

# 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	$V_{CE0}$	80	100	Vdc
Collector-Base Voltage	$V_{CB}$	80	100	Vdc
Emitter-Base Voltage	$V_{EB}$	5.0		Vdc
Collector Current — Continuous Peak	$I_C$	1.0 3.0		Adc
Base Current	$I_B$	0.4		Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	30 0.24		Watts W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	2.0 0.016		Watts 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
----------------	--------	-----	-----	------

### OFF CHARACTERISTICS

Collector-Emitter Sustaining Voltage (1) ( $I_C = 30\text{ mAdc}, I_B = 0$ )	TIP29B, TIP30B TIP29C, TIP30C	$V_{CE0(sus)}$	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  $\leq 2.0\%$ .

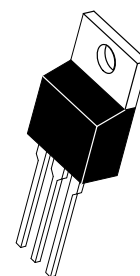
(2)  $f_T = |h_{fe}| \cdot f_{test}$ .

(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

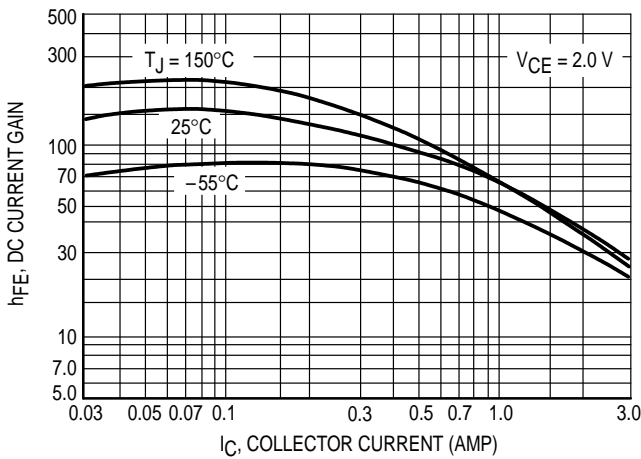
**NPN**  
**TIP29B**  
**TIP29C**  
**PNP**  
**TIP30B**  
**TIP30C**

