

## COMPLEMENTARY SILICON PLASTIC POWER TRANSISTORS

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

### FEATURES:

\* Collector-Emitter Sustaining Voltage -

$V_{CE(sus)}$  = 40V(Min)- TIP41, TIP42  
 60V(Min)- TIP41A, TIP42A  
 80V(Min)- TIP41B, TIP42B  
 100V(Min)-TIP41C, TIP42C

\* Collector-Emitter Saturation Voltage-  $V_{CE(sat)} = 1.5V(\text{Max}) @ I_C = 6.0A$

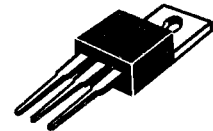
\* Current Gain-Bandwidth Product  $f_T = 3.0 \text{ MHz (Min)} @ I_C = 500mA$

NPN	PNP
TIP41	TIP42
TIP41A	TIP42A
TIP41B	TIP42B
TIP41C	TIP42C

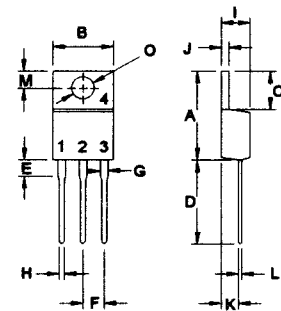
6 AMPERE  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
40 -100 VOLTS  
65 WATTS

### MAXIMUM RATINGS

Characteristic	Symbol	TIP41 TIP42	TIP41A TIP42A	TIP41B TIP42B	TIP41C TIP42C	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				V
Collector Current - Continuous - Peak	$I_C$	6 10				A
Base Current	$I_B$	2				A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	65 0.52				W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +150				$^\circ\text{C}$



TO-220



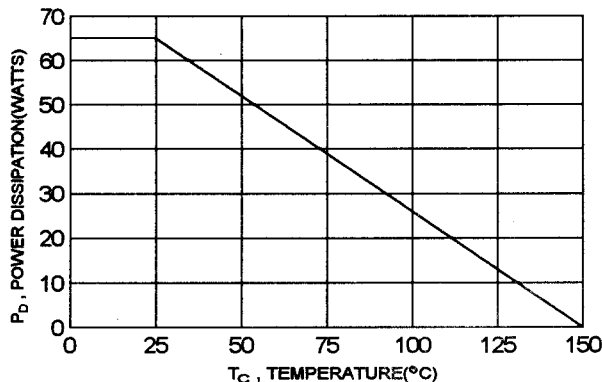
PIN 1.BASE  
2.COLLECTOR  
3.EMITTER  
4.COLLECTOR(CASE)

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.92	$^\circ\text{C/W}$

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



**TIP41, TIP41A, TIP41B, TIP41C NPN / TIP42, TIP42A, TIP42B, TIP42C 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) ( $I_C = 30\text{ mA}$ , $I_B = 0$ )	TIP41, TIP42 TIP41A, TIP42A TIP41B, TIP42B TIP41C, TIP42C	$V_{CEO(sus)}$	40 60 80 100	V
Collector Cutoff Current ( $V_{CE} = 30\text{ V}$ , $I_B = 0$ ) ( $V_{CE} = 60\text{ V}$ , $I_B = 0$ )	TIP41, TIP42, TIP41A, TIP42A TIP41B, TIP42B, TIP41C, TIP42C	$I_{CEO}$	0.7 0.7	mA
Collector Cutoff Current ( $V_{CE} = 40\text{ V}$ , $V_{EB} = 0$ ) ( $V_{CE} = 60\text{ V}$ , $V_{EB} = 0$ ) ( $V_{CE} = 80\text{ V}$ , $V_{EB} = 0$ ) ( $V_{CE} = 100\text{ V}$ , $V_{EB} = 0$ )	TIP41, TIP42 TIP41A, TIP42A TIP41B, TIP42B TIP41C, TIP42C	$I_{CES}$	0.4 0.4 0.4 0.4	mA
Emitter Cutoff Current ( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )		$I_{EBO}$	1.0	mA

