

## COMPLEMENTARY SILICON PLASTIC POWER TRANSISTORS

... designed for use in general purpose power amplifier and switching applications.

### FEATURES:

\* Collector-Emitter Sustaining Voltage -

$V_{CE(sust)}$  = 40V(Min)- TIP29,TIP30  
 60V(Min)- TIP29A,TIP30A  
 80V(Min)- TIP29B,TIP30B  
 100V(Min)-TIP29C,TIP30C

\* Collector-Emitter Saturation Voltage-  $V_{CE(sat)}=0.7V(Max)@I_C = 1.0 A$

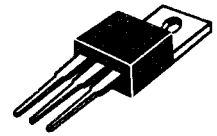
\* Current Gain-Bandwidth Product  $f_T=3.0 MHz (Min)@ I_C=200 mA$

NPN	PNP
TIP29	TIP30
TIP29A	TIP30A
TIP29B	TIP30B
TIP29C	TIP30C

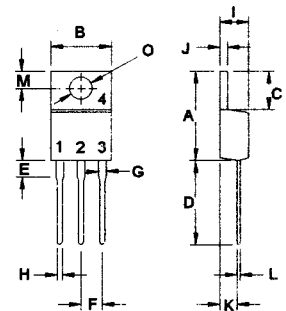
1.0 AMPERE  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
40-100 VOLTS  
30 WATTS

### MAXIMUM RATINGS

Characteristic	Symbol	TIP29 TIP30	TIP29A TIP30A	TIP29B TIP30B	TIP29C TIP30C	Unit
Collector-Emitter Voltage	$V_{CEO}$	40	60	80	100	V
Collector-Base Voltage	$V_{CBO}$	40	60	80	100	V
Emitter-Base Voltage	$V_{EBO}$	5.0				V
Collector Current - Continuous - Peak	$I_C$	1.0 3.0				A
Base Current	$I_B$	0.4				A
Total Power Dissipation@ $T_C = 25^\circ C$ Derate above $25^\circ C$	$P_D$	30 0.24				W W/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +150				$^\circ C$



TO-220



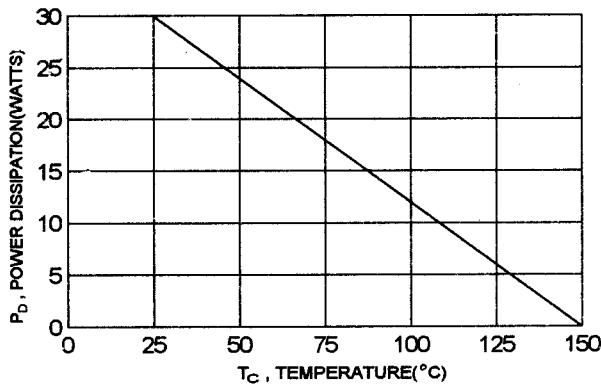
PIN 1.BASE  
2.COLLECTOR  
3.EMITTER  
4.COLLECTOR(CASE)

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	4.167	$^\circ C/W$

DIM	MILLIMETERS	
	MIN	MAX
A	14.68	15.31
B	9.78	10.42
C	5.01	6.52
D	13.06	14.62
E	3.57	4.07
F	2.42	3.66
G	1.12	1.36
H	0.72	0.96
I	4.22	4.98
J	1.14	1.38
K	2.20	2.97
L	0.33	0.55
M	2.48	2.98
O	3.70	3.90

FIGURE -1 POWER DERATING



**TIP29, TIP29A, TIP29B, TIP29C NPN / TIP30, TIP30A, TIP30B, TIP30C PNP**

**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) ( $I_c = 30\text{ mA}$ , $I_B = 0$ )	TIP29, TIP30 TIP29A, TIP30A TIP29B, TIP30B TIP29C, TIP30C	$V_{CEO(sus)}$	40 60 80 100	V
Collector Cutoff Current ( $V_{CE} = 30\text{ V}$ , $I_B = 0$ ) ( $V_{CE} = 60\text{ V}$ , $I_B = 0$ )	TIP29, TIP30, TIP29A, TIP30A ←TIP29B, TIP30B, TIP29C, TIP30C	$I_{CEO}$	0.3 0.3	mA
Collector Cutoff Current ( $V_{CE} = 40\text{ V}$ , $V_{EB} = 0$ ) ( $V_{CE} = 60\text{ V}$ , $V_{EB} = 0$ ) ( $V_{CE} = 80\text{ V}$ , $V_{EB} = 0$ ) ( $V_{CE} = 100\text{ V}$ , $V_{EB} = 0$ )	TIP29, TIP30 TIP29A, TIP30A TIP29B, TIP30B TIP29C, TIP30C	$I_{CES}$	0.2 0.2 0.2 0.2	mA
Emitter Cutoff Current ( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )		$I_{EBO}$	1.0	mA

