

8961726 TEXAS INSTR (OPT0)

62C 36964 D

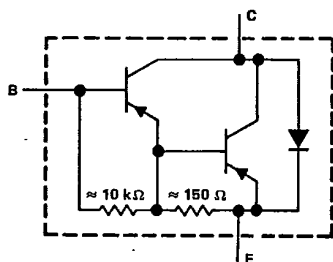
TIP625, TIP626, TIP627
P-N-P DARLINGTON-CONNECTED
SILICON POWER TRANSISTORS

REVISED OCTOBER 1984

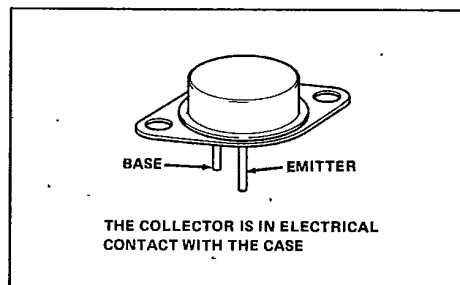
- Designed For Complementary Use With TIP620, TIP621, TIP622
- 65 W at 25°C Case Temperature
- 5 A Rated Collector Current
- Min h_{FE} of 1000 at 3 V, 3 A
- 50 mJ Reverse Energy Rating

T-33-31

device schematic



TO-3 PACKAGE



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

	TIP625	TIP626	TIP627
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	-5 A		
Peak collector current (see Note 1)	-8 A		
Continuous base current	-0.1 A		
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)	65 W		
Continuous device dissipation at (or below) 25°C free-air temperature (see Note 3)	4 W		
Unclamped inductive load energy (see Note 4)	50 mJ		
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	260°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 0.37 W/°C or refer to Dissipation Derating Curve, Figure 9.
 3. Derate linearly to 200°C free-air temperature at the rate of 23 mW/°C or refer to Dissipation Derating Curve, Figure 10.
 4. This rating is based on the capability of the transistor to operate safely in the circuit in Figure 2. $L = 20$ mH, $R_{BB2} = 100 \Omega$, $V_{BB2} = 0$ V, $R_S = 0.1 \Omega$, $V_{CC} = 20$ V. Energy $\approx I_C^2 L/2$.

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electrical characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	TIP625			TIP626			TIP627			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$V_{(BR)CEO}$	$I_C = -30 \text{ mA}$, See Note 5 $I_B = 0$,	-60			-80			-100			V
I_{CBO}	$V_{CB} = -60 \text{ V}$, $I_E = 0$		-0.2								mA
	$V_{CB} = -80 \text{ V}$, $I_E = 0$					-0.2					
	$V_{CB} = -100 \text{ V}$, $I_E = 0$								-0.2		
I_{CEO}	$V_{CE} = -30 \text{ V}$, $I_B = 0$		-0.5								mA
	$V_{CE} = -40 \text{ V}$, $I_B = 0$					-0.5					
	$V_{CE} = -60 \text{ V}$, $I_B = 0$								-0.5		
I_{EBO}	$V_{EB} = -5 \text{ V}$, $I_C = 0$		-2			-2			-2		mA
h_{FE}	$V_{CE} = -3 \text{ V}$, See Notes 5 and 6 $I_C = -0.5 \text{ A}$,	1000			1000			1000			
	$V_{CE} = -3 \text{ V}$, See Notes 5 and 6 $I_C = -3 \text{ A}$,	1000			1000			1000			
V_{BE}	$V_{CE} = -3 \text{ V}$, See Notes 5 and 6 $I_C = -3 \text{ A}$,		-2.5			-2.5			-2.5		V
$V_{CE(sat)}$	$I_B = -12 \text{ mA}$, See Notes 5 and 6 $I_C = -3 \text{ A}$,		-2			-2			-2		V
	$I_B = -20 \text{ mA}$, See Notes 5 and 6 $I_C = -5 \text{ A}$,		-4			-4			-4		
V_F	$I_F = 10 \text{ A}$, See Notes 5 and 6		3.5			3.5			3.5		V

