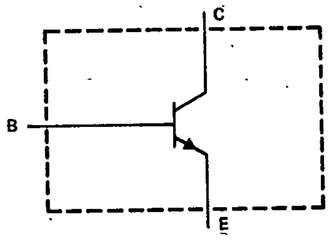
TIP3055
N-P-N SILICON POWER TRANSISTOR

T-33-13

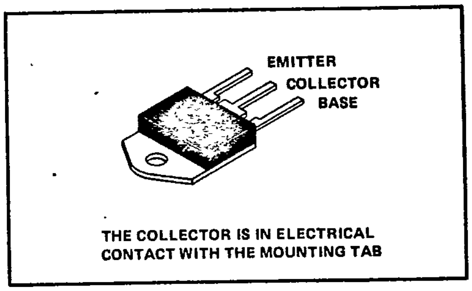
DECEMBER 1970 – REVISED OCTOBER 1984

- Designed for Complementary Use with TIP2955
- 90 W at 25°C Case Temperature
- 15 A Continuous Collector Current
- Plastic-Case Version of 2N3055
- Designed for Automotive Ignition, Linear Amplifier and Power Amplifier 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)

	TIP3055
Collector-base voltage	100 V
Collector-emitter voltage (see Note 1)	70 V
Emitter-base voltage	7 V
Continuous collector current	15 A
Continuous base current	7 A
Safe operating region at (or below) 25°C case temperature	See Figure 4
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)	90 W
Continuous device dissipation at (or below) 25°C free-air temperature (see Note 3)	3.5 W
Unclamped inductive load energy (see Note 4)	62.5 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. This value applies when the base-emitter resistance $R_{BE} = 100\,\Omega$.
2. Derate linearly to 150°C case temperature at the rate of 0.72 W/°C.
3. Derate linearly to 150°C free-air temperature at the rate of 28 mW/°C.
4. This rating is based on the capability of the transistor to operate safely in the circuit of Figure 2. $L = 20\,mH$, $R_{BB2} = 200\,\Omega$, $V_{BB2} = 0\,V$, $R_S = 0.1\,\Omega$, $V_{CC} = -10\,V$. Energy $= I_C{}^2L/2$.

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T-33-13

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$	I_C = 30 mA, I_B = 0, See Note 5	60			V
I_{CER}	V_{CE} = 70 V, R_{BE} = 100 Ω			1	mA
I_{CEO}	V_{CE} = 30 V, I_B = 0			0.7	mA
I_{CEV}	V_{CE} = 100 V, V_{BE} = −1.5 V			5	mA
I_{EBO}	V_{EB} = 7 V, I_C = 0			5	mA
h_{FE}	V_{CE} = 4 V, I_C = 4 A, See Notes 5 and 6	20		70	
	V_{CE} = 4 V, I_C = 10 A, See Notes 5 and 6	5			
V_{BE}	V_{CE} = 4 V, I_C = 4 A, See Notes 5 and 6			1.8	V
$V_{CE(sat)}$	I_B = 0.4 A, I_C = 4 A, See Notes 5 and 6			1.1	V
	I_B = 3.3 A, I_C = 10 A, See Notes 5 and 6			3	
h_{fe}	V_{CE} = 10 V, I_C = 1 A, f = 1 kHz	15			
$\|h_{fe}\|$	V_{CE} = 10 V, I_C = 0.5 A, f = 1 MHz	3			MHz

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 and located within 3,2 mm (0.125 inch) from the device body.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$			1.39	°C/W
$R_{\theta JA}$			35.7	

resistive-load switching characteristics

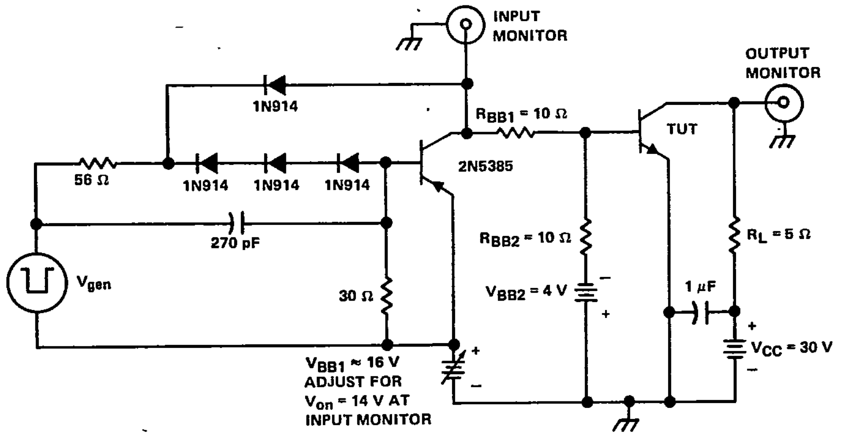
PARAMETER	TEST CONDITIONS†	MIN	TYP	MAX	UNIT
t_{on}	I_C = 6 A, $I_{B(1)}$ = 0.6 A, $I_{B(2)}$ = −0.6 A,		0.6		µs
t_{off}	$V_{BE(off)}$ = −4 V, R_L = 5 Ω, See Figure 1		1		

