



NPN POWER TRANSISTORS

COMPLEMENTARY TO THE TIP30 SERIES

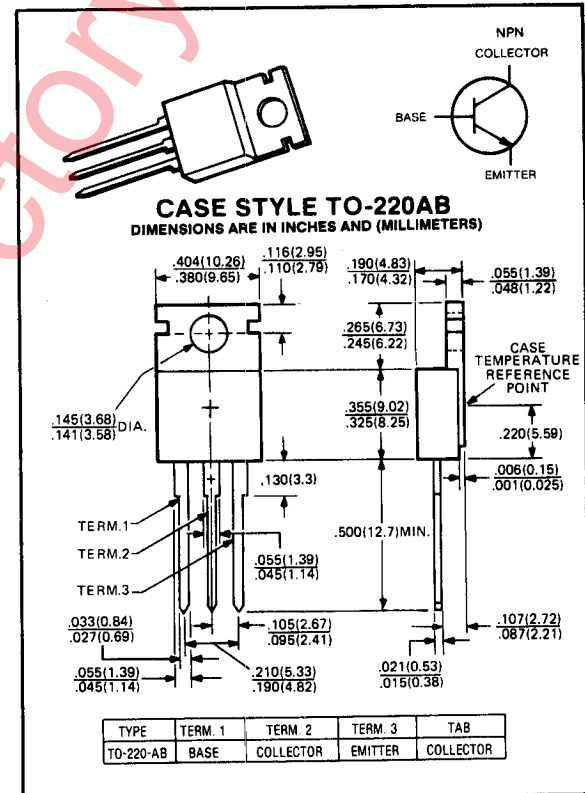
TIP 29 Series

40-100 VOLTS
1 AMP, 30 WATTS

The TIP29 Series power transistors are designed for use in general purpose amplifier and switching applications.

Features:

- Designed for complementary use with TIP30 series
- 30W at 25°C case temperature
- 1A continuous collector current
- 3A peak collector current
- Minimum f_T of 3 MHz at 10V, 0.02A
- Customer-specified selections available



maximum ratings ($T_C = 25^\circ C$) (unless otherwise noted)

| RATING | SYMBOL | TIP29 | TIP29A | TIP29B | TIP29C | UNITS |
|--|----------------|-------------|-------------|-------------|-------------|------------|
| Collector-Emitter Voltage | V_{CEO} | 40 | 60 | 80 | 100 | Volts |
| Collector-Base Voltage | V_{CBO} | 80 | 100 | 120 | 140 | Volts |
| Emitter Base Voltage | V_{EBO} | 5 | 5 | 5 | 5 | Volts |
| Collector Current — Continuous | I_C | 1 | 1 | 1 | 1 | A |
| Collector Current — Peak | I_{CM} | 3 | 3 | 3 | 3 | A |
| Base Current — Continuous | I_B | 0.4 | 0.4 | 0.4 | 0.4 | A |
| Total Power Dissipation @ $T_A = 25^\circ C$ @ $T_C = 25^\circ C$ | P_D | 2 30 | 2 30 | 2 30 | 2 30 | Watts |
| Operating and Storage Junction Temperature Range | T_J, T_{STG} | -65 to +150 | -65 to +150 | -65 to +150 | -65 to +150 | $^\circ C$ |

thermal characteristics

| | | | | | | |
|---|-----------------|------|------|------|------|--------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 4.17 | 4.17 | 4.17 | 4.17 | $^\circ C/W$ |
| Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds | T_L | 250 | 250 | 250 | 250 | $^\circ C$ |

electrical characteristics ($T_C = 25^\circ C$) (unless otherwise specified)

| CHARACTERISTIC | | SYMBOL | MIN | TYP | MAX | UNIT |
|---|-------------------------------------|-----------|-----------------------|------------------|--------------------------|-------|
| Collector-Emitter Breakdown Voltage ($I_C = 30\text{mA}$) | TIP29 TIP29A TIP29B TIP29C | V_{CEO} | 40 60 80 100 | — — — — | — — — — | Volts |
| Collector Cutoff Current ($V_{CE} = 30\text{V}$) ($V_{CE} = 60\text{V}$) | TIP29, TIP29A TIP29B, TIP29C | I_{CEO} | — — | — — | 0.3 0.3 | mA |
| Collector Cutoff Current ($V_{CE} = 80\text{V}$) ($V_{CE} = 100\text{V}$) ($V_{CE} = 120\text{V}$) ($V_{CE} = 140\text{V}$) | TIP29 TIP29A TIP29B TIP29C | I_{CES} | — — — — | — — — — | 0.2 0.2 0.2 0.2 | mA |
| Emitter Cutoff Current ($V_{EB} = 5\text{V}$, $I_C = 0$) | | I_{EBO} | — | — | 1 | mA |