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

6. 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
$R_{\theta JC}$		2.69		°C/W
$R_{\theta JA}$		43.75		

resistive-load switching characteristic at 25°C case temperature

PARAMETER	TEST CONDITIONS†	MIN	TYP	MAX	UNIT
t_{on}	$I_C = -3 \text{ A}$, $I_{B1} = -12 \text{ mA}$, $I_{B2} = 12 \text{ mA}$,		1.5		μs
t_{off}	$V_{BE(off)} = 5 \text{ V}$, $R_L = 10 \Omega$, See Figure 1		8.5		

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

TIP Devices

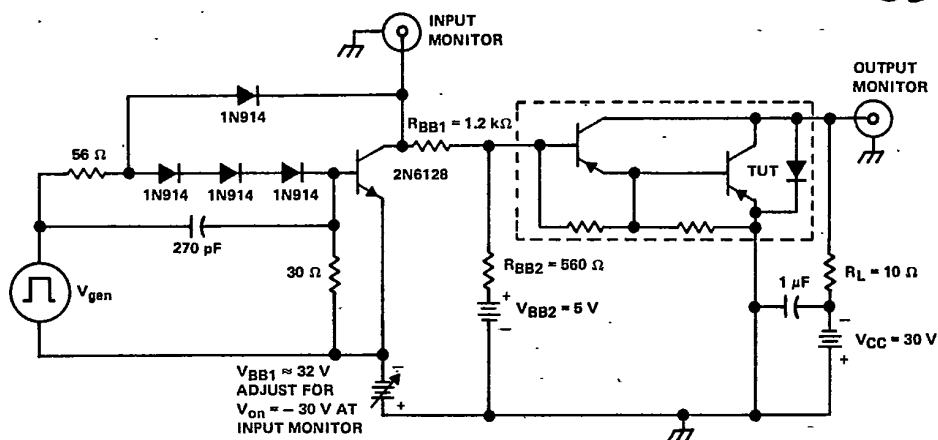
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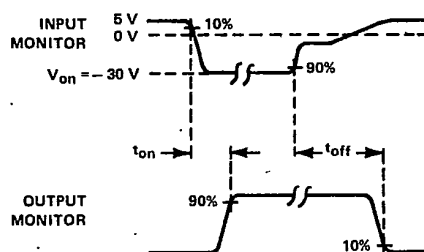
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PARAMETER MEASUREMENT INFORMATION

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TEST CIRCUIT



VOLTAGE WAVEFORMS

- NOTES: A. V_{gen} is a 30-V pulse into a 50 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 , $t_w = 20$ μ s, duty cycle ≤ 2 %.
 C. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{in} \geq 10$ M Ω , $C_{in} \leq 11.5$ 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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TIP Devices