**ON CHARACTERISTICS (1)**

DC Current Gain ( $I_C = 0.3\text{ A}$ , $V_{CE} = 4.0\text{ V}$ , ) ( $I_C = 3.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ , )	$h_{FE}$	30 15	75	
Collector-Emitter Saturation Voltage ( $I_C = 6.0\text{ A}$ , $I_B = 600\text{ mA}$ )	$V_{CE(sat)}$		1.5	V
Base-Emitter On Voltage ( $I_C = 6.0\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )	$V_{BE(on)}$		2.0	V

**DYNAMIC CHARACTERISTICS**

Current Gain - Bandwidth Product (2) ( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f_{TEST} = 1\text{ MHz}$ )	$f_T$	3.0		MHz
Small Signal Current Gain ( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 1\text{ kHz}$ )	$h_{fe}$	20		

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

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

FIGURE 2 - SWITCHING TIME TEST CIRCUIT

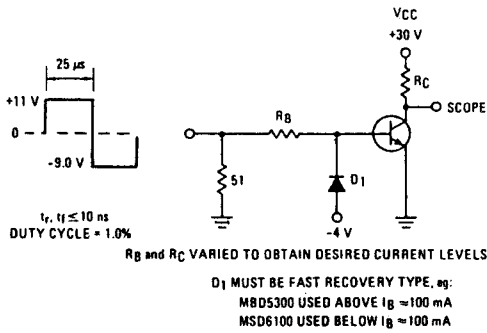


FIG-3 TURN-ON TIME

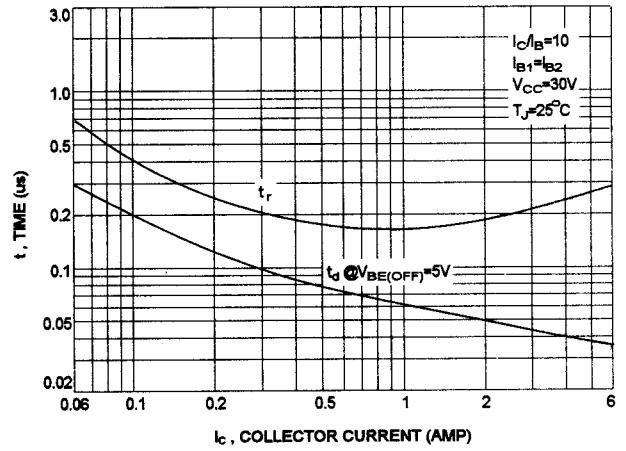


FIG-4 DC CURRENT GAIN

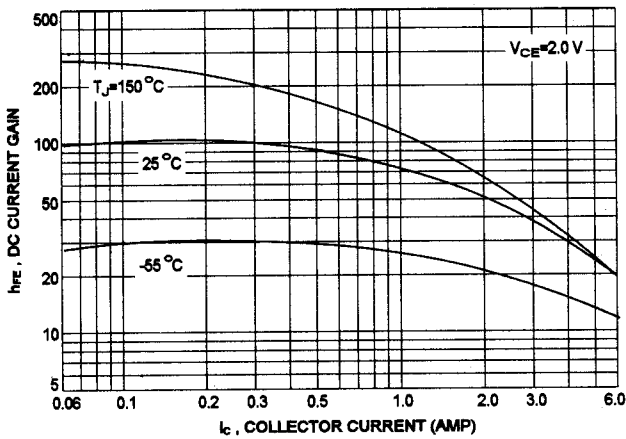


FIG-5 TURN-OFF TIME

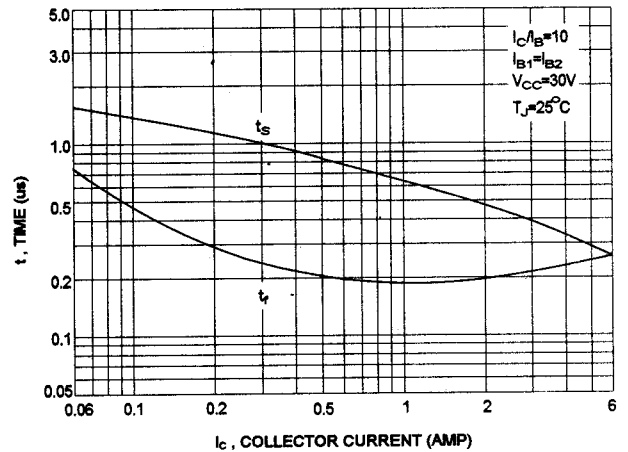
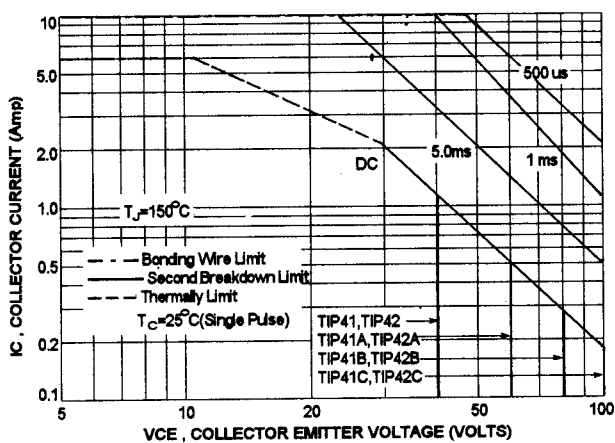


