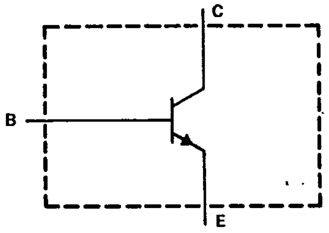
TIPL762, TIPL762A
N-P-N SILICON POWER TRANSISTORS

OCTOBER 1982 – REVISED OCTOBER 1984

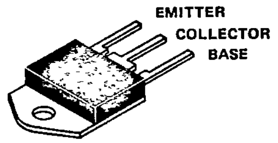
T-33-13

- 120 W at 25°C Free-Air Temperature
- 6 A Continuous Collector Current
- 12 A Peak Collector Current
- Operating Characteristics Fully Guaranteed at 100°C
- Transient Power Dissipation Guaranteed at 100°C
- I_{CES} < 100 μA at Maximum Rated V_{CE} at 100°C
- 1000 Volt Blocking Capability
- High Sustaining Voltage
  TIPL762 . . . 350 V Min.
  TIPL762A . . . 400 V Min.
- Specifically Designed for High-Voltage, Inductive-Load Switching Applications

device schematic



TO-218AA PACKAGE



THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE MOUNTING TAB

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

	TIPL762	TIPL762A
Collector-base voltage	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	6 A	
Peak collector current (see Note 1)	12 A	
Continuous device dissipation at (or below) 25°C case temperature (see Figure 12)	120 W	
Operating junction and storage temperature range	– 65°C to 150°C	

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

TIPL Devices

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TIPL762, TIPL762A
N-P-N SILICON POWER TRANSISTORS

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

PARAMETER	TEST CONDITIONS	TIPL762 MIN	TIPL762 TYP	TIPL762 MAX	TIPL762A MIN	TIPL762A TYP	TIPL762A MAX	UNIT
$V_{CEO(sus)}$	$I_C = 0.1$ A, L = 25 mH, See Note 2	350			400			V
I_{CEO}	$V_{CE} = 350$ V, $I_B = 0$			50				µA
	$V_{CE} = 400$ V, $I_B = 0$						50	
I_{CES}	$V_{CE} = 800$ V, $V_{BE} = 0$			50				µA
	$V_{CE} = 1000$ V, $V_{BE} = 0$						50	
	$V_{CE} = 800$ V, $V_{BE} = 0$, $T_C = 100$°C			100				
	$V_{CE} = 1000$ V, $V_{BE} = 0$, $T_C = 100$°C						100	
I_{EBO}	$V_{EB} = 10$ V, $I_C = 0$			1			1	mA
h_{FE}	$V_{CE} = 5$ V, $I_C = 0.5$ A, See Notes 3 and 4	15		60	15		60	
$V_{CE(sat)}$	$I_C = 2$ A, $I_B = 0.4$ A, See Notes 3 and 4			0.5			0.5	V
	$I_C = 4$ A, $I_B = 0.8$ A, See Notes 3 and 4			1			1	
	$I_C = 6$ A, $I_B = 1.2$ A, See Notes 3 and 4			2.5			2.5	
	$I_C = 6$ A, $I_B = 1.2$ A, $T_C = 100$°C			5			5	
$V_{BE(sat)}$	$I_C = 2$ A, $I_B = 0.4$ A, See Notes 3 and 4			1.1			1.1	V
	$I_C = 4$ A, $I_B = 0.8$ A, See Notes 3 and 4			1.3			1.3	
	$I_C = 6$ A, $I_B = 1.2$ A, See Notes 3 and 4			1.5			1.5	
	$I_C = 6$ A, $I_B = 1.2$ A, $T_C = 100$°C			1.4			1.4	
f_T	$V_{CE} = 10$ V, $I_C = 0.5$ A, See Note 5		7			7		MHz
C_{obo}	$V_{CB} = 20$ V, $I_E = 0$, f = 0.1 MHz		105			105		pF

NOTES:
2. Inductive loop switching measurement.
3. These parameters are measured using pulse techniques, $t_w \leq 300$ 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 MHz to the frequency at which $|h_{fe}| = 1$.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$			1.25	°C/W

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{on}	$I_C = 6$ A, $V_{CC} = 200$ V, $I_{B1} = 1.2$ A, $I_{B2} = -1.2$ A, $T_C = 25$°C, See Figure 1			1	µs
t_s				2.5	µs
t_f				0.45	µs
t_{on}	$I_C = 6$ A, $V_{CC} = 200$ V, $I_{B1} = 1.2$ A, $I_{B2} = -1.2$ A, $T_C = 100$°C, See Figure 1			2.5	µs
t_s				3	µs
t_f				1	µs

