

8961726 TEXAS INSTR (OPTO)

62C 37027 D

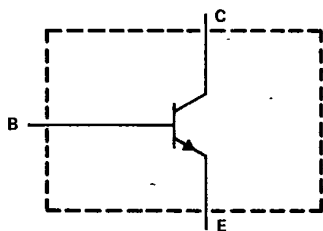
7-33-13

TIPL753, TIPL753A
N-P-N SILICON POWER TRANSISTORS

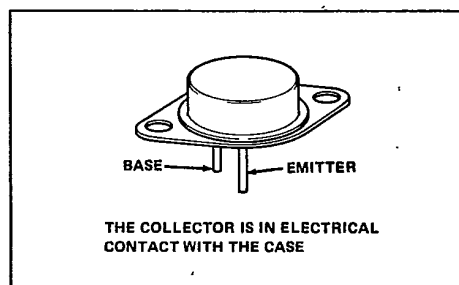
OCTOBER 1982 - REVISED OCTOBER 1984

- 150 W at 25°C Case Temperature
- 8 A Continuous Collector Current
- 14 A Peak Collector Current
- Operating Characteristics Fully Guaranteed at 100°C
- Transient Power Dissipation Guaranteed at 100°C
- $I_{CES} < 100 \mu A$ at Maximum Rated V_{CE} at 100°C
- High Sustaining Voltage
TIPL753 ... 350 V Min.
TIPL753A ... 400 V Min.
- 1000 V Blocking Capability
- Specifically Designed for High-Voltage, Inductive-Load Switching Applications

device schematic



TO-3 PACKAGE



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

	TIPL753	TIPL753A
Collector-base voltage ($I_E = 0$)	800 V	1000 V
Collector-emitter voltage ($V_{BE} = 0$)	800 V	1000 V
Collector-emitter voltage ($I_B = 0$)	350 V	400 V
Base-emitter voltage	10 V	
Continuous collector current	8 A	
Peak collector current (see Note 1)	14 A	
Continuous device dissipation at (or below) 25°C case temperature (see Figure 12)	150 W	
Operating junction and storage temperature range	-65°C to 200°C	

NOTE 1: This value applies for, $t_W \leq 10$ ms, duty cycle $\leq 2\%$.

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electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	TIPL753			TIPL753A			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
$V_{CE(sus)}$	$I_C = 100 \text{ mA}$, $L = 25 \text{ mH}$, See Note 2	350			400			V
I_{CEO}	$V_{CE} = 350 \text{ V}$, $I_B = 0$		50					μA
	$V_{CE} = 400 \text{ V}$, $I_B = 0$				50			
I_{CES}	$V_{CE} = 800 \text{ V}$, $V_{BE} = 0$		50					μA
	$V_{CE} = 1000 \text{ V}$, $V_{BE} = 0$					50		
	$V_{CE} = 800 \text{ V}$, $V_{BE} = 0$, $T_C = 100^\circ\text{C}$		100					
	$V_{CE} = 1000 \text{ V}$, $V_{BE} = 0$, $T_C = 100^\circ\text{C}$					100		
I_{EBO}	$V_{EB} = 10 \text{ V}$, $I_C = 0$		1			1		mA
h_{FE}	$V_{CE} = 5 \text{ V}$, $I_C = 0.5 \text{ A}$, See Notes 3 and 4	15	60	15	60			
$V_{CE(sat)}$	$I_C = 2 \text{ A}$, $I_B = 0.4 \text{ A}$, See Notes 3 and 4		0.5		0.5			V
	$I_C = 5 \text{ A}$, $I_B = 1 \text{ A}$, See Notes 3 and 4		1		1			
	$I_C = 8 \text{ A}$, $I_B = 1.6 \text{ A}$, See Notes 3 and 4		2.5		2.5			
	$I_C = 8 \text{ A}$, $I_B = 1.6 \text{ A}$, $T_C = 100^\circ\text{C}$, See Notes 3 and 4		5		5			
$V_{BE(sat)}$	$I_C = 2 \text{ A}$, $I_B = 0.4 \text{ A}$, See Notes 3 and 4		1.1		1.1			V
	$I_C = 5 \text{ A}$, $I_B = 1 \text{ A}$, See Notes 3 and 4		1.3		1.3			
	$I_C = 8 \text{ A}$, $I_B = 1.6 \text{ A}$, See Notes 3 and 4		1.6		1.6			
	$I_C = 8 \text{ A}$, $I_B = 1.6 \text{ A}$, $T_C = 100^\circ\text{C}$, See Notes 3 and 4		1.5		1.5			
f_T	$V_{CE} = 10 \text{ V}$, $I_C = 0.5 \text{ A}$, See Note 5		8		8			MHz
C_{obo}	$V_{CB} = 20 \text{ V}$, $I_E = 0$, $f = 0.1 \text{ MHz}$	105			105			pF

