

8961726 TEXAS INSTR (OPTO)

62C 36900 D

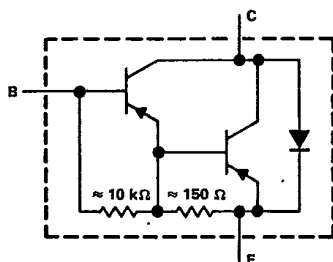
**TIP125, TIP126, TIP127
P-N-P DARLINGTON-CONNECTED
SILICON POWER TRANSISTORS**

REVISÉ OCTOBER 1984

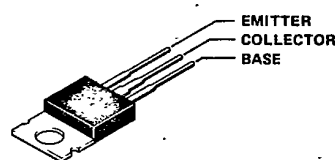
- Designed For Complementary use with TIP120, TIP121, TIP122
- 65 W at 25°C Case Temperature
- 5 A Rated Collector Current
- Min h_{FE} of 1000 at 3 V, 3 A
- 50 mJ Reverse Energy Rating

T-33-31

device schematic



TO-220AB PACKAGE



THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE MOUNTING TAB

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

	TIP125	TIP126	TIP127
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		
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)	65 W		
Continuous device dissipation at (or below) 25°C free-air temperature (see Note 3)	2 W		
Unclamped inductive load energy (see Note 4)	50 mJ		
Operating collector junction and storage temperature range	−65°C to 150°C		
Lead temperature 3,2 mm (0.125 inch) from case for 10 seconds	260°C		

- NOTES:**
1. This value applies for $t_{\text{W}} < 0.3$ ms, duty cycle $\leq 10\%$.
 2. Derate linearly to 150°C case temperature at the rate of $0.52\text{ W}/^{\circ}\text{C}$ or refer to Dissipation Derating Curve, Figure 9.
 3. Derate linearly to 150°C free-air temperature at the rate of $16\text{ mW}/^{\circ}\text{C}$ 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. $L = 20\text{ mH}$, $R_{\text{B2}} = 100\ \Omega$, $V_{\text{B2}} = 0\text{ V}$, $R_{\text{S}} = 0.1\ \Omega$, $V_{\text{CC}} = 20\text{ V}$. Energy $\approx I_{\text{C}}^2 L/2$.

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electrical characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	TIP125			TIP126			TIP127			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_{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_{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_{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			
$V_{CE(sat)}$	$I_B = -12 \text{ mA}$, 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_{BE}	$V_{CE} = -3 \text{ V}$, See Notes 5 and 6 $I_C = -3 \text{ A}$		-2.5			-2.5			-2.5		V
V_F	$I_F = 5 \text{ A}$, See Notes 5 and 6 $I_B = 0$		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
$R_{\theta JC}$			1.92	°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}	$I_C = -3 \text{ A}$, $I_{B1} = -12 \text{ mA}$, $I_{B2} = 12 \text{ mA}$		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

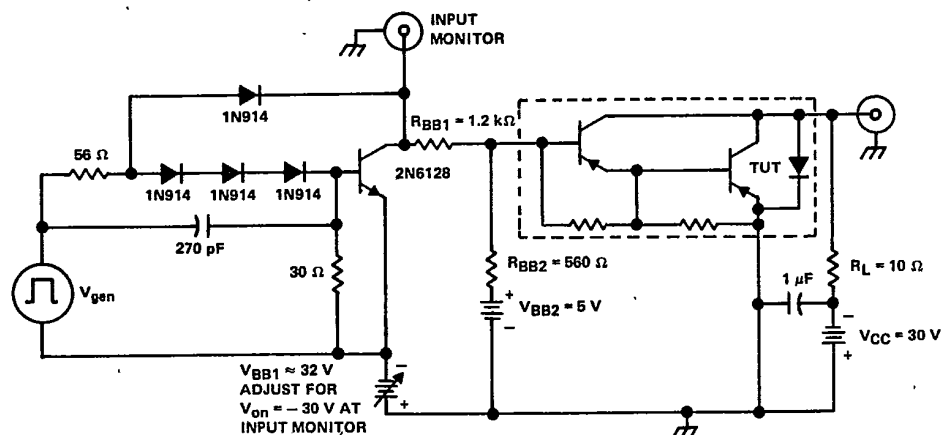
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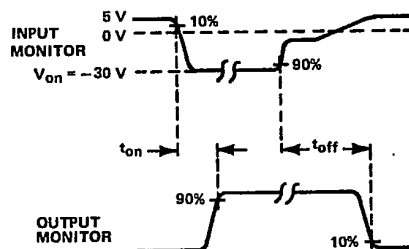
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PARAMETER MEASUREMENT INFORMATION

