

8961726 TEXAS INSTR (OPT0)

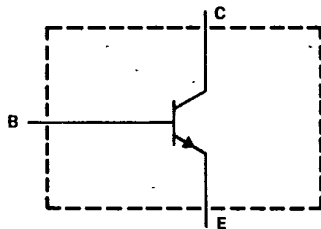
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TIP73, TIP73A, TIP73B, TIP73C  
N-P-N SILICON POWER TRANSISTORS  
*T-33-13*

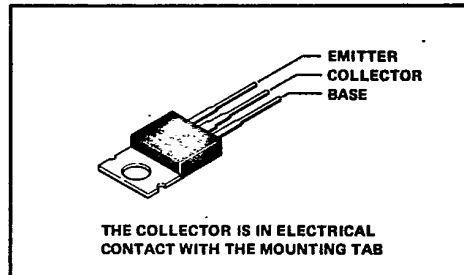
FEBRUARY 1977 - REVISED OCTOBER 1984

- Designed for Complementary Use with TIP74, TIP74A, TIP74B, TIP74C
- 80 W at 25°C Case Temperature
- 15 A Rated Collector Current
- Min  $f_T$  of 5 MHz at 4 V, 1 A
- Meets or Surpasses all JEDEC-Registered Specifications for 2N6486, 2N6487 and 2N6488 at 25°C
- Designed for Power-Amplifier and High-Speed Switching Applications

device schematic



TO-220AB PACKAGE



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

	TIP73	TIP73A	TIP73B	TIP73C
Collector-base voltage	60V	70V	90V	110V
Collector-emitter voltage ( $I_B = 0$ )	40V	60V	80V	100V
Emitter-base voltage	5V			
Continuous collector current	15 A			
Continuous base current	5 A			
Continuous device dissipation at (or below) 25°C case temperature (see Note 1)	80 W			
Continuous device dissipation at (or below) 25°C free-air temperature (see Note 2)	2 W			
Safe operating area at (or below) 25°C case temperature	See Figure 11			
Uncfamped inductive load energy (see Note 3)	90 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. Derate linearly to 150°C case temperature at the rate of 0.64 W/°C or refer to Dissipation Derating Curve, Figure 9.  
 2. Derate linearly to 150°C free-air temperature at the rate of 16 mW/°C or refer to Dissipation Derating Curve, Figure 10.  
 3. This rating is based on the capability of the transistor to operate safely in the circuit of Figure 2.  $L = 20$  mH,  $R_{BB2} = 100 \Omega$ ,  $V_{BB2} = 0$  V,  $R_S = 0.1 \Omega$ ,  $V_{CC} = 20$  V. Energy  $\approx I_C^2 L / 2$ .

TIP Devices

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TIP73, TIP73A, TIP73B, TIP73C  
N-P-N SILICON POWER TRANSISTORS

electrical characteristics at 25°C case temperature

PARAMETER	TEST CONDITIONS	TIP73		TIP73A		TIP73B		TIP73C		UNIT	
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP		MAX
$V_{(BR)CEO}$	$I_C = 200\text{ mA}$ , $I_B = 0$ , See Note 4	40			60			80		100	V
$V_{(BR)CEV}$	$I_C = 200\text{ mA}$ , $V_{BE} = -1.5\text{ V}$ , See Note 4	50			70			90		110	V
$I_{CEO}$	$V_{CE} = 30\text{ V}$ , $I_B = 0$		50		50				50		$\mu\text{A}$
	$V_{CE} = 60\text{ V}$ , $I_B = 0$						50				$\mu\text{A}$
$I_{CES}$	$V_{CE} = 40\text{ V}$ , $V_{BE} = 0$		50								$\mu\text{A}$
	$V_{CE} = 60\text{ V}$ , $V_{BE} = 0$				50						$\mu\text{A}$
	$V_{CE} = 80\text{ V}$ , $V_{BE} = 0$						50				$\mu\text{A}$
	$V_{CE} = 100\text{ V}$ , $V_{BE} = 0$							50			$\mu\text{A}$
$I_{EBO}$	$V_{EB} = 4.5\text{ V}$ , $I_C = 0$		50		50		50		50		$\mu\text{A}$
$h_{FE}$	$V_{CE} = 4\text{ V}$ , $I_C = 5\text{ A}$ , See Notes 4 and 5	20	150	20	150	20	150	20	150		
	$V_{CE} = 4\text{ V}$ , $I_C = 15\text{ A}$ , See Notes 4 and 5	5		5		5		5			
$V_{BE}$	$V_{CE} = 4\text{ V}$ , $I_C = 5\text{ A}$ , See Notes 4 and 5		1.3		1.3		1.3		1.3		V
	$V_{CE} = 4\text{ V}$ , $I_C = 15\text{ A}$ , See Notes 4 and 5		3.5		3.5		3.5		3.5		V
$V_{CE(sat)}$	$I_B = 0.5\text{ A}$ , $I_C = 5\text{ A}$ , See Notes 4 and 5		1.3		1.3		1.3		1.3		V
	$I_B = 5\text{ A}$ , $I_C = 15\text{ A}$ , See Notes 4 and 5		3.5		3.5		3.5		3.5		V
$h_{fe}$	$V_{CE} = 4\text{ V}$ , $I_C = 1\text{ A}$ , $f = 1\text{ kHz}$	25		25		25		25			
$ h_{fe} $	$V_{CE} = 4\text{ V}$ , $I_C = 1\text{ A}$ , $f = 1\text{ MHz}$	5		5		5		5			

