

8961726 TEXAS INSTR (OPTO)

62C 36958 D

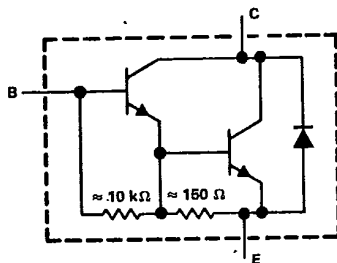
TIP620, TIP621, TIP622
N-P-N DARLINGTON-CONNECTED
SILICON POWER TRANSISTORS

REVISED OCTOBER 1984

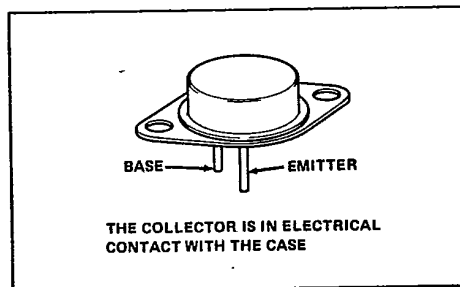
T-33-29

- Designed For Complementary use with TIP625, TIP626, TIP627
- 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

device schematic



TO-3 PACKAGE



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

	TIP620	TIP621	TIP622
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	-66°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	TIP620		TIP621		TIP622		UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
V(BR)CEO	I _C = 30 mA, See Note 5 I _B = 0,	60			80		100	V
I _{CBO}	V _{CB} = 60 V, I _E = 0		0.2					mA
	V _{CB} = 80 V, I _E = 0				0.2			
	V _{CB} = 100 V, I _E = 0						0.2	
I _{CEO}	V _{CE} = 30 V, I _B = 0		0.50					mA
	V _{CE} = 40 V, I _B = 0				0.5			
	V _{CE} = 50 V, I _B = 0						0.5	
I _{EBO}	V _{EB} = 5 V, I _C = 0		2		2		2	mA
h _{FE}	V _{CE} = 3 V, See Notes 5 and 6 I _C = 0.5 A,	1000			1000		1000	
	V _{CE} = 3 V, See Notes 5 and 6 I _C = 3 A,	1000			1000		1000	
V _{BE}	V _{CE} = 3 V, See Notes 5 and 6 I _B = 12 mA, I _C = 3 A,		2.5		2.5		2.5	V
V _{CE(sat)}	I _B = 12 mA, See Notes 5 and 6 I _C = 3 A,		2		2		2	V
	I _B = 20 mA, See Notes 5 and 6 I _C = 5 A,		4		4		4	
V _F	I _F = 5 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 μs, duty cycle ≤ 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 _{θJC}		2.69		°C/W
R _{θJA}		43.75		

resistive-load switching characteristic 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,			1.5			μs
t _{off}	V _{BE(off)} = -5 V, R _L = 10 Ω, See Figure 1			8.5			

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

TIP Devices

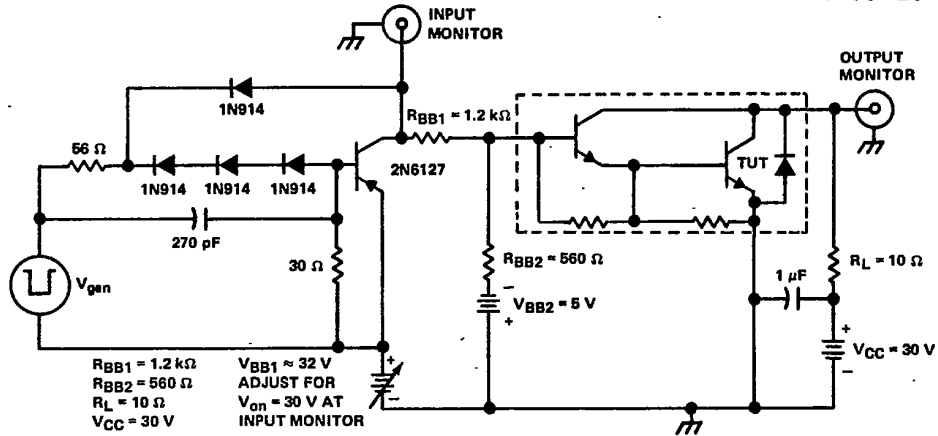
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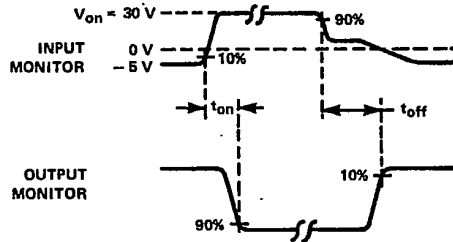
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PARAMETER MEASUREMENT INFORMATION