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{sv}	$I_C = 6$ A, $I_{B1} = 1.2$ A, $T_C = 25$°C, $V_{BE(off)} = -10$ V, See Figure 2			2.5	µs
t_{rv}				200	µs
t_{fi}				150	µs
t_{ti}				50	µs
t_{xo}				300	µs
t_{sv}	$I_C = 6$ A, $I_{B1} = 1.2$ A, $T_C = 100$°C, $V_{BE(off)} = -10$ V, See Figure 2			3	µs
t_{rv}				300	µs
t_{fi}				150	µs
t_{ti}				50	µs
t_{xo}				500	µs

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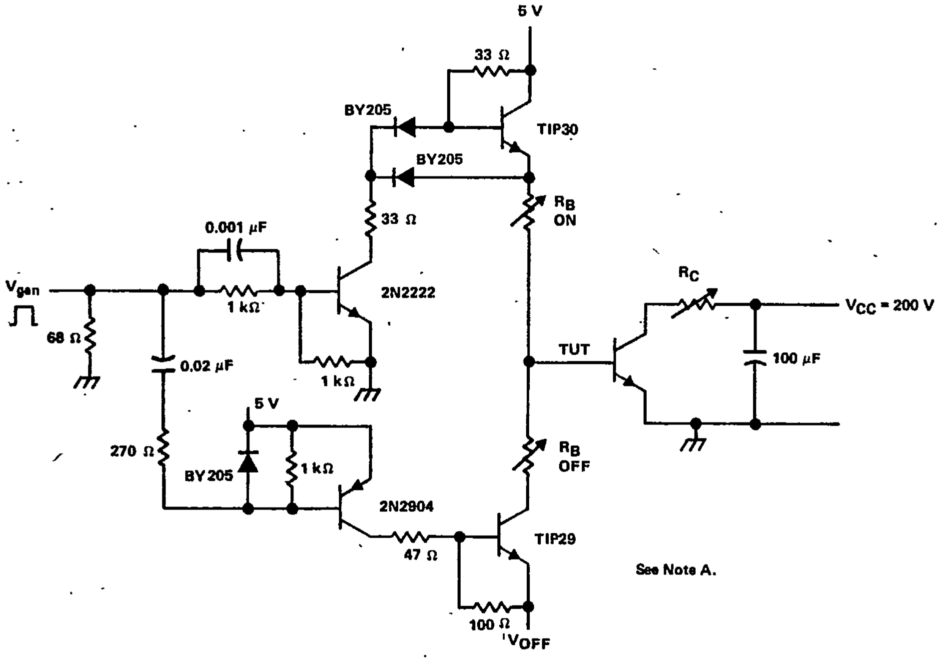
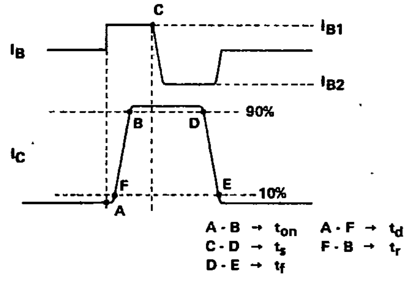
PARAMETER MEASUREMENT INFORMATION



See Note A.

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 ≤ 2%.
B. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{in} \geq 10\ M\Omega$, $C_{in} \leq 11.5$ pF.
C. Resistors must be noninductive types.

FIGURE 1. RESISTIVE-LOAD SWITCHING

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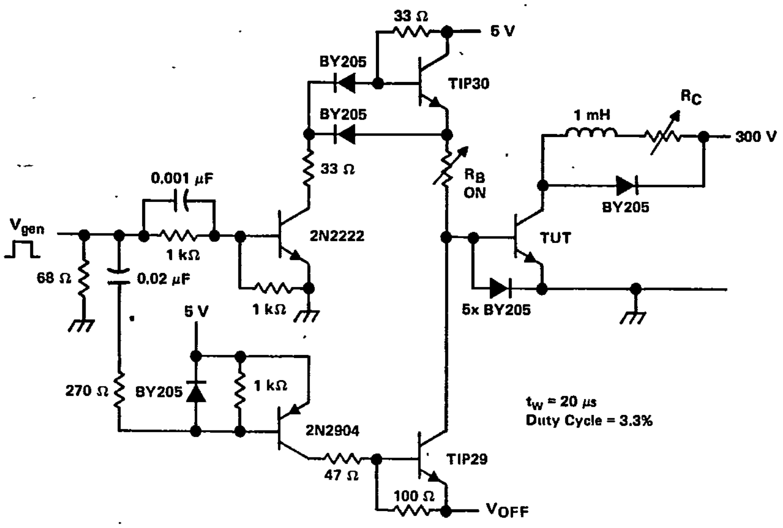
PARAMETER MEASUREMENT INFORMATION