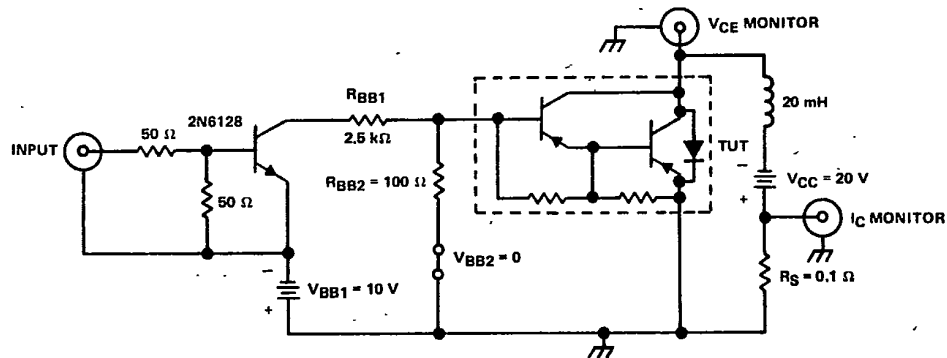
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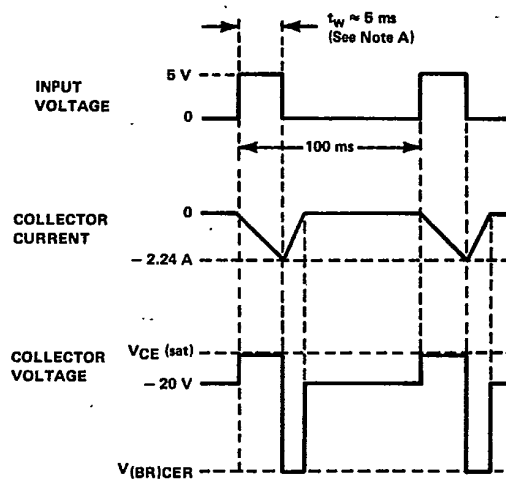
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PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE AND CURRENT WAVEFORMS

NOTE A: Input pulse duration is increased until $I_{CM} = -2.24$ A.

FIGURE 2. INDUCTIVE-LOAD SWITCHING

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TYPICAL CHARACTERISTICS

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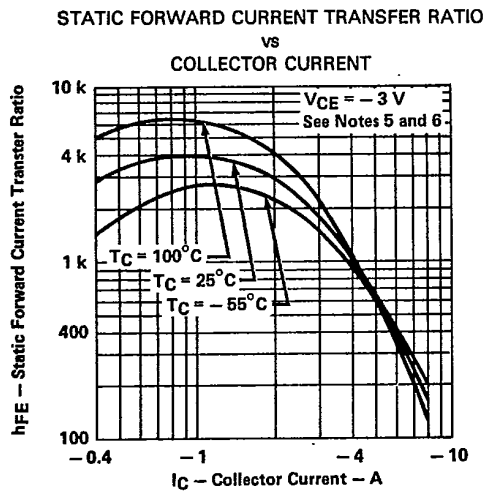