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TEST CIRCUIT



VOLTAGE WAVEFORMS

- NOTES:
- V_{gen} is a -30-V pulse into a 50Ω termination.
 - The V_{gen} waveform is supplied by a generator with the following characteristics: $t_r \leq 15 \text{ ns}$, $t_f \leq 15 \text{ ns}$, $Z_{out} = 50 \Omega$, $t_w = 20 \mu\text{s}$, duty cycle $\leq 2\%$.
 - Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15 \text{ ns}$, $R_{in} \geq 10 \text{ M}\Omega$, $C_{in} \leq 11.5 \text{ pF}$.
 - Resistors must be noninductive types.
 - 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

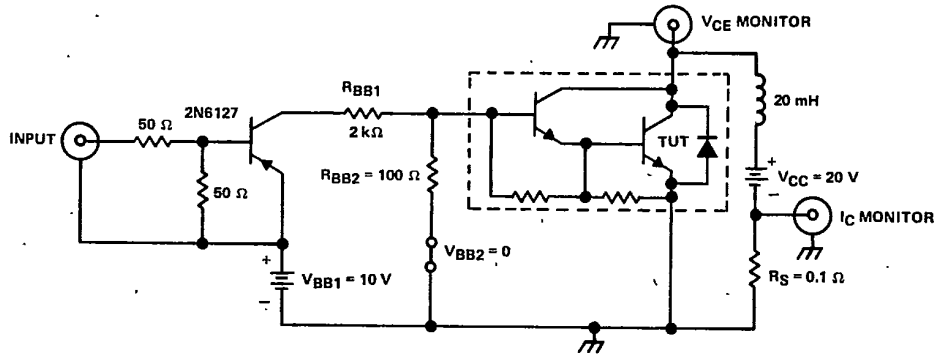
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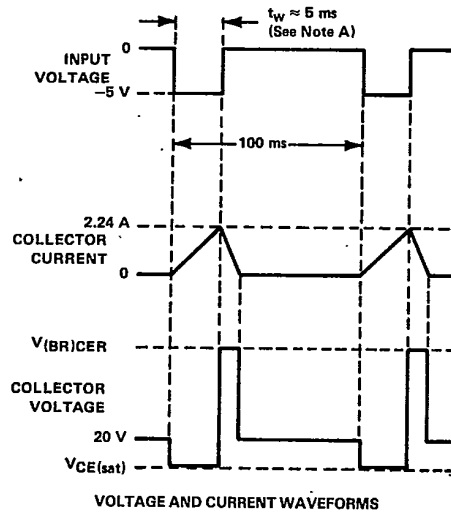
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PARAMETER MEASUREMENT INFORMATION



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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STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