NOTES: 2. Inductive loop switching measurement.

3. These parameters must be measured using pulse techniques, pulse duration = 300 μs , duty cycle = 2%.

4. 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.

5. To obtain f_T , the $|h_{fe}|$ response is extrapolated at the rate of -6 dB per octave from $f = 1 \text{ MHz}$ to the frequency at which $|h_{fe}| = 1$.

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thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$			1.17	$^{\circ}\text{C/W}$

resistive-load switching characteristics

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{on}	$I_C = 8\text{ A}, V_{CC} = 200\text{ V}, I_{B(1)} = 1.6\text{ A},$ $I_{B2} = -1.6\text{ A}, T_C = 25^{\circ}\text{C},$ See Figure 1			0.8	μs
t_s				2.5	μs
t_f				0.45	μs
t_{on}	$I_C = 8\text{ A}, V_{CC} = 200\text{ V}, I_{B1} = 1.6\text{ A},$ $I_{B2} = -1.6\text{ A}, T_C = 100^{\circ}\text{C},$ See Figure 1			1.4	μs
t_s				3	μs
t_f				1	μs

inductive-load switching characteristics

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{sv}	$I_C = 8\text{ A}, I_{B1} = 1.6\text{ A}, V_{BE(off)} = -10\text{ V},$ $T_C = 25^{\circ}\text{C},$ See Figure 2			2.5	μs
t_{rv}				200	ns
t_{fi}				150	ns
t_{tj}				50	ns
t_{xo}				300	ns
t_{sv}	$I_C = 8\text{ A}, I_{B1} = 1.6\text{ A}, V_{BE(off)} = -10\text{ V},$ $T_C = 100^{\circ}\text{C},$ See Figure 2			3	μs
t_{rv}				300	ns
t_{fi}				150	ns
t_{tj}				50	ns
t_{xo}				500	ns

