

# Complementary Silicon Plastic Power Transistors

... designed for use in general purpose amplifier and switching applications.  
Compact TO-220 AB package.

## MAXIMUM RATINGS

Rating	Symbol	TIP29B TIP30B	TIP29C TIP30C	Unit
Collector-Emitter Voltage	$V_{CEO}$	80	100	Vdc
Collector-Base Voltage	$V_{CB}$	80	100	Vdc
Emitter-Base Voltage	$V_{EB}$	5.0		Vdc
Collector Current — Continuous	$I_C$	1.0		Adc
Peak		3.0		
Base Current	$I_B$	0.4		Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	$P_D$	30		Watts
Derate above $25^\circ\text{C}$		0.24		W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	2.0		Watts
Derate above $25^\circ\text{C}$		0.016		W/ $^\circ\text{C}$
Unclamped Inductive Load Energy (See Note 3)	E	32		mJ
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +150		$^\circ\text{C}$

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.167	$^\circ\text{C/W}$

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Collector-Emitter Sustaining Voltage (1) ( $I_C = 30\text{ mAdc}, I_B = 0$ )	TIP29B, TIP30B TIP29C, TIP30C	$V_{CEO(sus)}$	80 100	— —	Vdc
Collector Cutoff Current ( $V_{CE} = 60\text{ Vdc}, I_B = 0$ )		$I_{CEO}$	—	0.3	mAdc
Collector Cutoff Current ( $V_{CE} = 80\text{ Vdc}, V_{EB} = 0$ ) ( $V_{CE} = 100\text{ Vdc}, V_{EB} = 0$ )	TIP29B, TIP30B TIP29C, TIP30C	$I_{CES}$	— —	200 200	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{BE} = 5.0\text{ Vdc}, I_C = 0$ )		$I_{EBO}$	—	1.0	mAdc

### ON CHARACTERISTICS (1)

DC Current Gain ( $I_C = 0.2\text{ Adc}, V_{CE} = 4.0\text{ Vdc}$ ) ( $I_C = 1.0\text{ Adc}, V_{CE} = 4.0\text{ Vdc}$ )		$h_{FE}$	40 15	— 75	—
Collector-Emitter Saturation Voltage ( $I_C = 1.0\text{ Adc}, I_B = 125\text{ mAdc}$ )		$V_{CE(sat)}$	—	0.7	Vdc
Base-Emitter On Voltage ( $I_C = 1.0\text{ Adc}, V_{CE} = 4.0\text{ Vdc}$ )		$V_{BE(on)}$	—	1.3	Vdc

### DYNAMIC CHARACTERISTICS

Current-Gain — Bandwidth Product (2) ( $I_C = 200\text{ mAdc}, V_{CE} = 10\text{ Vdc}, f_{test} = 1.0\text{ MHz}$ )		$f_T$	3.0	—	MHz
Small-Signal Current Gain ( $I_C = 0.2\text{ Adc}, V_{CE} = 10\text{ Vdc}, f = 1.0\text{ kHz}$ )		$h_{fe}$	20	—	—

(1) Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

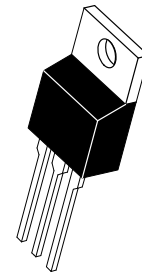
(2)  $f_T = |h_{fe}| \cdot f_{test}$ .

(3) This rating based on testing with  $L_C = 20\text{ mH}$ ,  $R_{BE} = 100\ \Omega$ ,  $V_{CC} = 10\text{ V}$ ,  $I_C = 1.8\text{ A}$ , P.R.F = 10 Hz.

REV 1

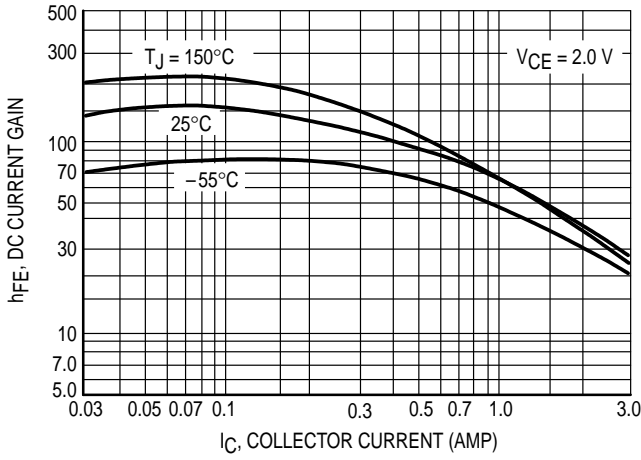
**NPN**  
**TIP29B**  
**TIP29C**  
**PNP**  
**TIP30B**  
**TIP30C**