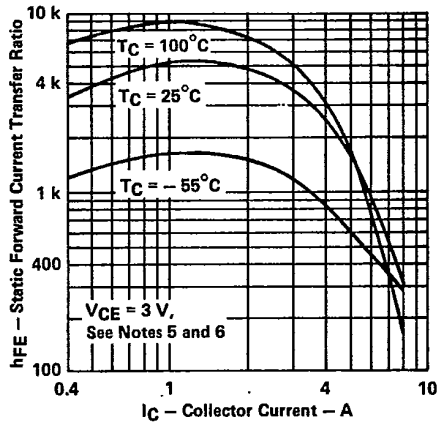


FIGURE 3

BASE-EMITTER VOLTAGE
vs
COLLECTOR CURRENT

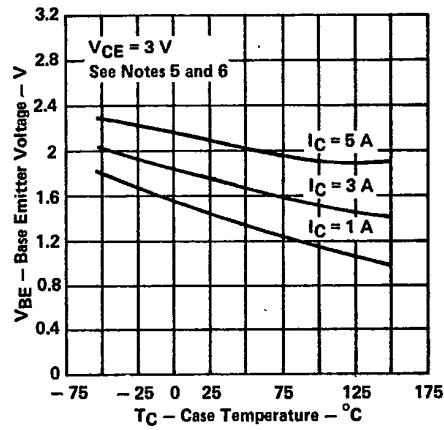


FIGURE 4

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
COLLECTOR CURRENT

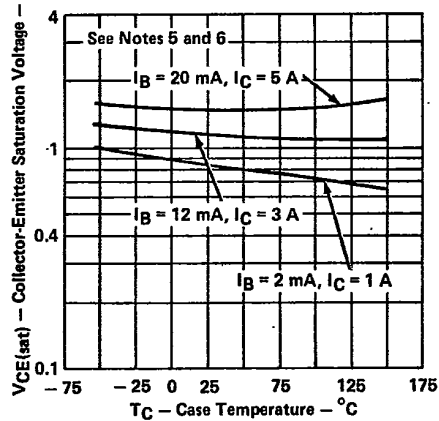


FIGURE 5

SMALL SIGNAL COMMON-EMITTER
FORWARD CURRENT TRANSFER RATIO
vs
FREQUENCY

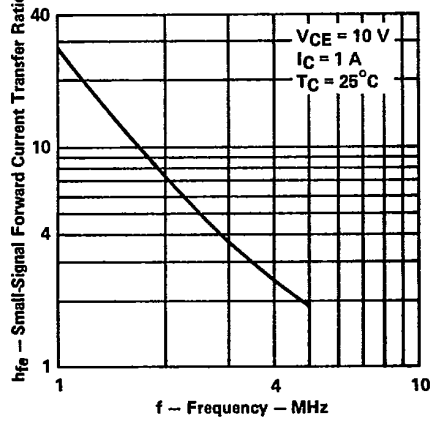


FIGURE 6

- 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

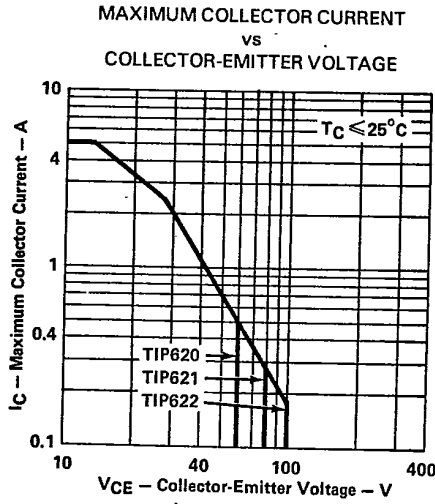


FIGURE 7

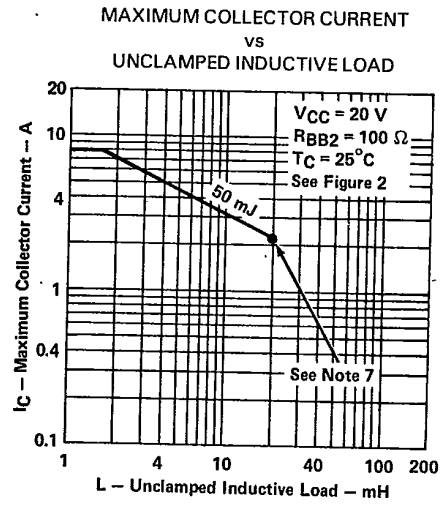


FIGURE 8

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

THERMAL INFORMATION

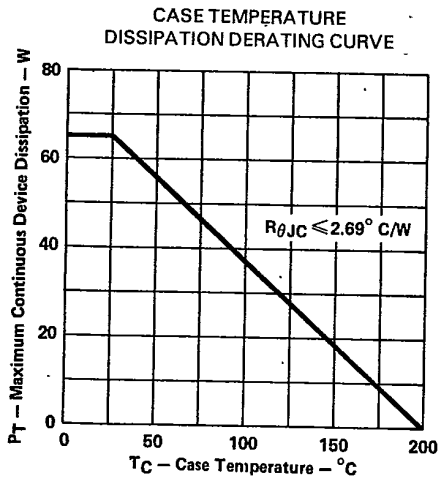


FIGURE 9

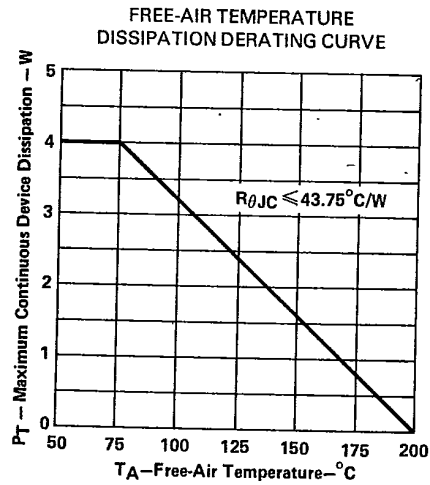


FIGURE 10



TIP Devices