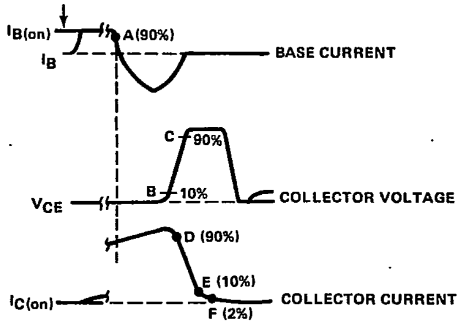


$t_w = 20\ \mu s$
Duty Cycle = 3.3%

ADJUST R_C FOR REQUIRED I_C

TEST CIRCUIT

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.



$A–B = t_{sv}$
$A–C = t_{rv}$
$D–E = t_{fi}$
$E–F = t_{ti}$
$B–E = t_{xo}$

VOLTAGE AND CURRENT WAVEFORMS

FIGURE 2. INDUCTIVE-LOAD SWITCHING

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TYPICAL CHARACTERISTICS

RESISTIVE-LOAD TURN-OFF TIME
vs
BASE CUTOFF CURRENT

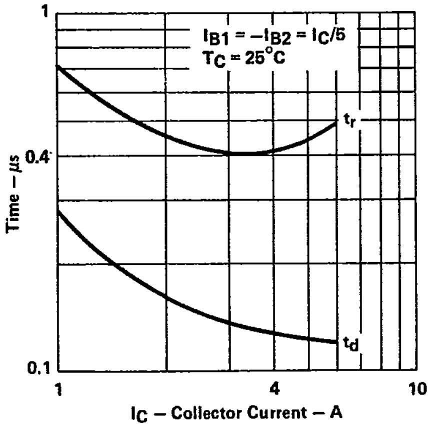

FIGURE 3

RESISTIVE-LOAD TURN-OFF TIME
vs
COLLECTOR CURRENT

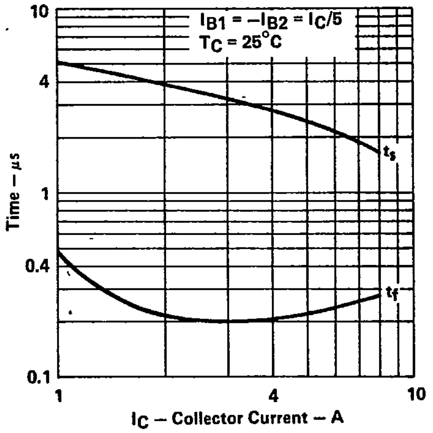

FIGURE 4

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

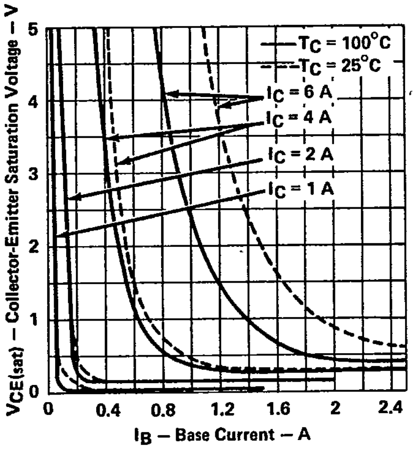

FIGURE 5

BASE-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

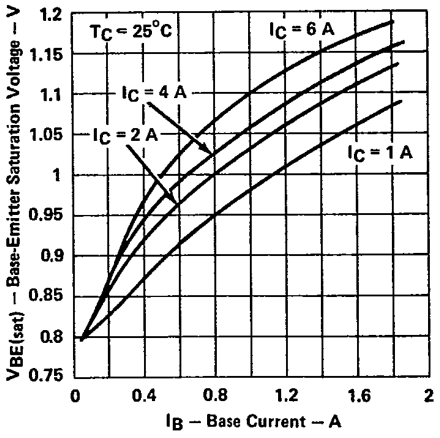

FIGURE 6

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TIPL762, TIPL762A
N-P-N SILICON POWER TRANSISTORS