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
$R_{\theta JC}$		1.56		
$R_{\theta JA}$		62.5		$^{\circ}\text{C/W}$
$R_{\theta CHS}$	See Note 6	0.7		
$C_{\theta C}$		0.9		$\text{J}/^{\circ}\text{C}$

NOTE 6: This parameter is measured using 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).

TIP Devices

resistive-load switching characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	MIN	TYP	MAX	UNIT
$t_d$			20		ns
$t_r$	$I_C = 5\text{ A}$ , $I_{B1} = 500\text{ mA}$ , $I_{B2} = -500\text{ mA}$ ,		350		
$t_s$	$V_{BE(off)} = -4.2\text{ V}$ , $R_L = 6\ \Omega$ , See Figure 1		500		
$t_f$			400		

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

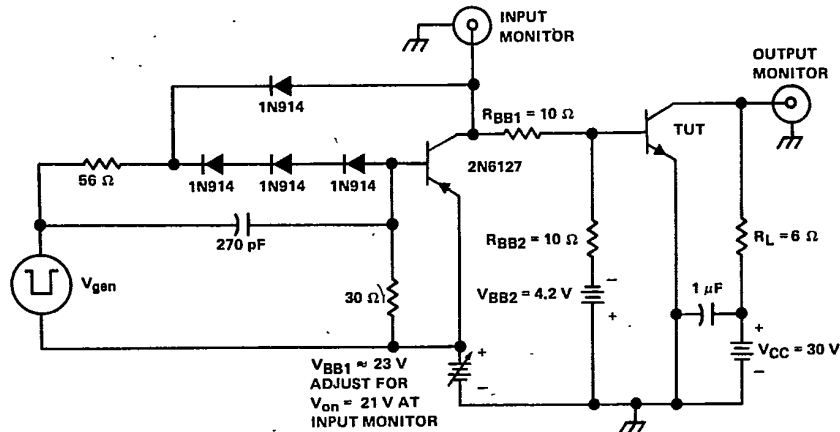
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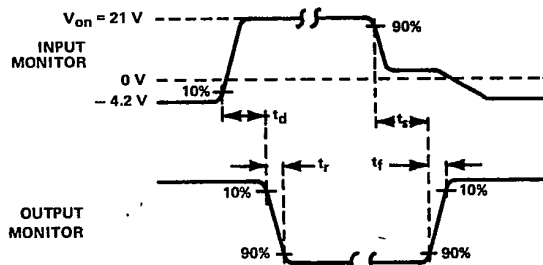
TIP73, TIP73A, TIP73B, TIP73C  
N-P-N SILICON POWER TRANSISTORS

