

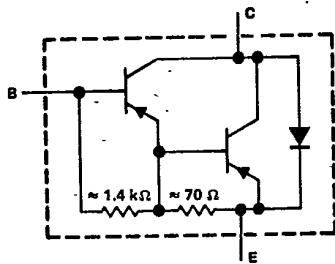
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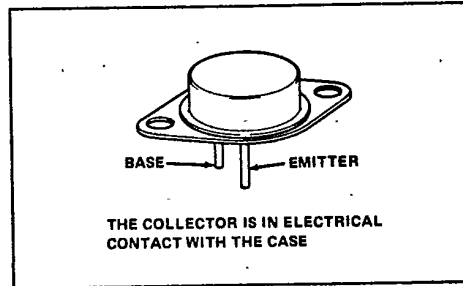
**TIP605, TIP606, TIP607**  
**P-N-P DARLINGTON-CONNECTED**  
**SILICON POWER TRANSISTORS**  
 REVISED OCTOBER 1984

- Designed For Complementary Use With TIP600, TIP601, TIP602 T-33-31
- 10 A Rated Collector Current
- Min  $h_{FE}$  of 200 at 4 V, 10 A
- Max  $I_{CEO}$  of 50  $\mu$ A
- Max  $V_{CE(sat)}$  of 2.5 V at  $I_C = 10$  A
- Similar to 2N6053, 2N6054, RCA8350, RCA8350A, RCA8350B

device schematic



TO-3 PACKAGE



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

	TIP605	TIP606	TIP607
Collector-base voltage	-60 V	-80 V	-100 V
Collector-emitter voltage ( $I_B = 0$ )	-60 V	-80 V	-100 V
Emitter-base voltage		-5 V	
Continuous collector current		-10 A	
Peak collector current (see Note 1)		-15 A	
Continuous base current		-1 A	
Safe operating areas at (or below) 25°C case temperature	See Figures 7 and 8		
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)	100 W		
Continuous device dissipation at (or below) 25°C free-air temperature (see Note 3)	5 W		
Operating collector junction and storage temperature range	-65°C to 200°C		
Lead temperature 3,2 mm (0.125 inch) from case for 10 seconds	300°C		

- NOTES: 1. This value applies for  $t_W \leq 0.3$  ms, duty cycle  $\leq 10\%$ .  
 2. Derate linearly to 200°C case temperature at the rate of 0.57 W/°C or refer to Dissipation Derating Curve, Figure 9.  
 3. Derate linearly to 200°C free-air temperature at the rate of 26.6 mW/°C or refer to Dissipation Derating Curve, Figure 10.

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electrical characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	TIP600			TIP601			TIP602			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V <sub>BRICEO</sub>	I <sub>C</sub> = -30 mA, I <sub>B</sub> = 0, See Note 4	-60			-80			-100			V
I <sub>CEO</sub>	V <sub>CE</sub> = -30 V, I <sub>B</sub> = 0			-50							μA
	V <sub>CE</sub> = -40 V, I <sub>B</sub> = 0						-50				
	V <sub>CE</sub> = -50 V, I <sub>B</sub> = 0								-50		
I <sub>CBO</sub>	V <sub>CB</sub> = -60 V, I <sub>E</sub> = 0			-50							μA
	V <sub>CB</sub> = -80 V, I <sub>E</sub> = 0						-50				
	V <sub>CB</sub> = -100 V, I <sub>E</sub> = 0								-50		
I <sub>EBO</sub>	V <sub>EB</sub> = -5 V, I <sub>C</sub> = 0			-8			-8			-8	mA
h <sub>FE</sub>	V <sub>CE</sub> = -4 V, I <sub>C</sub> = -3 A, See Notes 4 and 5	1000	20000		1000	20000		1000	20000		
	V <sub>CE</sub> = -4 V, I <sub>C</sub> = -10 A, See Notes 4 and 5	200			200			200			
V <sub>BE</sub>	V <sub>CE</sub> = -4 V, I <sub>B</sub> = -6 mA, I <sub>C</sub> = -3 A, See Notes 4 and 5			-2.8			-2.8			-2.8	V
V <sub>CE(sat)</sub>	I <sub>B</sub> = -6 mA, I <sub>C</sub> = -3 A, See Notes 4 and 5			-2			-2			-2	V
	I <sub>B</sub> = -100 mA, I <sub>C</sub> = -10 A, See Notes 4 and 5			-2.5			-2.5			-2.5	
V <sub>F</sub>	I <sub>F</sub> = 10 A, See Notes 4 and 5			3.5			3.5			3.5	V