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

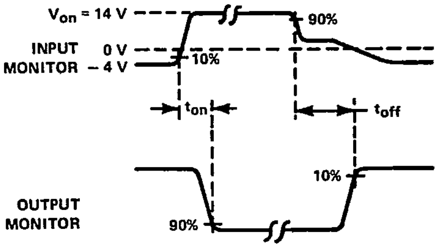
128

T-33-13

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



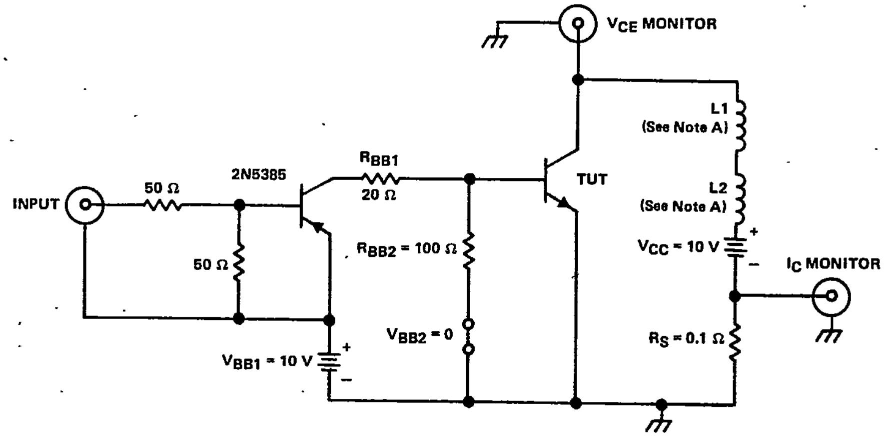
VOLTAGE WAVEFORMS

NOTES:
- A. V_{gen} is a −30-V pulse into a 50 Ω 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 Ω, t_w = 20 µs.
- C. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15$ ns, $R_{in} \geq 10$ MΩ, $C_{in} \leq 11.5$ pF.
- D. Resistors must be noninductive types.
- E. The d-c power supplies may require additional bypassing in order to minimize ringing.

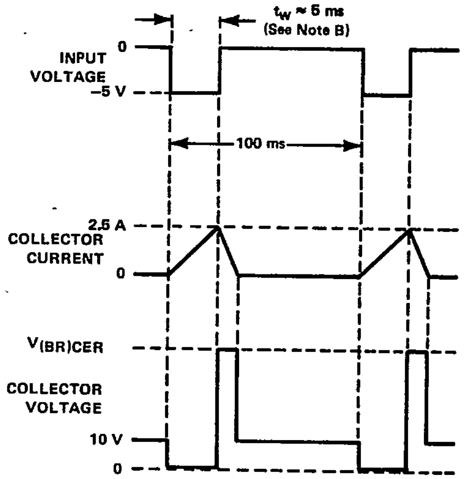
FIGURE 1. RESISTIVE-LOAD SWITCHING

T-33-13

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE AND CURRENT WAVEFORMS

NOTES: A. L1 and L2 are 10 mH, 0.11 Ω. Chicago Standard Transformer Corporation C-2688, or equivalent.
B. Input pulse duration is increased until I_{CM} = 2.5 A.

FIGURE 2. INDUCTIVE-LOAD SWITCHING

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T-33-13

TYPICAL CHARACTERISTICS

STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

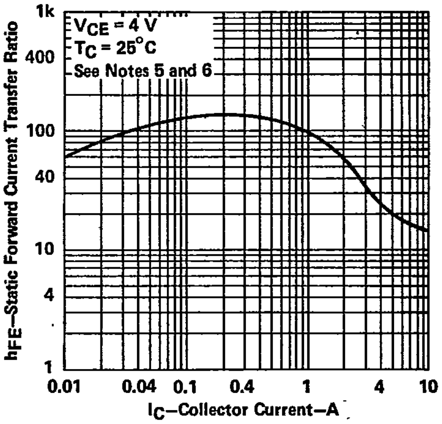

FIGURE 3

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 and located within 3,2 mm (0.125 inch) from the device body.

MAXIMUM SAFE OPERATING AREA

FORWARD-BIAS SAFE OPERATING AREA

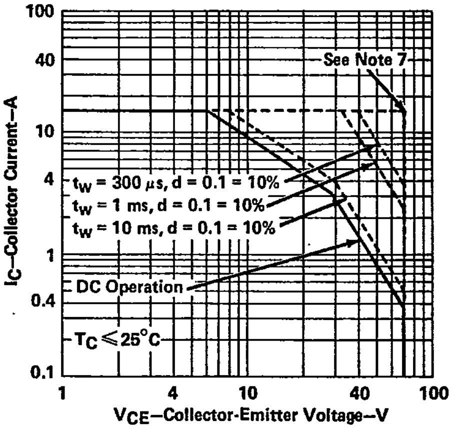

FIGURE 4

NOTE 7: This combination of maximum voltage and current may be achieved only when switching from saturation to cutoff with a clamped inductive load.

T-33-13

THERMAL INFORMATION

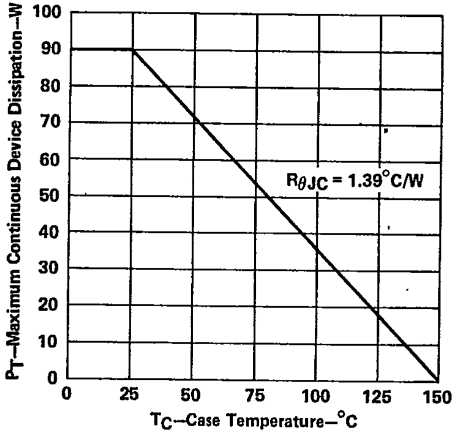
DISSIPATION DERATING CURVE

FIGURE 5