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

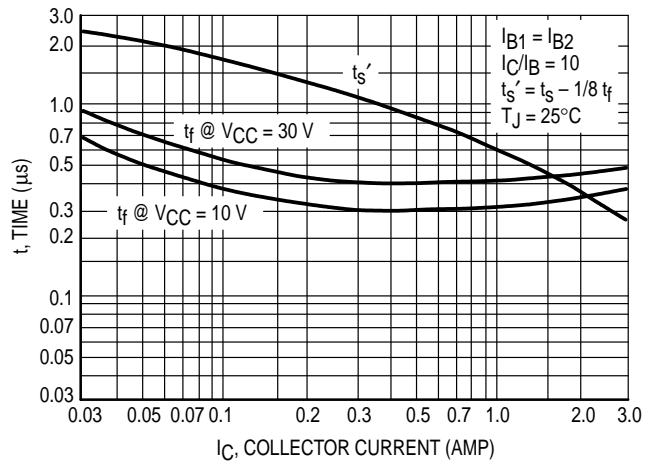


**CASE 221A-06**  
**TO-220AB**

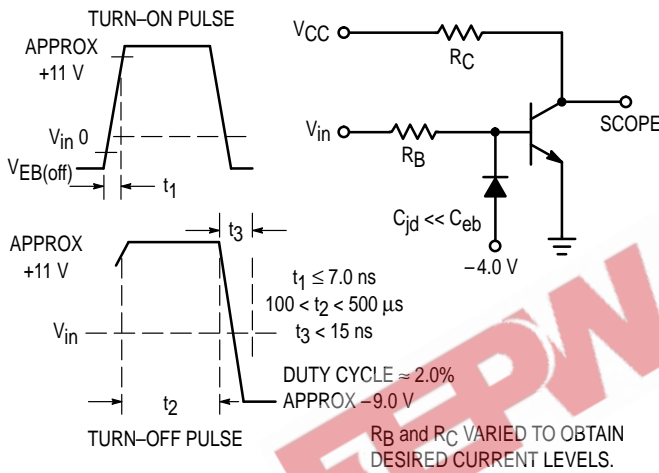
**TIP29B TIP29C TIP30B TIP30C**



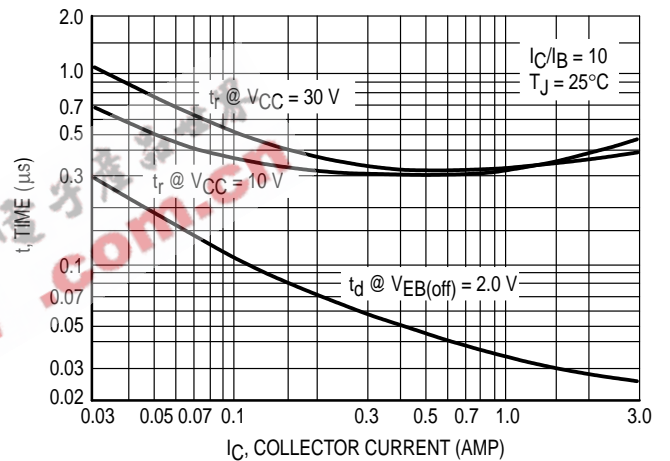
**Figure 1. DC Current Gain**



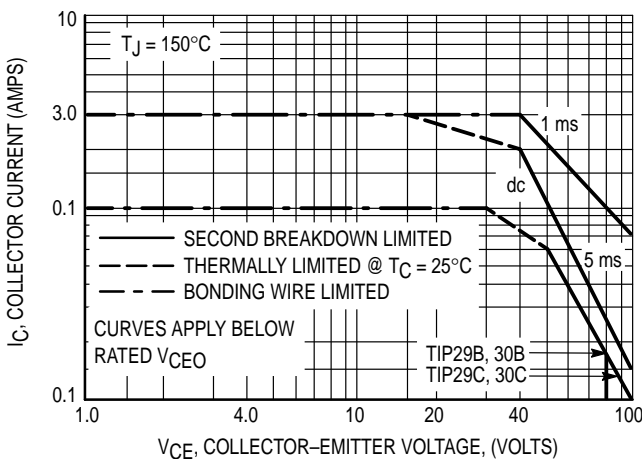
**Figure 2. Turn-Off Time**



**Figure 3. Switching Time Equivalent Circuit**



**Figure 4. Turn-On Time**



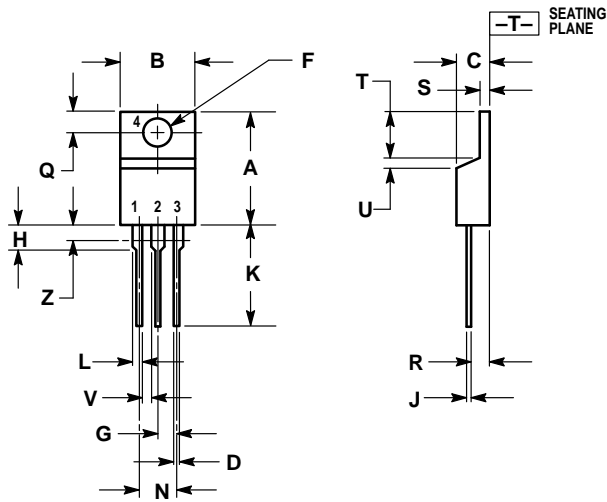
**Figure 5. Active Region Safe Operating Area**

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.

**TIP29B TIP29C TIP30B TIP30C**

**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:  
 PIN 1: BASE  
 2: COLLECTOR  
 3: EMITTER  
 4: COLLECTOR



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

**TIP29B TIP29C TIP30B TIP30C**

EEPW 电子产品世界  
.com.cn

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

**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



TIP29B/D