FIG-6 ACTIVE REGION SAFE OPERATING AREA



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.

TIP41, TIP41A, TIP41B, TIP41C NPN / TIP42, TIP42A, TIP42B, TIP42C PNP

FIG-7 COLLECTOR SATURATION REGION

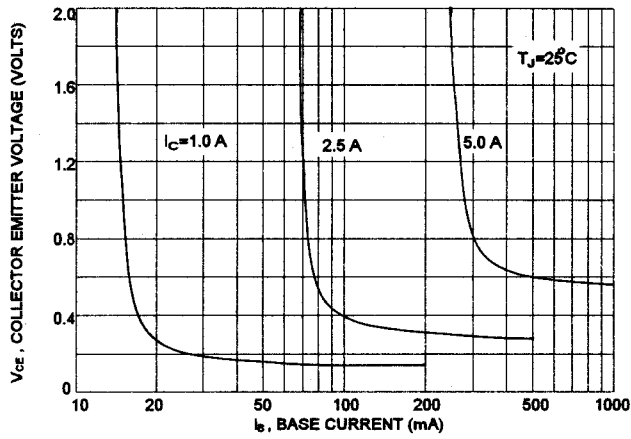


FIG-8 CAPACITANCES

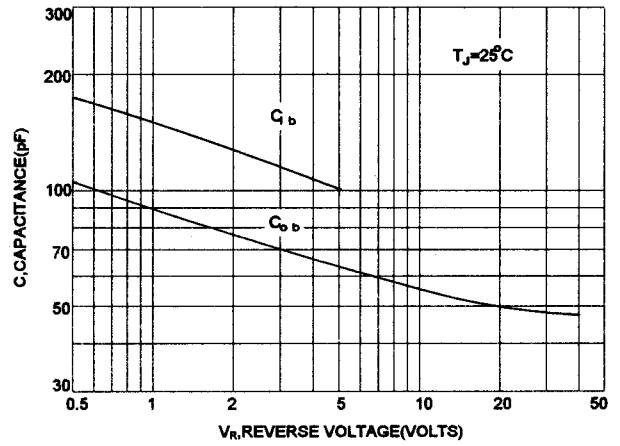


FIG-9 "ON" VOLTAGE

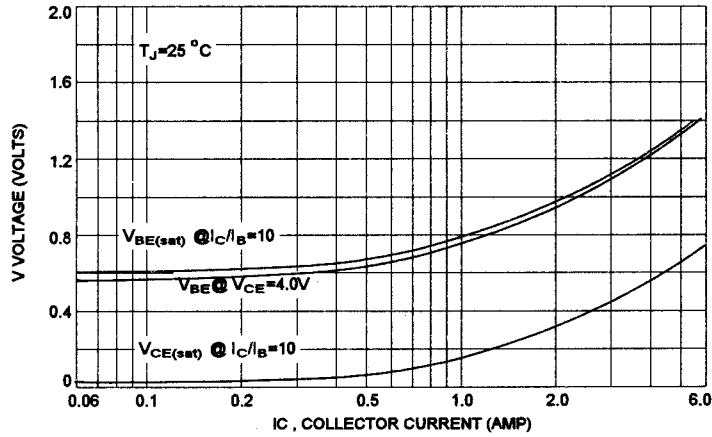


FIG-10 COLLECTOR CUT-OFF REGION