FIGURE 3

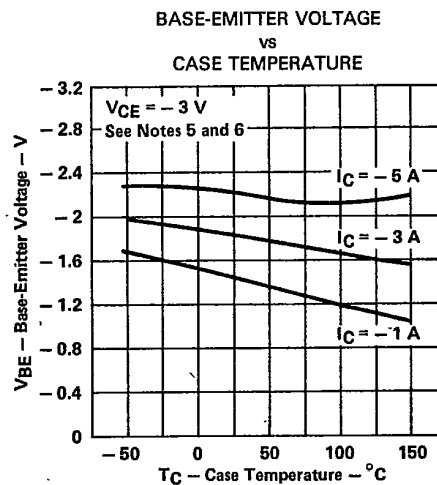


FIGURE 4

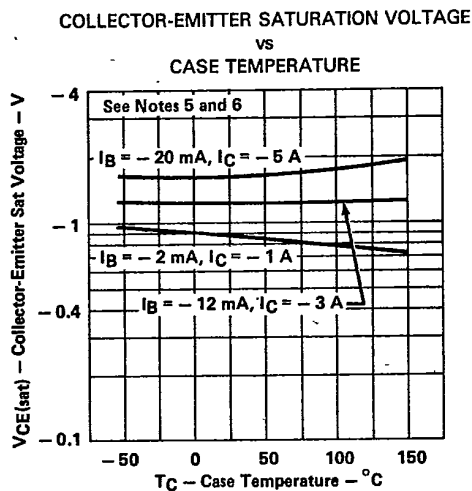


FIGURE 5

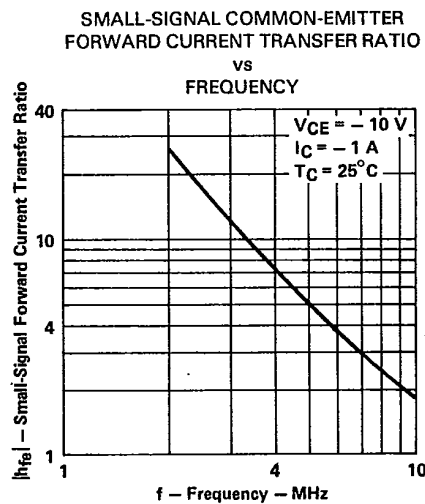


FIGURE 6

- NOTES: 5. These parameters must be measured using pulse techniques, $t_w = 300 \mu\text{s}$, duty cycle $\leq 2\%$.
6. 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.



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MAXIMUM SAFE OPERATING AREA

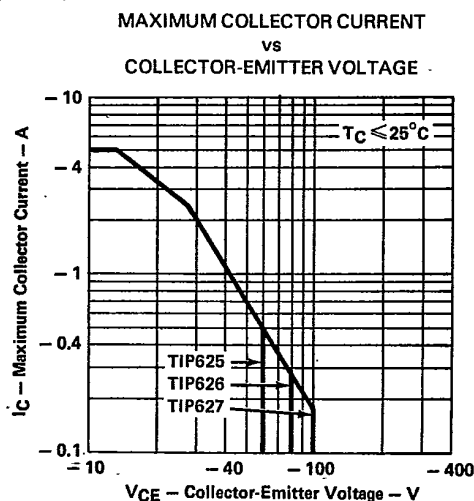


FIGURE 7

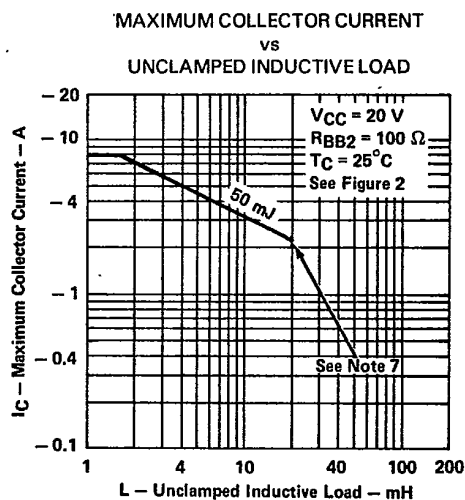


FIGURE 8

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

THERMAL INFORMATION

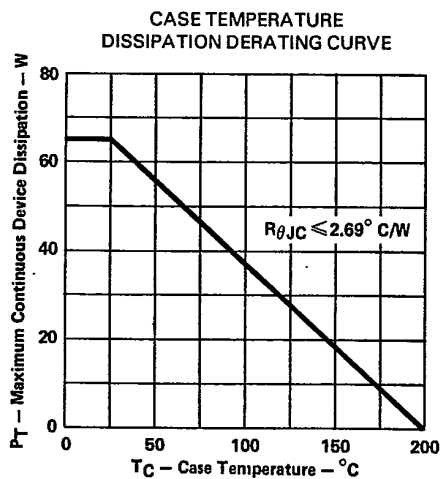


FIGURE 9

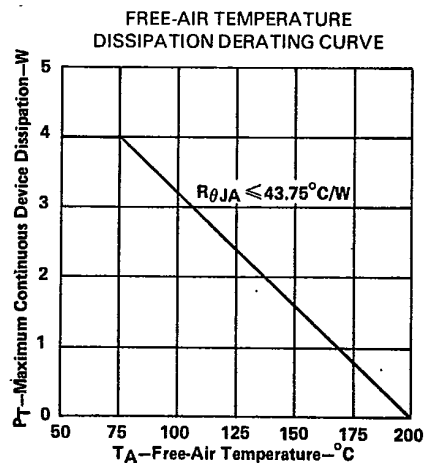


FIGURE 10

TIP Devices