NPN POWER TRANSISTORS

COMPLEMENTARY TO THE TIP30 SERIES

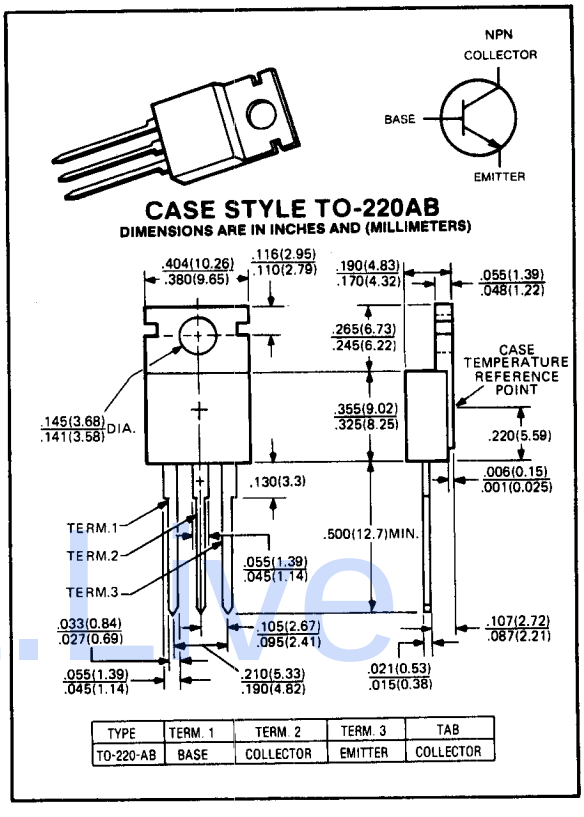
TIP 29 Series

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° C) (unless otherwise noted)

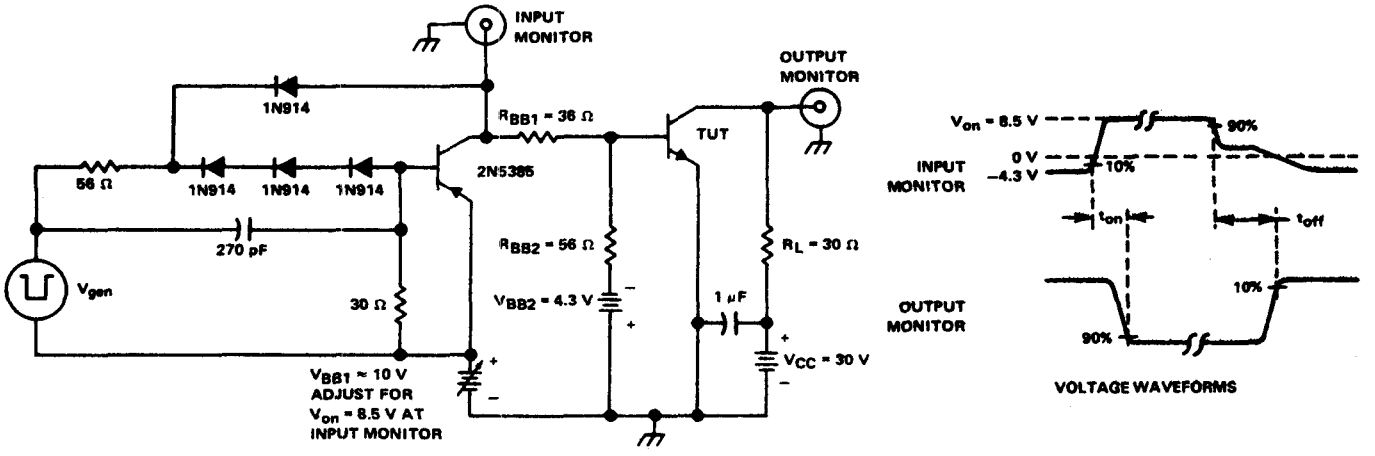
RATING	SYMBOL	TIP29	TIP29A	TIP29B	TIP29C	UNITS
Collector-Emitter Voltage	V_{CEO}	40	60	80	100	Volts
Collector-Base Voltage	V_{CBO}	80	100	120	140	Volts
Emitter Base Voltage	V_{EBO}	5	5	5	5	Volts
Collector Current — Continuous Peak	I_C I_{CM}	1 3	1 3	1 3	1 3	A
Base Current — Continuous	I_B	0.4	0.4	0.4	0.4	A
Total Power Dissipation @ T_A = 25°C @ T_C = 25°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	°C

thermal characteristics

Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.17	4.17	4.17	4.17	°C/W
Maximum Lead Temperature for Soldering Purposes: ⅛" from Case for 5 Seconds	T_L	250	250	250	250	°C

electrical characteristics (T_C = 25°C) (unless otherwise specified)