TIPL Devices



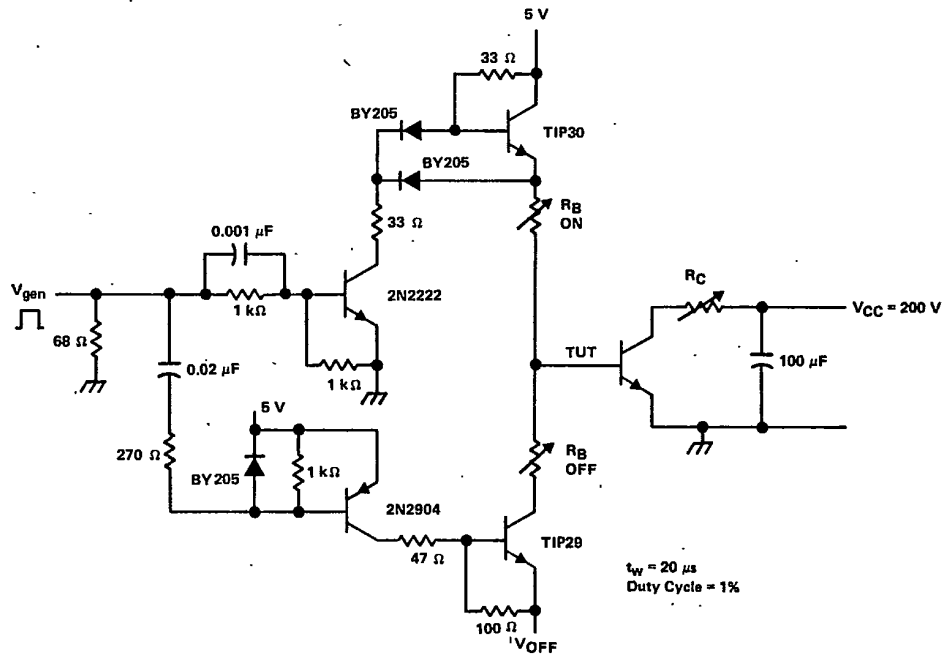
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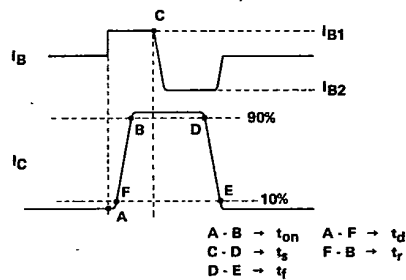
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TIPL753, TIPL753A
N-P-N SILICON POWER TRANSISTORS

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



CURRENT WAVEFORMS

- NOTES: A. The V_{gen} waveform is supplied by the following characteristics: $t_r \leq 15$ ns, $t_f \leq 15$ ns, $Z_{out} = 50 \Omega$, $t_w = 20 \mu s$, duty cycle $\leq 2\%$.
B. 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.
C. Resistors must be noninductive types.

FIGURE 1. RESISTIVE-LOAD SWITCHING

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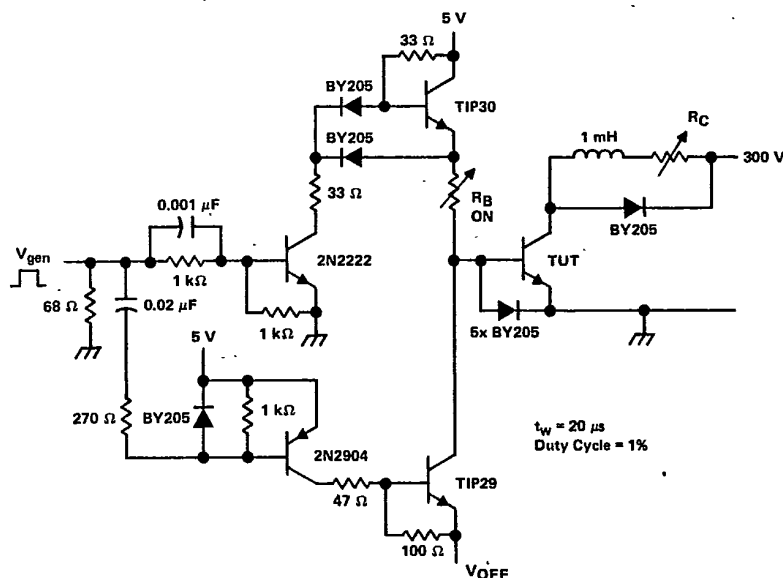
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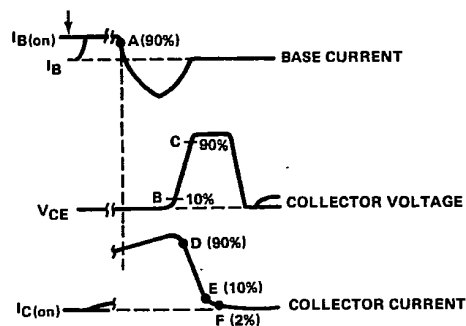
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N-P-N SILICON POWER TRANSISTORS

PARAMETER MEASUREMENT INFORMATION

ADJUST R_C FOR REQUIRED I_C

TEST CIRCUIT



VOLTAGE AND CURRENT WAVEFORMS

NOTES: A. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{in} \geq 10 \Omega$, $C_{in} \leq 11.5$ pF.
 B. Resistors must be noninductive types.

