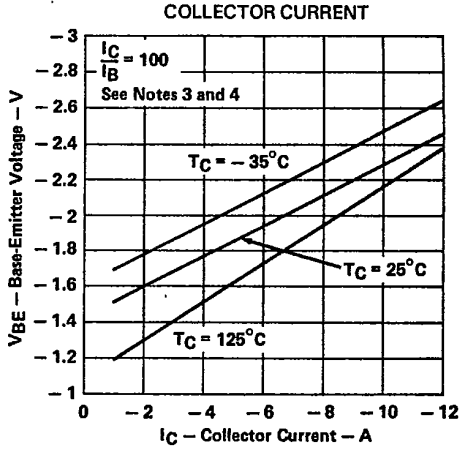

FIGURE 5

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

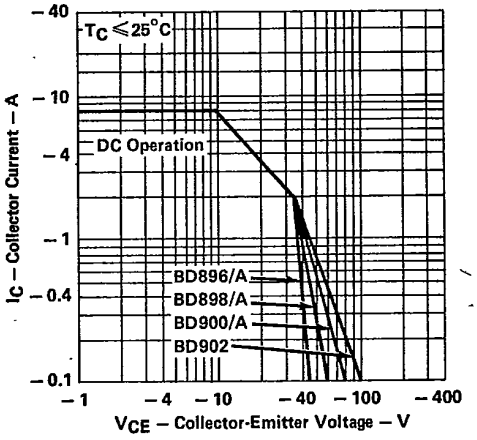

FIGURE 6

THERMAL INFORMATION

CASE TEMPERATURE
DISSIPATION DERATING CURVE

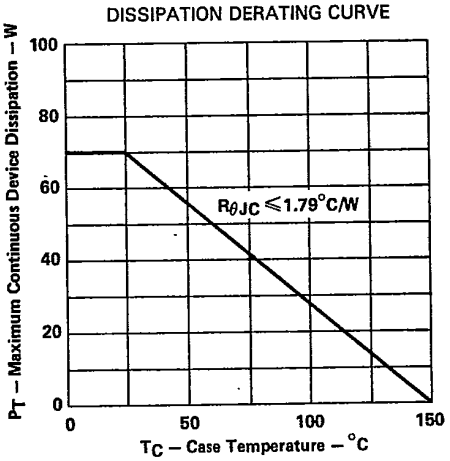

FIGURE 7

FREE-AIR TEMPERATURE
DISSIPATION DERATING CURVE

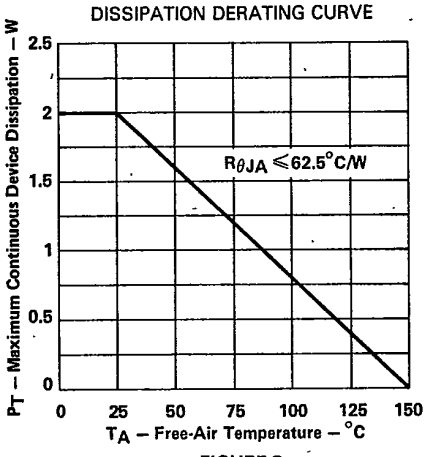

FIGURE 8