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT
off characteristics						
Collector-Emitter Breakdown Voltage (I_C = 30mA)	TIP29	V_{CEO}	40	—	—	Volts
	TIP29A		60	—	—	
	TIP29B		80	—	—	
	TIP29C		100	—	—	
Collector Cutoff Current		I_{CEO}				
(V_{CE} = 30V)	TIP29, TIP29A		—	—	0.3	mA
(V_{CE} = 60V)	TIP29B, TIP29C		—	—	0.3	
Collector Cutoff Current		I_{CES}				
(V_{CE} = 80V)	TIP29		—	—	0.2	mA
(V_{CE} = 100V)	TIP29A		—	—	0.2	
(V_{CE} = 120V)	TIP29B		—	—	0.2	
(V_{CE} = 140V)	TIP29C		—	—	0.2	
Emitter Cutoff Current (V_{EB} = 5V, I_C = 0)		I_{EBO}	—	—	1	mA
second breakdown						
Second Breakdown with Base Forward Biased		FBSOA	SEE FIGURE 3			
on characteristics						
DC Current Gain		h_{FE}				
(I_C = .2A, V_{CE} = 4V)			40	—	—	—
(I_C = 1A, V_{CE} = 4V)			15	—	75	
Collector-Emitter Saturation Voltage (I_C = 1A, I_B = 125mA)		$V_{CE(sat)}$	—	—	0.7	V
Base-Emitter Voltage (I_C = 1A, V_{CE} = 4V)		$V_{BE(on)}$	—	—	1.3	V
switching characteristics						
Turn-on Time	R_L = 30Ω, I_C = 1A	t_{on}	—	0.5	—	μs
Turn-off Time	I_{B1} = I_{B2} = 0.1A, $V_{BE(off)}$ = -4.3V	t_{off}	—	2	—	

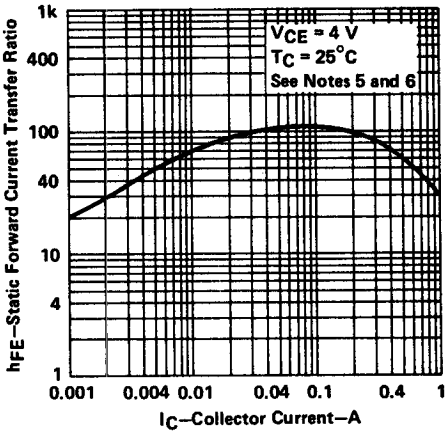


TEST CIRCUIT

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, duty cycle ≤ 2%.
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

STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT



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.

FIGURE 2. TYPICAL CHARACTERISTICS

FORWARD-BIAS SAFE OPERATING AREA

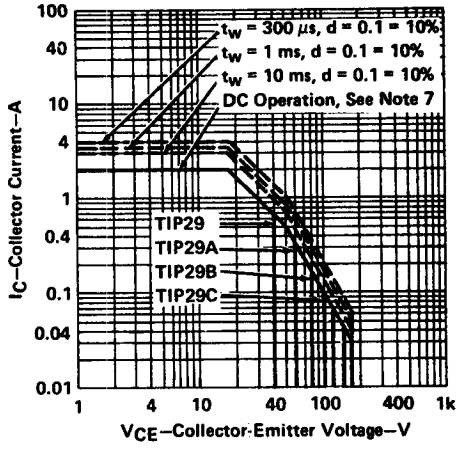


FIGURE 3 MAXIMUM SAFE OPERATING AREA

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

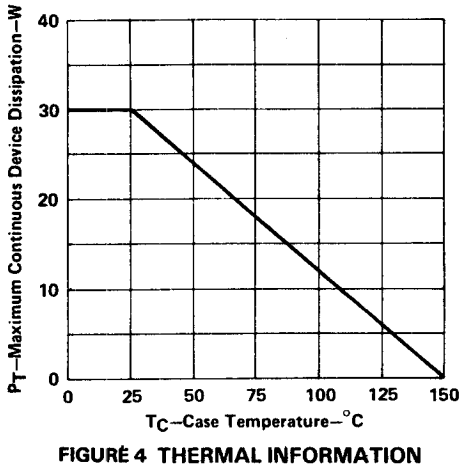


FIGURE 4 THERMAL INFORMATION