

8961726 TEXAS INSTR (OPT0)

62C 36946 D

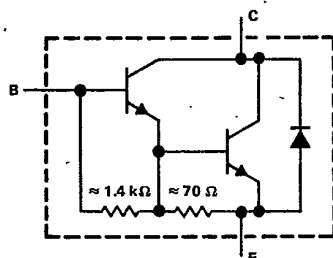
TIP600, TIP601, TIP602
N-P-N DARLINGTON-CONNECTED
SILICON POWER TRANSISTORS

REVISED OCTOBER 1984

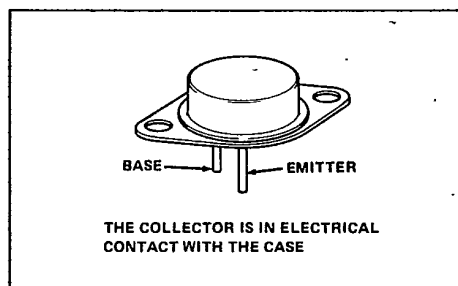
- Designed For Complementary Use With TIP605, TIP606, TIP607
- 100 W at 25°C Case Temperature
- 10 A Rated Collector Current
- Min h_{FE} of 200 at 4 V, 10 A
- Max I_{CEO} of 50 μ A
- Max $V_{CE(sat)}$ of 2.5 V at $I_C = 10$ A
- Similar to 2N6055, 2N6056, 2N6383, 2N6384, 2N6385

T-33-29

device schematic



TO-3 PACKAGE



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

	TIP600	TIP601	TIP602
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 area 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 28.6 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	
$V_{(BR)CEO}$	$I_C = 30 \text{ mA}$, See Note 4 $I_B = 0$	60			80			100			V
I_{CEO}	$V_{CE} = 30 \text{ V}$, $I_B = 0$			50							μA
	$V_{CE} = 40 \text{ V}$, $I_B = 0$						50				
	$V_{CE} = 50 \text{ V}$, $I_B = 0$									50	
I_{CBO}	$V_{CB} = 60 \text{ V}$, $I_E = 0$			50							μA
	$V_{CB} = 80 \text{ V}$, $I_E = 0$						50				
	$V_{CB} = 100 \text{ V}$, $I_E = 0$									50	
I_{EBO}	$V_{EB} = 5 \text{ V}$, $I_C = 0$			8			8			8	mA
h_{FE}	$V_{CE} = 4 \text{ V}$, See Notes 4 and 5 $I_C = 3 \text{ A}$	1000	20000		1000	20000		1000	20000		
	$V_{CE} = 4 \text{ V}$, See Notes 4 and 5 $I_C = 10 \text{ A}$	200			200			200			
V_{BE}	$V_{CE} = 4 \text{ V}$, See Notes 4 and 5 $I_C = 10 \text{ A}$			2.8			2.8			2.8	V
$V_{CE(sat)}$	$I_B = 6 \text{ mA}$, See Notes 4 and 5 $I_C = 3 \text{ A}$			2			2			2	V
	$I_B = 100 \text{ mA}$, See Notes 4 and 5 $I_C = 10 \text{ A}$			2.5			2.5			2.5	
V_F	$I_F = 10 \text{ A}$, See Notes 4 and 5			3.5			3.5			3.5	V

NOTES: 4. These parameters must be measured using pulse techniques, $t_W = 300 \mu\text{s}$, duty cycle $\leq 2\%$.

