

# TIP29, A, B, C (NPN), TIP30, A, B, C (PNP)

## Complementary Silicon Plastic Power Transistors

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

### MAXIMUM RATINGS

Rating	Symbol	TIP29 TIP30	TIP29A TIP30A	TIP29B TIP30B	TIP29C TIP30C	Unit
Collector-Emitter Voltage	$V_{CEO}$	40	60	80	100	Vdc
Collector-Base Voltage	$V_{CB}$	40	60	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 (Note 1)	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	$^\circ\text{C/W}$

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

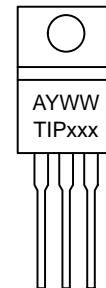
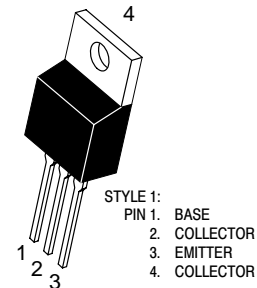


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**1 AMPERE  
POWER TRANSISTORS  
COMPLEMENTARY SILICON  
40, 60, 80-100 VOLTS  
30 WATTS**

### MARKING DIAGRAM



**TO-220AB  
CASE 221A-09  
STYLE 1**

xxx = Specific Device Code:  
29, 29A, 29B, 29C,  
30, 30A, 30B, 30C  
A = Assembly Location  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

## TIP29, A, B, C (NPN), TIP30, A, B, C (PNP)

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Sustaining Voltage ( $I_C = 30\text{ mAdc}$ , $I_B = 0$ ) (Note 2) TIP29, TIP30 TIP29A, TIP30A TIP29B, TIP30B TIP29C, TIP30C	$V_{CEO(sus)}$	40 60 80 100	– – – –	Vdc
Collector Cutoff Current ( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 60\text{ Vdc}$ , $I_B = 0$ ) TIP29, TIP29A, TIP30, TIP30A TIP29B, TIP29C, TIP30B, TIP30C	$I_{CEO}$	– –	0.3 0.3	mAdc
Collector Cutoff Current ( $V_{CE} = 40\text{ Vdc}$ , $V_{EB} = 0$ ) ( $V_{CE} = 60\text{ Vdc}$ , $V_{EB} = 0$ ) ( $V_{CE} = 80\text{ Vdc}$ , $V_{EB} = 0$ ) ( $V_{CE} = 100\text{ Vdc}$ , $V_{EB} = 0$ ) TIP29, TIP30 TIP29A, TIP30A TIP29B, TIP30B TIP29C, TIP30C	$I_{CES}$	– – – –	200 200 200 200	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{BE} = 5.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	–	1.0	mAdc

### ON CHARACTERISTICS (Note 2)

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 (Note 3) ( $I_C = 200\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f_{test} = 1.0\text{ MHz}$ )	$f_T$	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	–	–

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

3.  $f_T = |h_{fe}| \cdot f_{test}$ .

### ORDERING INFORMATION

Device	Package	Shipping
TIP29	TO–220AB	50 Units/Rail
TIP29A		
TIP29B		
TIP29C		
TIP30		
TIP30A		
TIP30B		
TIP30C		