7-33-13

PARAMETER MEASUREMENT INFORMATION



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

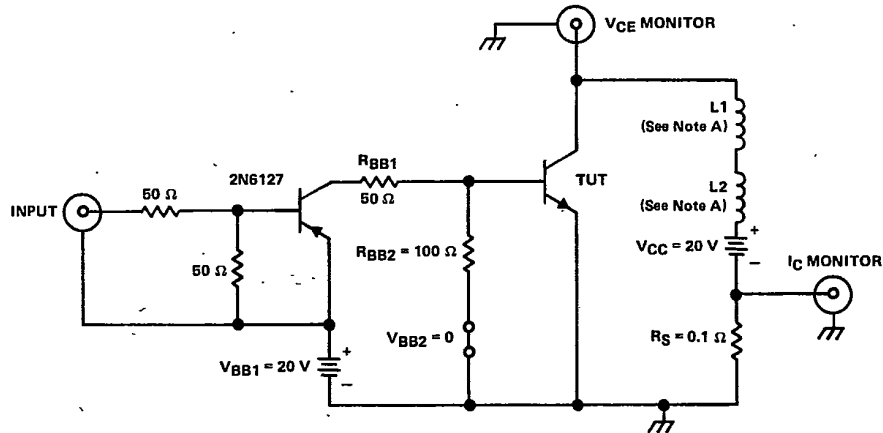
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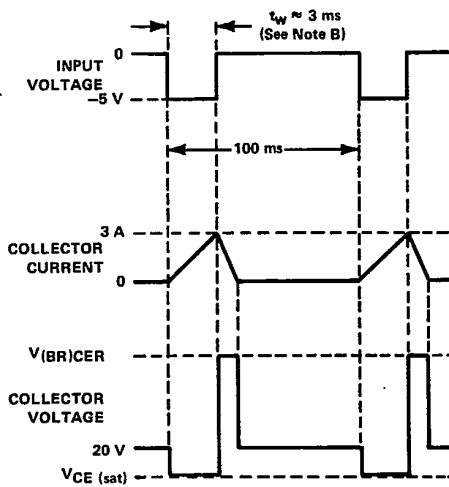
TIP73, TIP73A, TIP73B, TIP73C  
N-P-N SILICON POWER TRANSISTORS

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PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE AND CURRENT WAVEFORMS

NOTES: A. L1 and L2 are 10 mH, 0.11  $\Omega$ , Chicago Standard Transformer Corporation C-2688, or equivalent.  
B. Input pulse duration is increased until  $I_{CM} = 3$  A.

FIGURE 2. INDUCTIVE-LOAD SWITCHING

5  
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TYPICAL CHARACTERISTICS

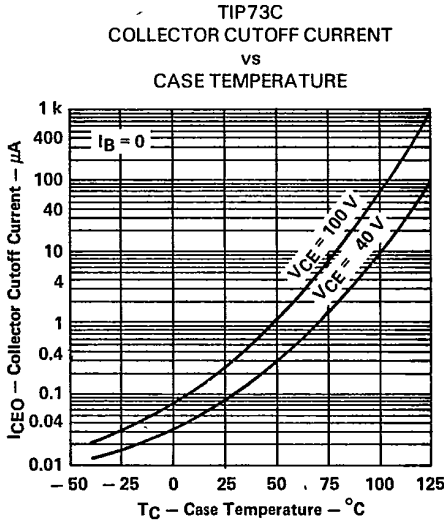


FIGURE 3

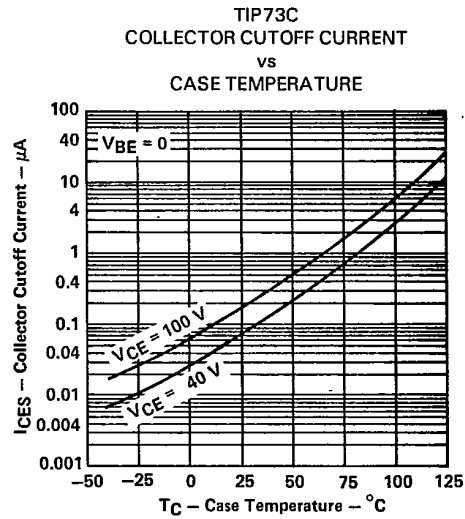


FIGURE 4

STATIC FORWARD CURRENT TRANSFER RATIO  
vs  
COLLECTOR CURRENT

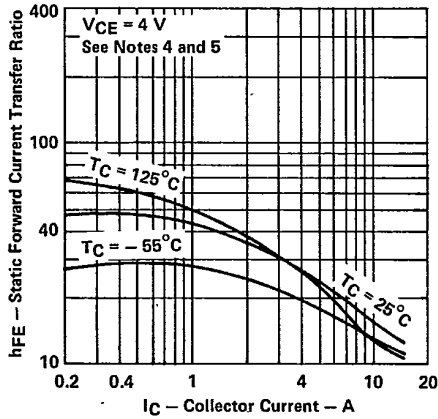


FIGURE 5

BASE-EMITTER VOLTAGE  
vs  
COLLECTOR CURRENT

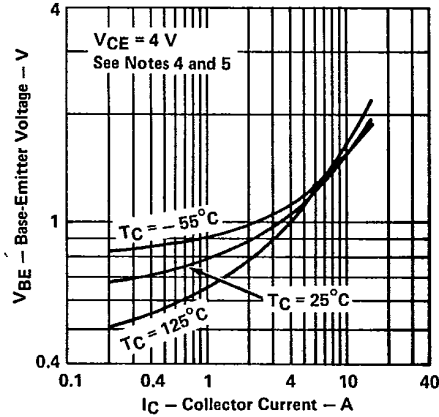


FIGURE 6

- 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.