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
$R_{\theta JC}$			1.75	$^{\circ}\text{C/W}$
$R_{\theta JA}$			35	
$R_{\theta CHS}$ See Note 6			0.4	

NOTE 6: This parameter is measured using a 0,08 mm (0.003 inch) mica insulator with Dow-Corning 11 compound on both sides of the insulator, a 0.138-32 (formerly 6-32) mounting screw with bushing, and a mounting torque of 0,9 newton-meter (8 inch-pounds).

resistive-load switching characteristic at 25°C case temperature

PARAMETER	TEST CONDITIONS†	MIN	TYP	MAX	UNIT
t_d	$I_C = 8 \text{ A}$, $V_{BE(off)} = -5 \text{ V}$, $I_{B1} = 80 \text{ mA}$, $I_{B2} = -80 \text{ mA}$, $R_L = 5 \Omega$, See Figure 1		0.035		μs
t_r			0.35		
t_s			1.8		
t_f			2.45		

† 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 ($V_{CE} \cdot I_C$)	$V_{CE} = 40 \text{ V}$, $I_C = 2 \text{ A}$, $t_{test} = 0.15 \text{ s}$	80 W
Reverse Pulse Energy ($\frac{I_C^2 L}{2}$)	$I_{CM} = 1 \text{ A}$, $L = 20 \text{ mH}$, $f = 10 \text{ Hz}$, $t_{test} = 0.5 \text{ s}$, See Figure 2	10 mJ

TIP Devices

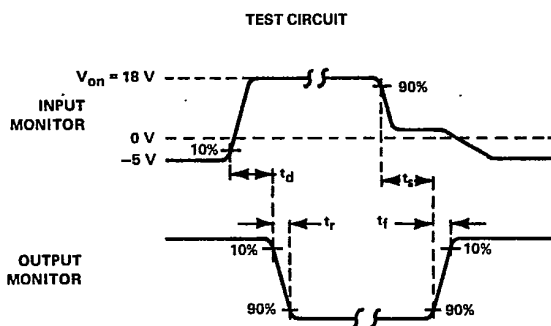
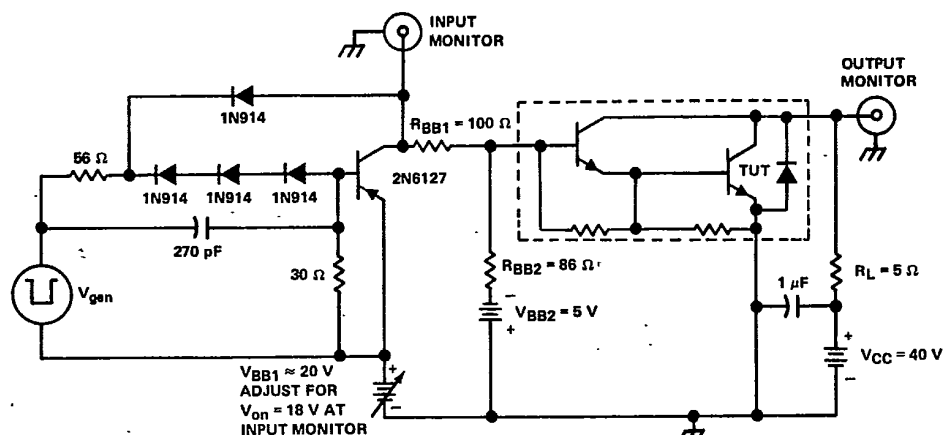
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**TIP600, TIP601, TIP602
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SILICON POWER TRANSISTORS**

PARAMETER MEASUREMENT INFORMATION

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- 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: $t_r \leq 15\text{ ns}$, $t_f \leq 15\text{ ns}$, $Z_{out} = 50\ \Omega$, $t_W = 20\ \mu\text{s}$, duty cycle $\leq 2\%$.
 C. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15\text{ ns}$, $R_{in} \geq 10\text{ M}\Omega$, $C_{in} \leq 11.5\text{ pF}$.
 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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PARAMETER MEASUREMENT INFORMATION