NOTES: 4. These parameters must be measured using pulse techniques, t<sub>W</sub> = 300 μs, duty cycle < 2 %.  
 5. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts located within 3.2 mm (0.125 inch) from the device body.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
R <sub>θJC</sub>			1.75	°C/W
R <sub>θJA</sub>			35	
R <sub>θCHS</sub> See Note 6			0.4	

NOTE 6: This parameter is measured using a 0.08 mm mica insulator with Dow-Corning 11 compound on both sides of the insulator, a 6-32 mounting screw with bushing, and a mounting torque of 0.9 mm Newton-meter.

resistive-load switching characteristic at 25°C case temperature

PARAMETER	TEST CONDITIONS†	MIN	TYP	MAX	UNIT
t <sub>d</sub>	I <sub>C</sub> = -8 A, I <sub>B1</sub> = -80 mA, I <sub>B2</sub> = 80 mA, V <sub>BE(off)</sub> = 5 V, R <sub>L</sub> = 5 Ω, See Figure 1		0.035		μs
t <sub>r</sub>		0.3			
t <sub>s</sub>		0.9			
t <sub>f</sub>		1.3			

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

functional tests at 25°C free-air temperature

TEST	CONDITIONS	LEVEL
Power (V <sub>CE</sub> * I <sub>C</sub> )	V <sub>CE</sub> = -40 V, I <sub>C</sub> = -2 A, t <sub>test</sub> = 0.15 s	80 W
Reverse Pulse Energy ( $\frac{I_C^2 L}{2}$ )	I <sub>CM</sub> = -1 A, L = 20 mH, f = 10 Hz, t <sub>test</sub> = 0.5 s, See Figure 2	10 mJ



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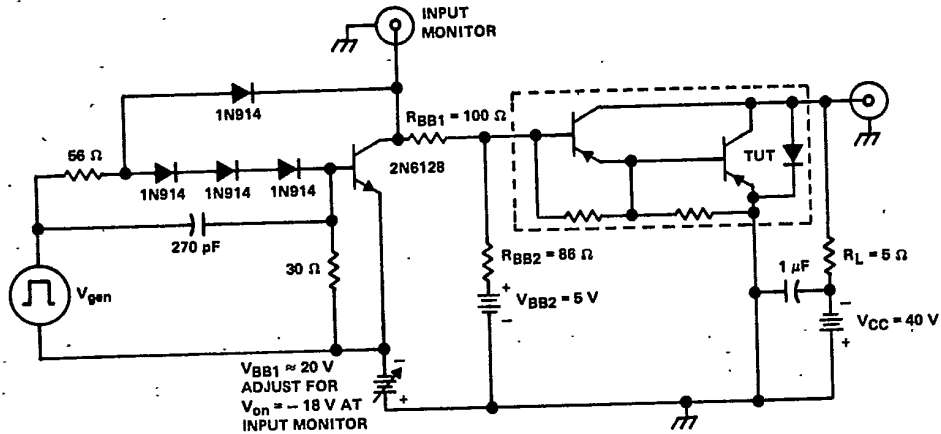
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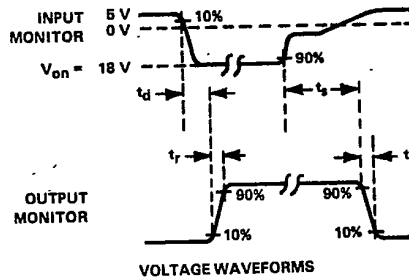
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PARAMETER MEASUREMENT INFORMATION

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TEST CIRCUIT



VOLTAGE WAVEFORMS

- NOTES:
- A.  $V_{gen}$  is a 30-V pulse into a 50  $\Omega$  termination.
  - B. The  $V_{gen}$  waveform is supplied by a generator with the following characteristics:  $t_r < 15$  ns,  $t_f < 15$  ns,  $Z_{out} = 60 \Omega$ ,  $t_w = 20 \mu s$ , duty cycle = 2%.
  - C. Waveforms are monitored on an oscilloscope with the following characteristics:  $t_r < 15$  ns,  $R_{in} > 10$  M $\Omega$ ,  $C_{in} < 11.5$  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