# TIP29, A, B, C (NPN), TIP30, A, B, C (PNP)

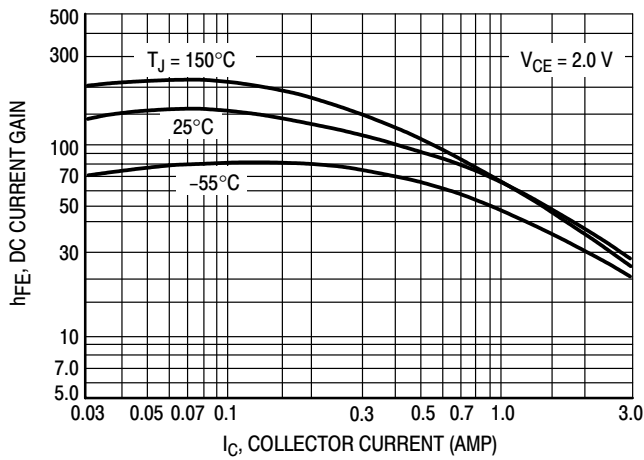


Figure 1. DC Current Gain

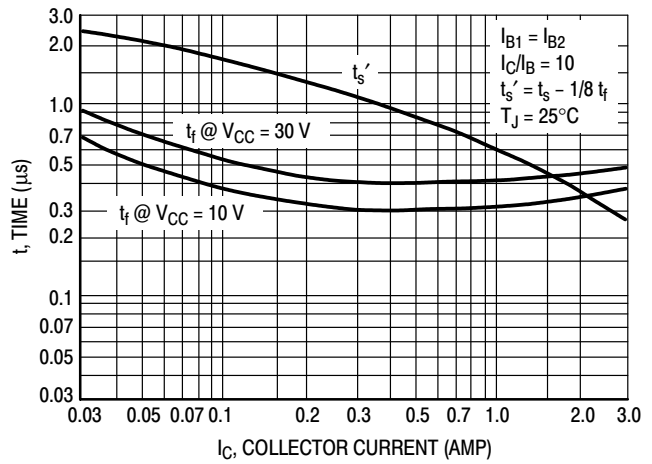


Figure 2. Turn-Off Time

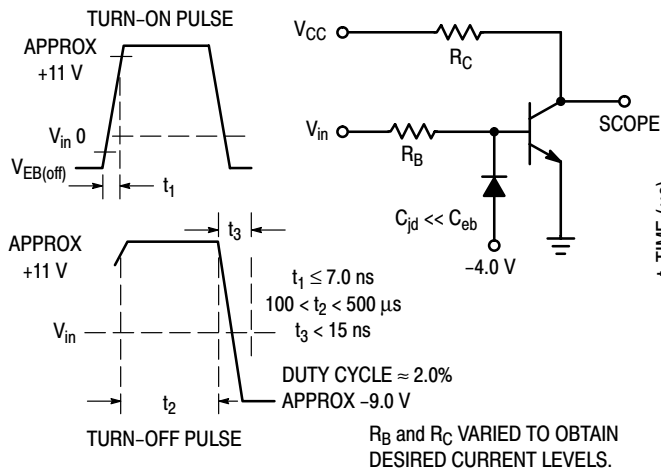


Figure 3. Switching Time Equivalent Circuit

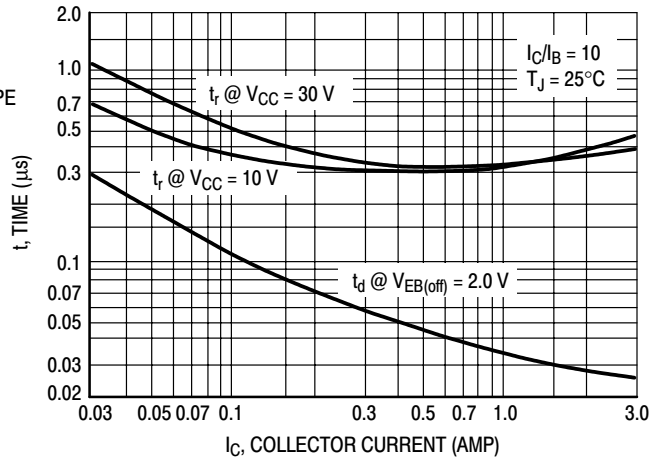


Figure 4. Turn-On Time

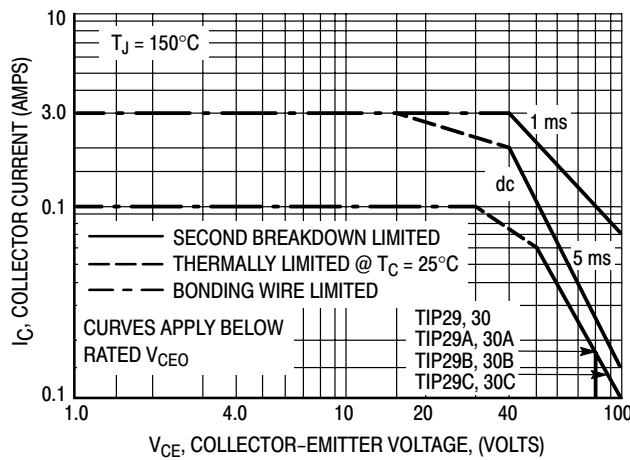


Figure 5. Active Region Safe Operating Area

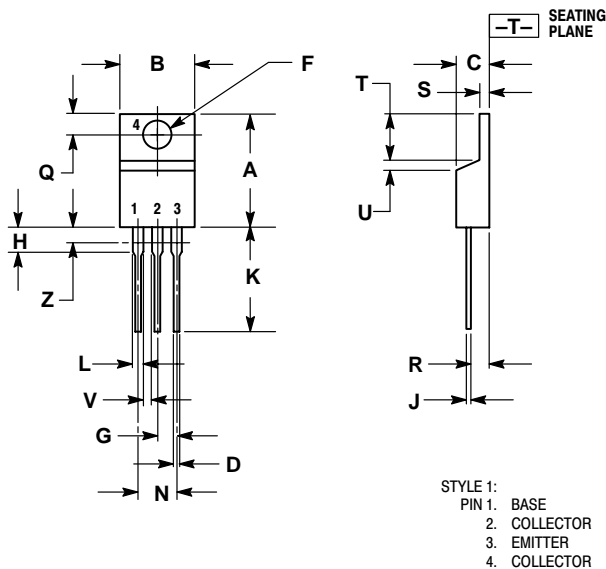
There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

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.

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## PACKAGE DIMENSIONS

TO-220AB  
CASE 221A-09  
ISSUE AA



- 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

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