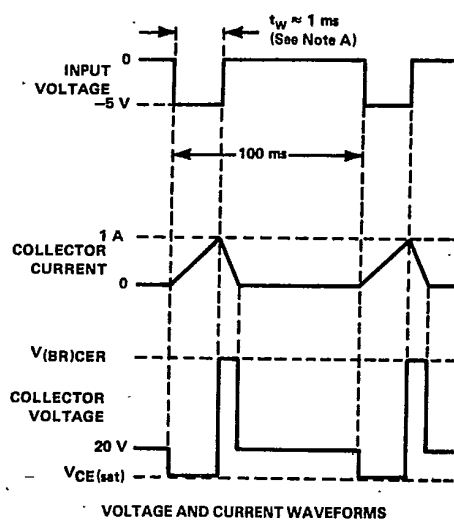
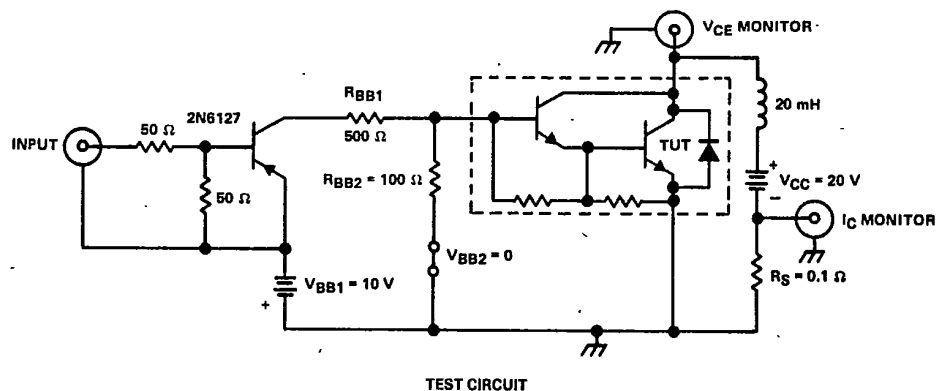
NOTE A: Input pulse duration is increased until $I_{CM} = 1$ A.