TIP Devices

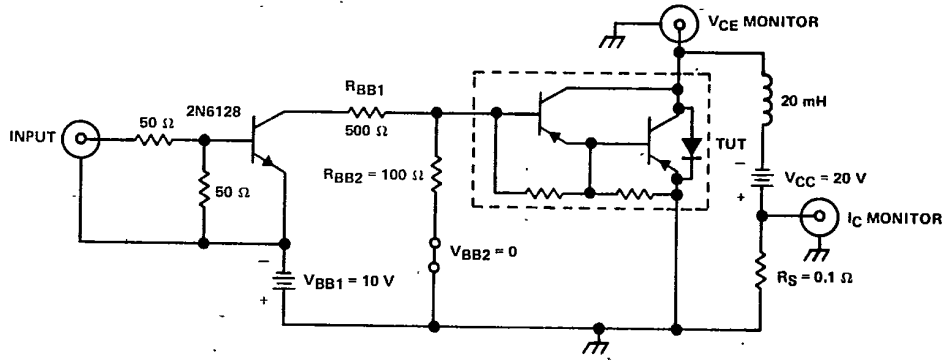
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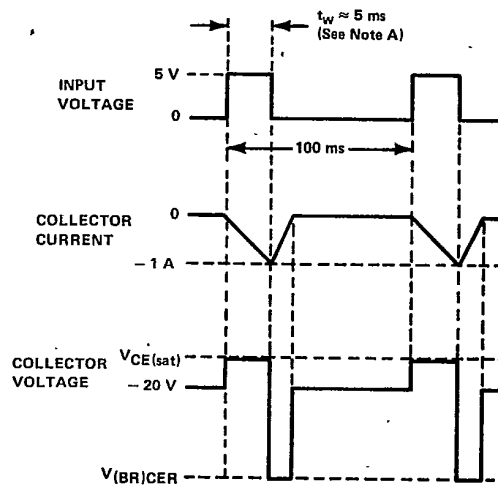
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PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE AND CURRENT WAVEFORMS

NOTE A: Input pulse duration is increased until  $I_{CM} = 1$  A.