FIGURE 2. INDUCTIVE-LOAD SWITCHING

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TYPICAL CHARACTERISTICS

TURN-ON TIME
vs
COLLECTOR CURRENT

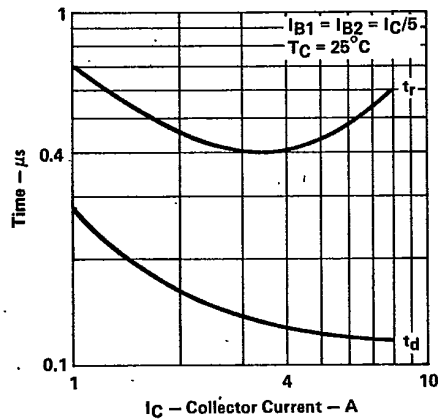


FIGURE 3

TURN-OFF TIME
vs
COLLECTOR CURRENT

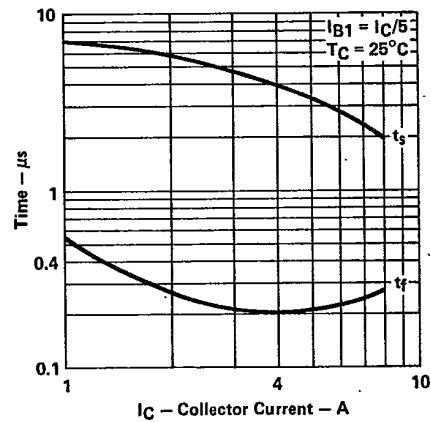


FIGURE 4

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

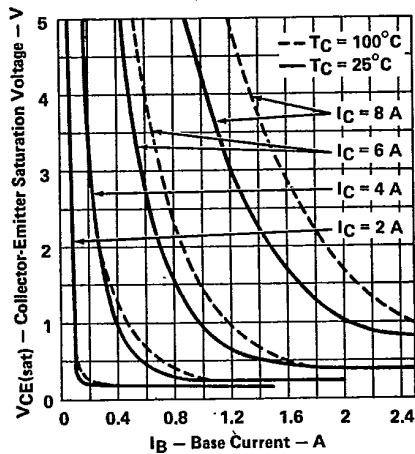


FIGURE 5

BASE-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

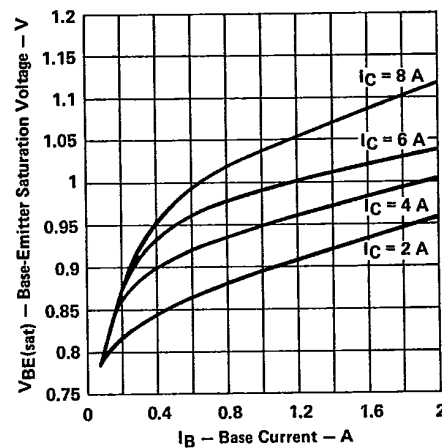


FIGURE 6

TIPL Devices



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TYPICAL CHARACTERISTICS