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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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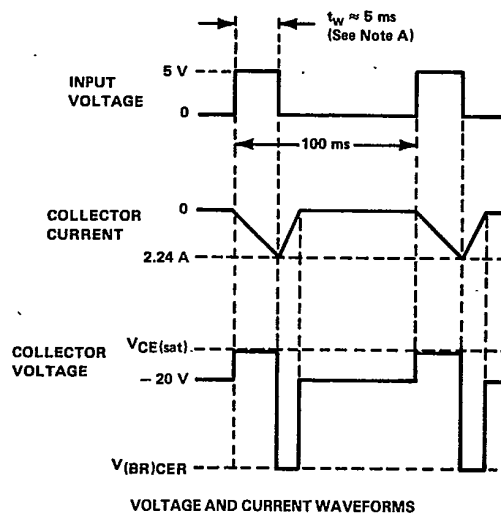
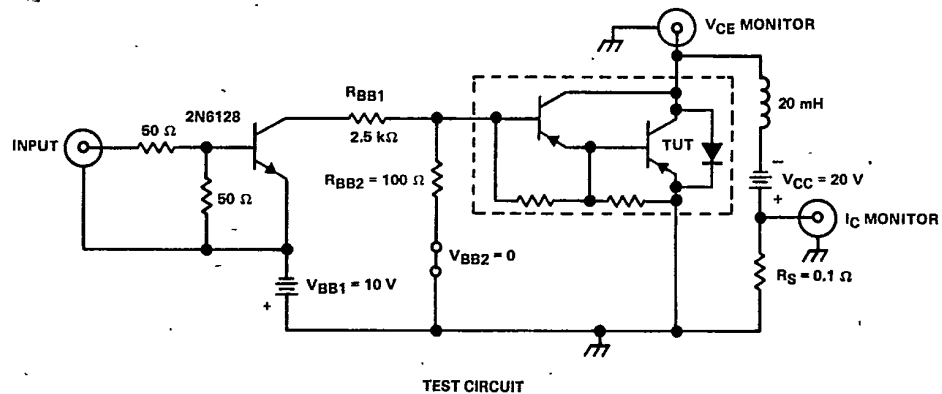
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PARAMETER MEASUREMENT INFORMATION



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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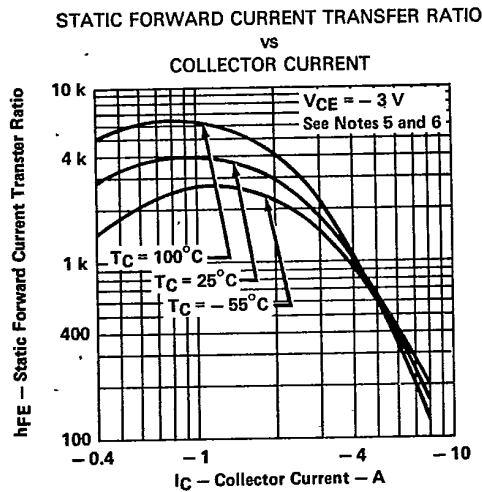