**ON CHARACTERISTICS (1)**

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

**DYNAMIC CHARACTERISTICS**

Current Gain - Bandwidth Product (2) ( $I_c = 200\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$ )	$f_T$	3.0		MHz
Small Signal Current Gain ( $I_c = 200\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 1\text{ kHz}$ )	$h_{fe}$	20		

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

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

FIG-2 TURN-ON TIME

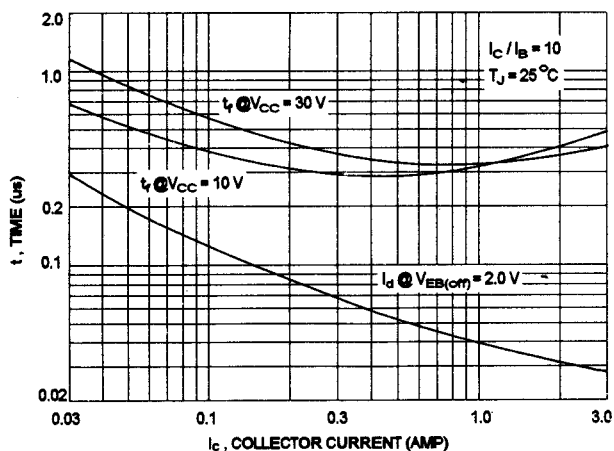


FIGURE 3 - SWITCHING TIME EQUIVALENT CIRCUIT

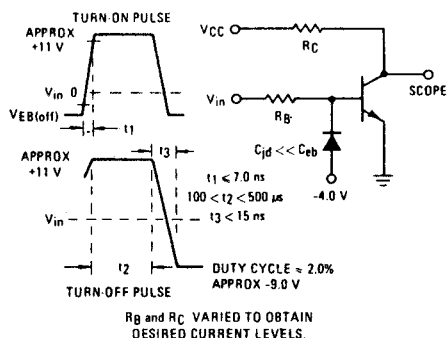


FIG-4 DC CURRENT GAIN

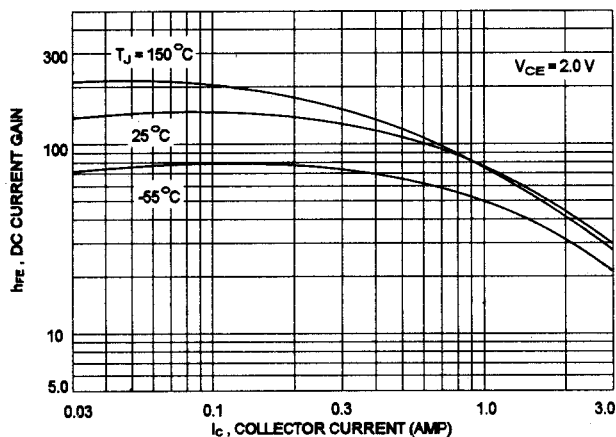


FIG-5 TURN-OFF TIME

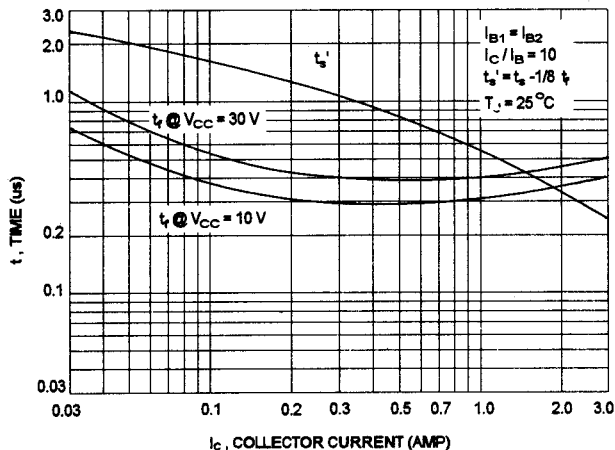
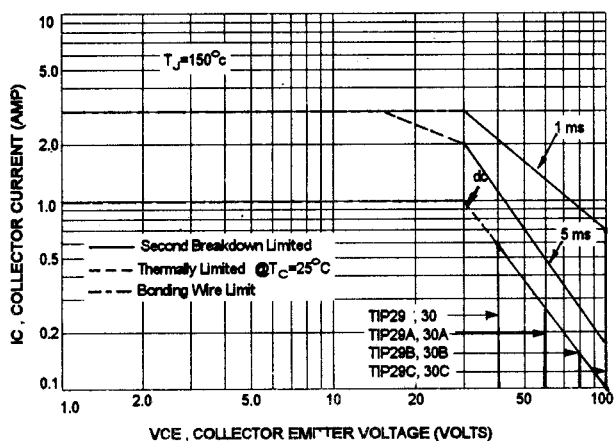


FIG-6 ACTIVE REGION SAFE OPERATING AREA



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

The data of FIG-6 curve is base on  $T_{J(PK)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on power level. 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 limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.