**1 AMPERE**  
**POWER TRANSISTORS**  
**COMPLEMENTARY**  
**SILICON**  
**80-100 VOLTS**  
**30 WATTS**

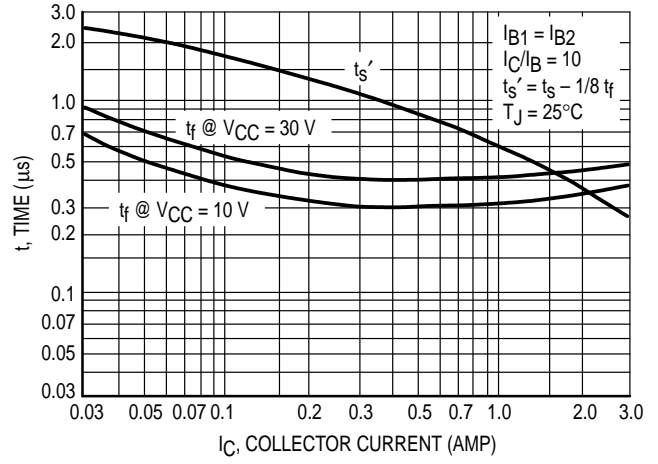


**CASE 221A-06**  
**TO-220AB**

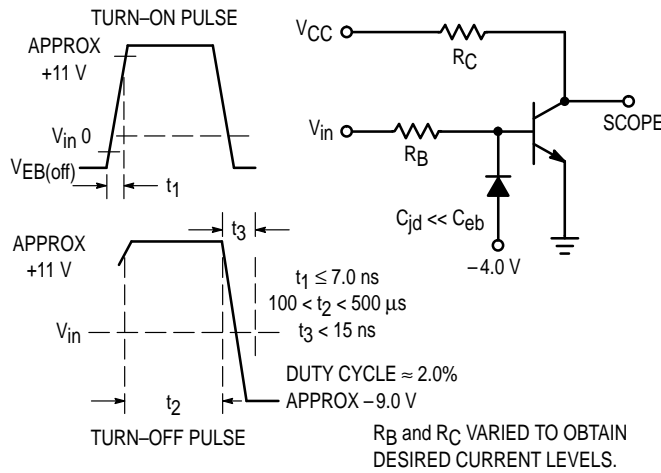
**TIP29B TIP29C TIP30B TIP30C**



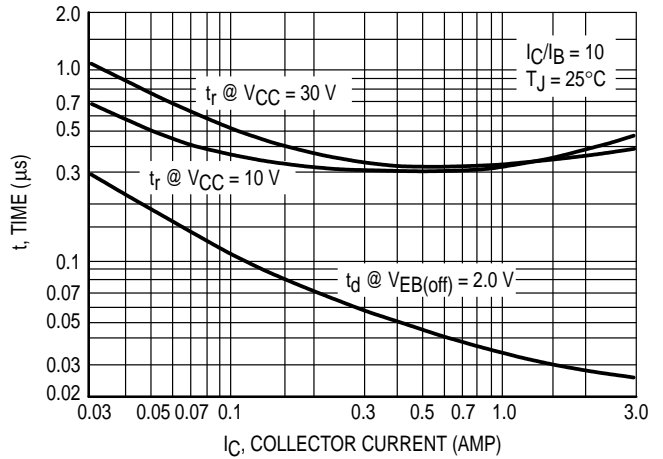
**Figure 1. DC Current Gain**



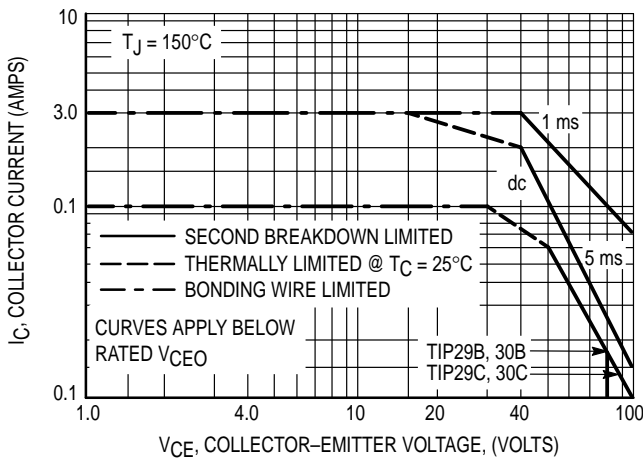
**Figure 2. Turn-Off Time**



**Figure 3. Switching Time Equivalent Circuit**



**Figure 4. Turn-On Time**

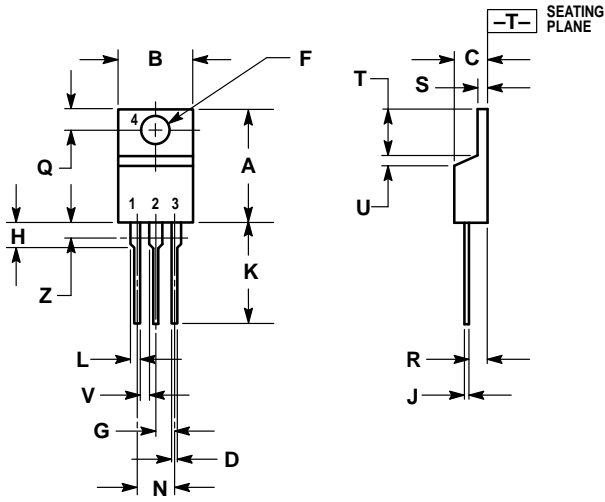


**Figure 5. Active Region Safe Operating Area**

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 5 is based on  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ . At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	—	1.15	—
Z	—	0.080	—	2.04

- STYLE 1:
1. BASE
  2. COLLECTOR
  3. EMITTER
  4. COLLECTOR

CASE 221A-06  
TO-220AB  
ISSUE Y

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**How to reach us:**

**USA / EUROPE:** Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,  
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

**MFAX:** RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244-6609  
**INTERNET:** <http://Design-NET.com>

**HONG KONG:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