FIGURE 2. INDUCTIVE-LOAD SWITCHING

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TYPICAL CHARACTERISTICS

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STATIC FORWARD CURRENT TRANSFER RATIO
VS
COLLECTOR CURRENT

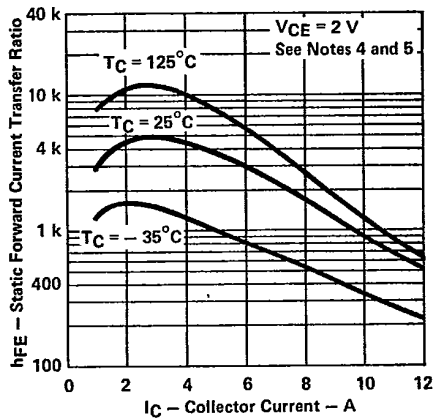


FIGURE 3

STATIC FORWARD CURRENT TRANSFER RATIO
VS
COLLECTOR CURRENT

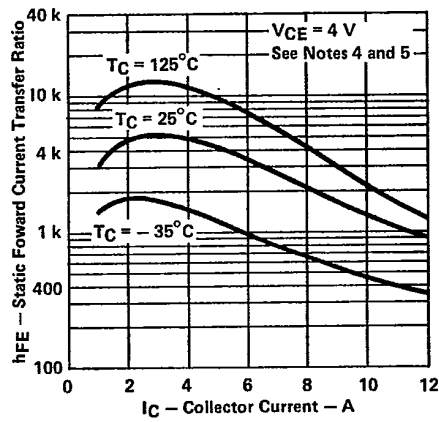


FIGURE 4

COLLECTOR-EMITTER
SATURATION VOLTAGE
VS
COLLECTOR CURRENT

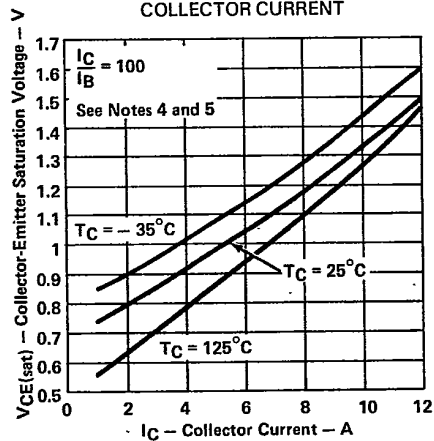


FIGURE 5

BASE-EMITTER VOLTAGE
VS
COLLECTOR CURRENT

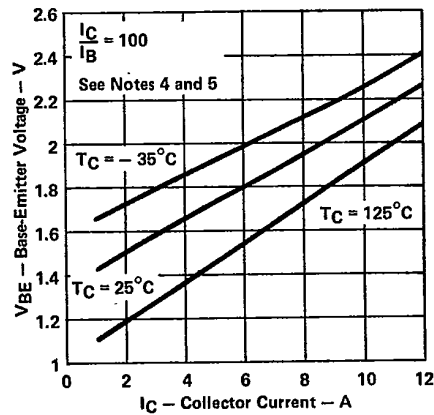


FIGURE 6

- 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 located within 3.2 mm (0.125 inch) from the device body.

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MAXIMUM SAFE OPERATING AREA

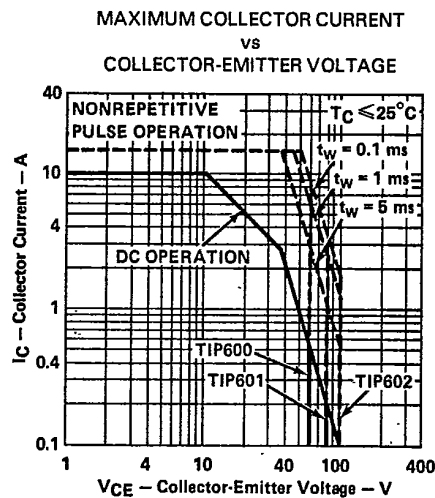


FIGURE 7

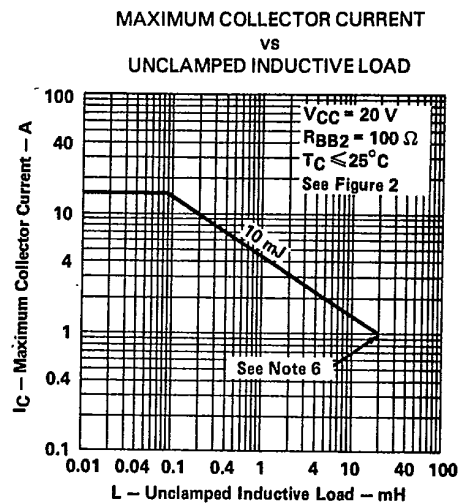


FIGURE 8

NOTE 6: Above this point the safe operating area has not been defined.

THERMAL INFORMATION

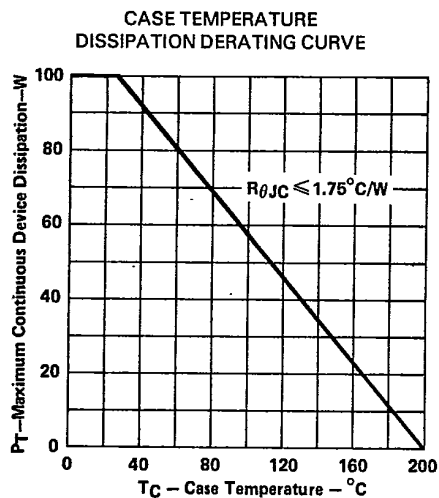


FIGURE 9

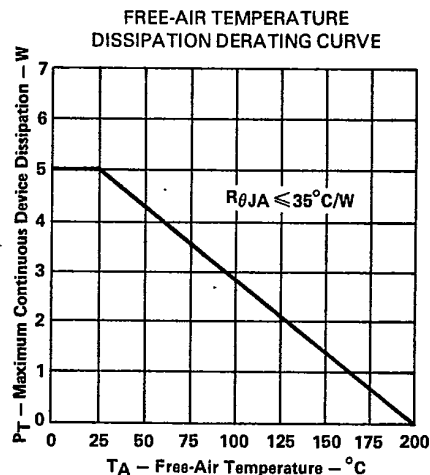


FIGURE 10

TIP Devices

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