TIP Devices

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TYPICAL CHARACTERISTICS

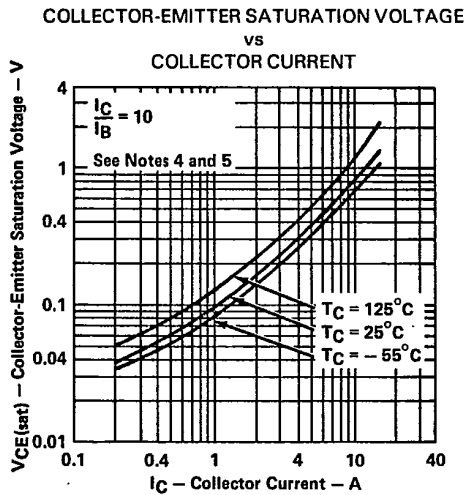


FIGURE 7

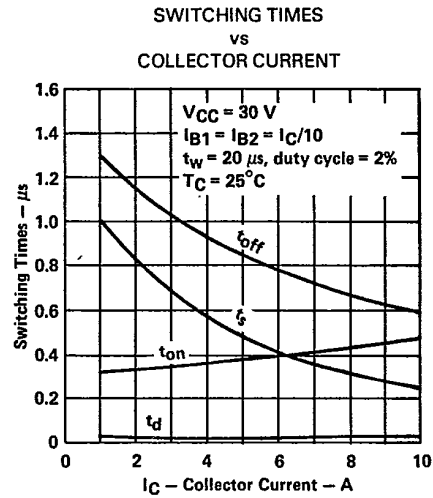


FIGURE 8

- 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.

MAXIMUM SAFE OPERATING AREA

MAXIMUM COLLECTOR CURRENT  
vs  
COLLECTOR-EMITTER VOLTAGE

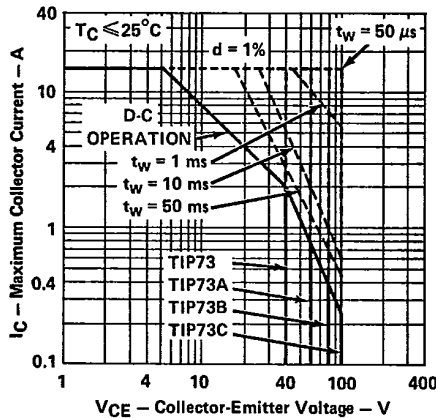


FIGURE 9



TIP Devices

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THERMAL INFORMATION

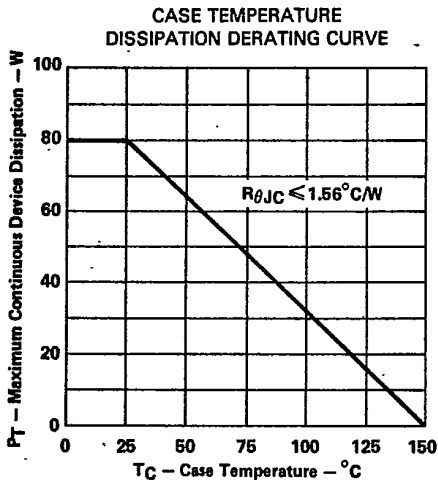


FIGURE 10

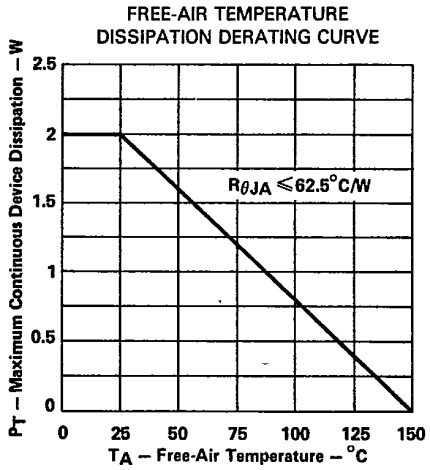


FIGURE 11



TIP Devices