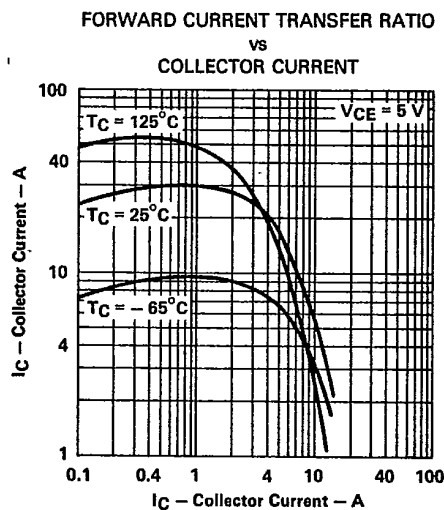


FIGURE 7

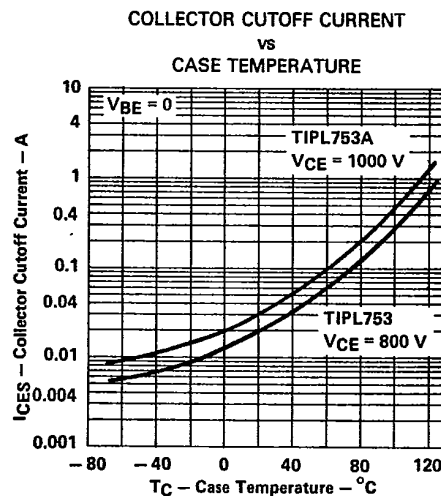


FIGURE 8

MAXIMUM SAFE OPERATING AREA

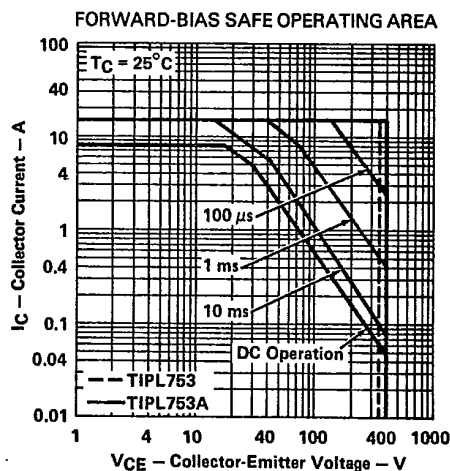


FIGURE 9

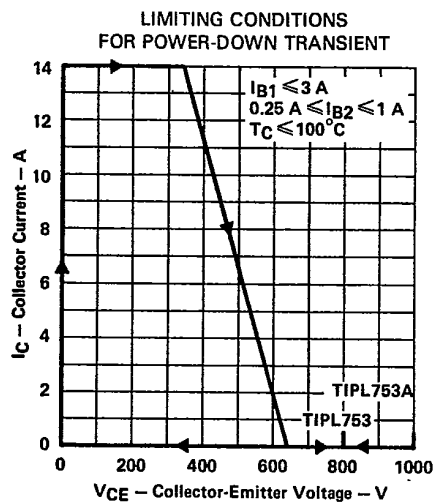


FIGURE 10

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THERMAL INFORMATION

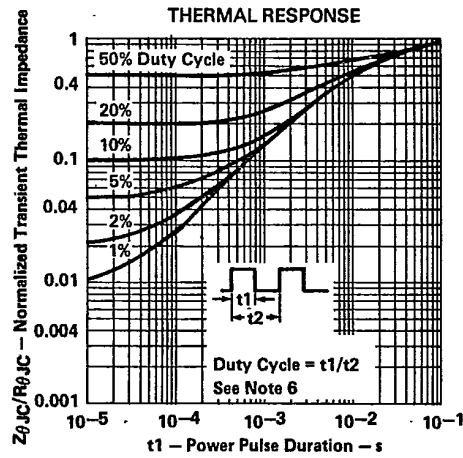


FIGURE 11

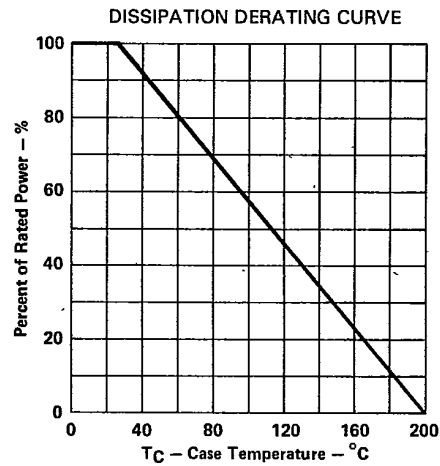


FIGURE 12

NOTE 6: Read time at end of t_1 , $T_{J(max)} - T_C = P_{D(peak)} \cdot \left(\frac{Z_{\theta JC}}{R_{\theta JC}} \right) \cdot R_{\theta JC(max)}$.

TIPL Devices