TYPICAL CHARACTERISTICS

FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

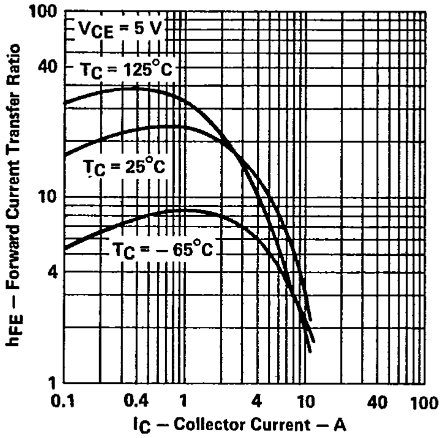

FIGURE 7

COLLECTOR CUTOFF CURRENT
vs
CASE TEMPERATURE

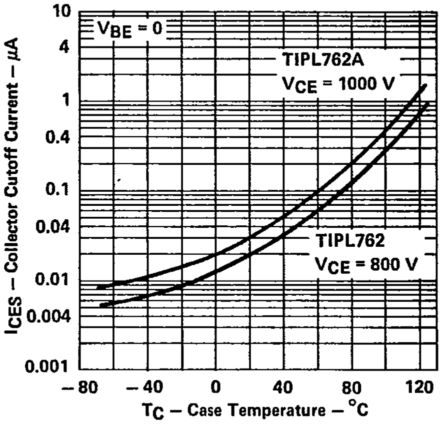

FIGURE 8

MAXIMUM SAFE OPERATING AREA

FORWARD-BIAS SAFE OPERATING AREA

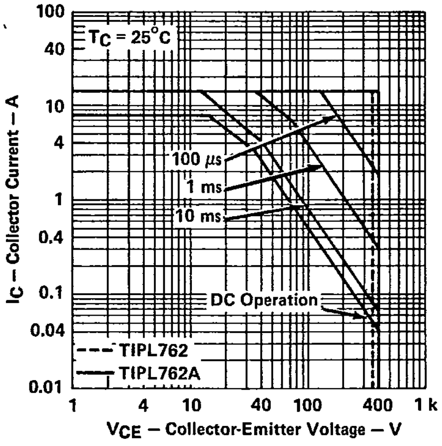

FIGURE 9

LIMITING CONDITIONS
FOR POWER-DOWN TRANSIENT

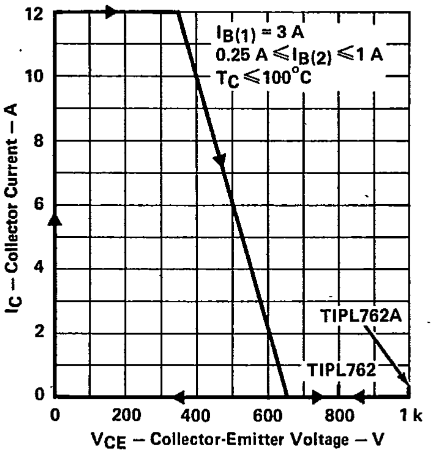

FIGURE 10

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THERMAL INFORMATION

THERMAL RESPONSE

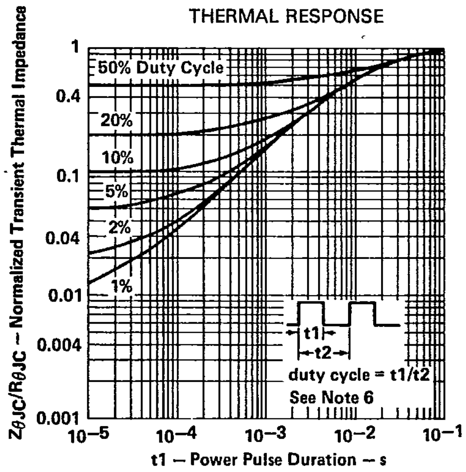

FIGURE 11

DISSIPATION DERATING CURVE

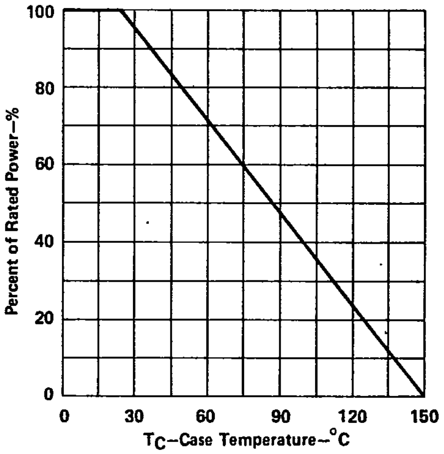

FIGURE 12

NOTE 6: Read time at end of t1, $T_{J(max)} - T_C = P_{D(peak)} \bullet \left(\frac{Z_{\theta JC}}{R_{\theta JC}}\right) \bullet R_{\theta JC(max)}$.