second breakdown

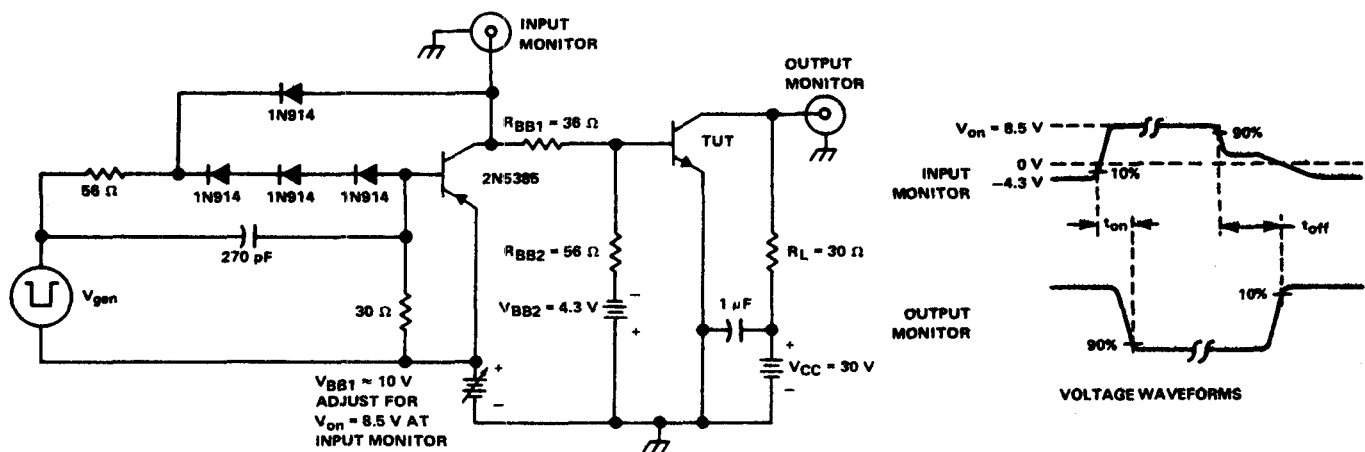
| | | |
|---|-------|--------------|
| Second Breakdown with Base Forward Biased | FBSOA | SEE FIGURE 3 |
|---|-------|--------------|

on characteristics

| | | | | | |
|--|---------------|----------|--------|---------|---|
| DC Current Gain ($I_C = .2\text{A}$, $V_{CE} = 4\text{V}$) ($I_C = 1\text{A}$, $V_{CE} = 4\text{V}$) | h_{FE} | 40 15 | — — | — 75 | — |
| Collector-Emitter Saturation Voltage ($I_C = 1\text{A}$, $I_B = 125\text{mA}$) | $V_{CE(sat)}$ | — | — | 0.7 | V |
| Base-Emitter Voltage ($I_C = 1\text{A}$, $V_{CE} = 4\text{V}$) | $V_{BE(on)}$ | — | — | 1.3 | V |

switching characteristics

| | | | | | | |
|---------------|---|-----------|---|-----|---|---------------|
| Turn-on Time | $R_L = 30\Omega$, $I_C = 1\text{A}$ $I_{B1} = I_{B2} = 0.1\text{A}$ $V_{BE(off)} = -4.3\text{V}$ | t_{on} | — | 0.5 | — | μs |
| Turn-off Time | | t_{off} | — | 2 | — | |

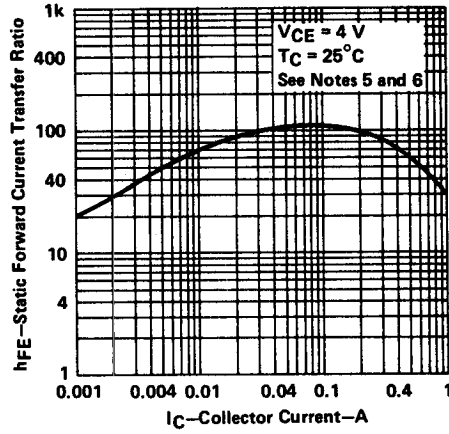


TEST CIRCUIT

- NOTES: A. V_{gen} is a -30-V pulse into a 50Ω termination.
 B. The V_{gen} waveform is supplied by a generator with the following characteristics: $t_r < 15\text{ns}$, $t_f < 15\text{ns}$, $Z_{out} = 50\Omega$, $t_w = 20\mu\text{s}$, duty cycle $\leq 2\%$.
 C. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r < 15\text{ns}$, $R_{in} > 10\text{M}\Omega$, $C_{in} < 11.5\text{pF}$.
 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

STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT



NOTES: 5. These parameters must be measured using pulse techniques, $t_w = 300 \mu s$, duty cycle $\leq 2\%$.
6. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts.

FIGURE 2. TYPICAL CHARACTERISTICS

FORWARD-BIAS SAFE OPERATING AREA

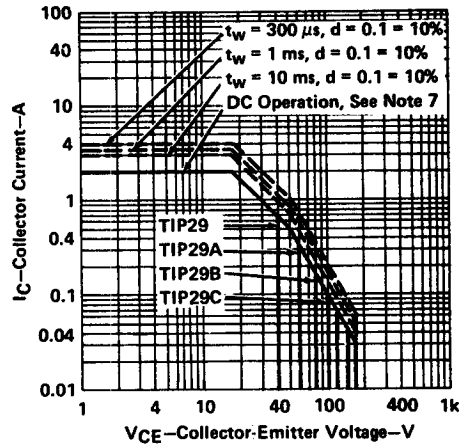


FIGURE 3. MAXIMUM SAFE OPERATING AREA

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

DISSIPATION DERATING CURVE

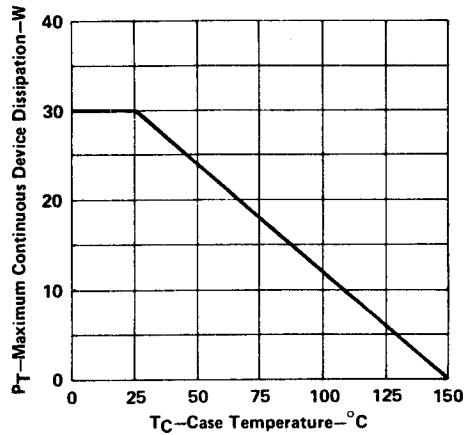


FIGURE 4. THERMAL INFORMATION