FIGURE 2. INDUCTIVE-LOAD SWITCHING

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TYPICAL CHARACTERISTICS

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STATIC FORWARD CURRENT TRANSFER RATIO  
vs  
COLLECTOR CURRENT

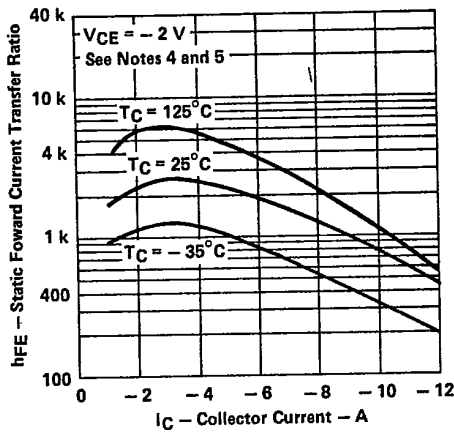


FIGURE 3

STATIC FORWARD CURRENT TRANSFER RATIO  
vs  
COLLECTOR CURRENT

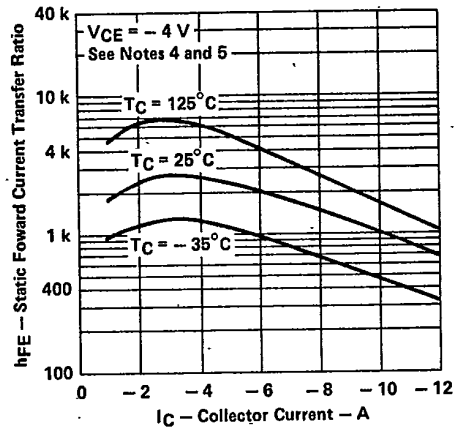


FIGURE 4

COLLECTOR-EMITTER SATURATION VOLTAGE  
vs  
COLLECTOR CURRENT

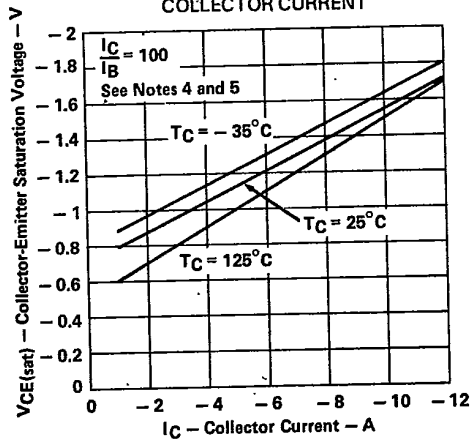


FIGURE 5

BASE-EMITTER VOLTAGE  
vs  
COLLECTOR CURRENT

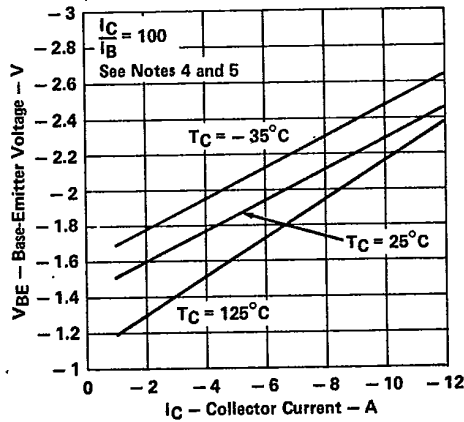


FIGURE 6

- NOTES: 4. These parameters must be measured using pulse techniques,  $t_w = 300 \mu s$ , duty cycle  $\leq 2\%$ .  
5. 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

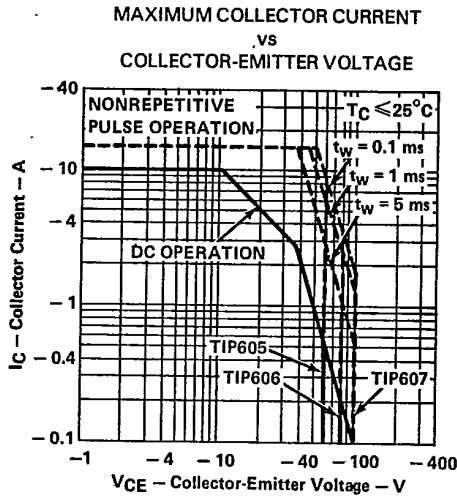


FIGURE 7

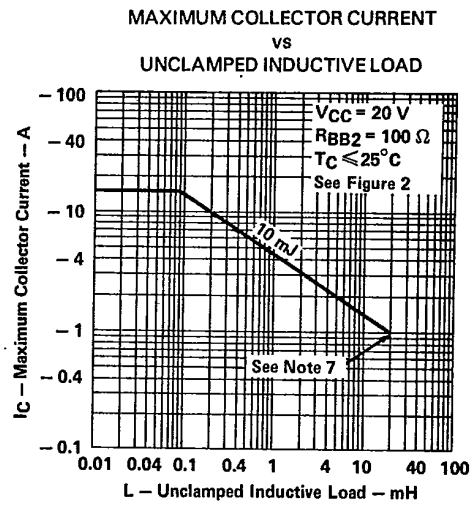


FIGURE 8

NOTE 7: Above this point the safe operating area has not been defined.

THERMAL INFORMATION

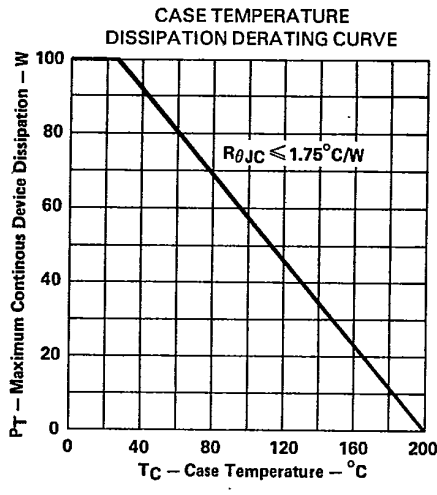


FIGURE 9

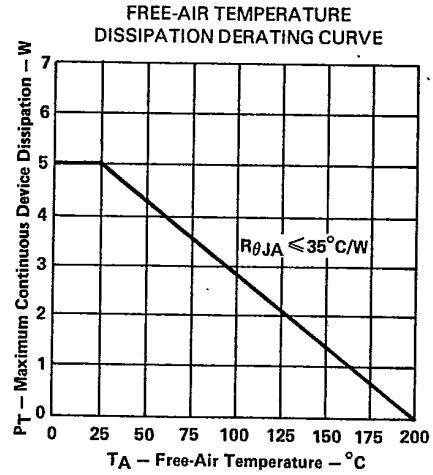


FIGURE 10

TIP Devices

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