FIGURE 3

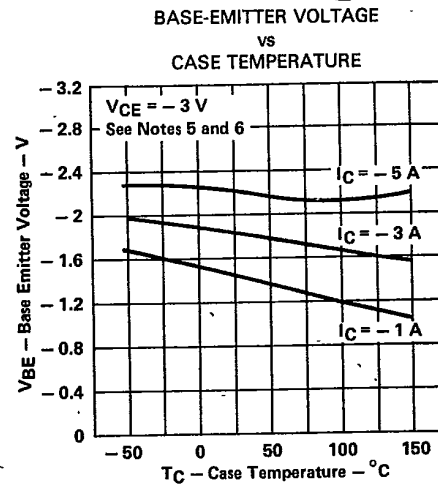


FIGURE 4

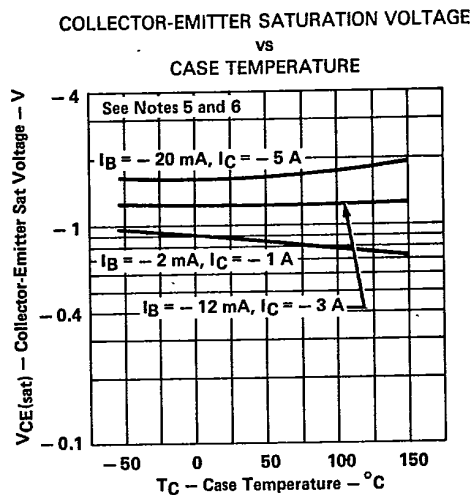


FIGURE 5

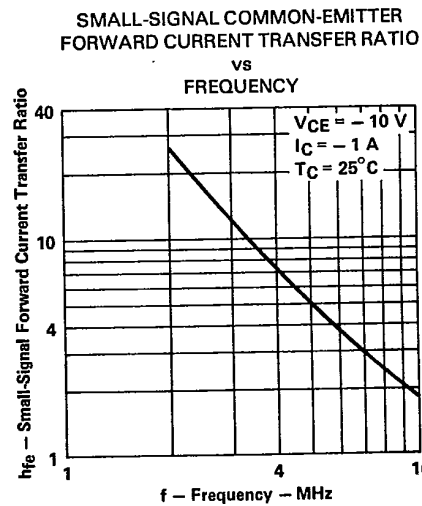


FIGURE 6

- NOTES: 5. These parameters must be measured using pulse techniques, $t_w = 300 \mu s$, 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

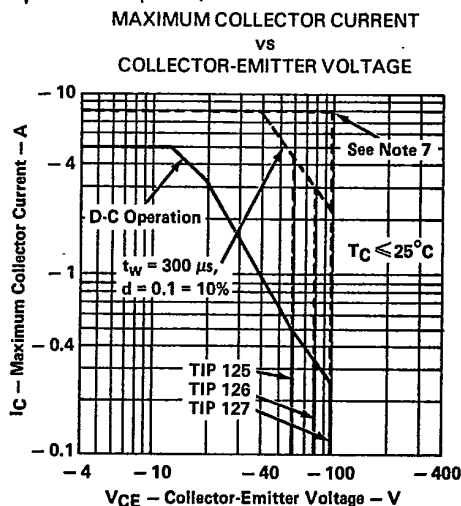


FIGURE 7

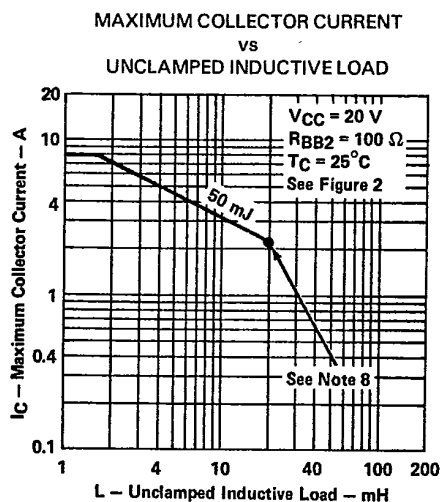


FIGURE 8

- NOTES: 7. This combination of maximum voltage and current may be achieved only when switching from saturation to cutoff with a clamped inductive load.
8. Above this point the safe operating area has not been defined.

THERMAL INFORMATION



TIP Devices

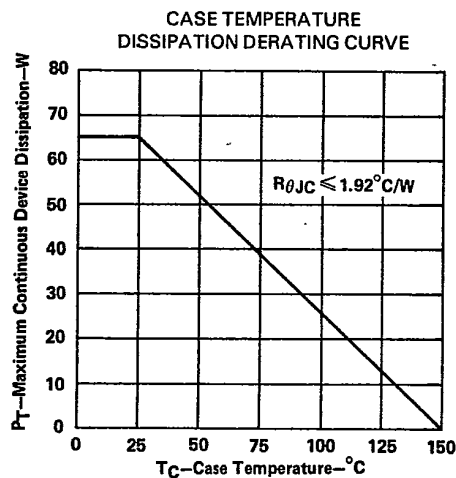


FIGURE 9

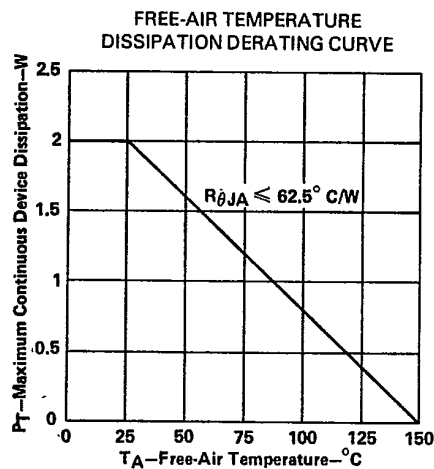


FIGURE 10