

## COMPLEMENTARY SILICON HIGH-POWER TRANSISTORS

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

### FEATURES:

\* Collector-Emitter Sustaining Voltage -

$V_{CEO(sus)} = 40V(\text{Min})$ - TIP35, TIP36  
 $60V(\text{Min})$ - TIP35A, TIP36A  
 $80V(\text{Min})$ - TIP35B, TIP36B  
 $100V(\text{Min})$ - TIP35C, TIP36C

\* DC Current Gain  $hFE=25(\text{Min})@I_C = 1.5A$

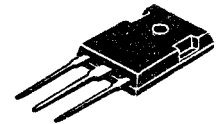
\* Current Gain-Bandwidth Product  $f_T=3.0 \text{ MHz}(\text{Min})@I_C=1.0A$

NPN	PNP
TIP35	TIP36
TIP35A	TIP36A
TIP35B	TIP36B
TIP35C	TIP36C

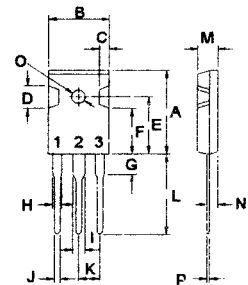
25 AMPERE  
COMPLEMENTARY SILICON  
POWER TRANSISTORS  
40 -100 VOLTS  
125 WATTS

### MAXIMUM RATINGS

Characteristic	Symbol	TIP35 TIP36	TIP35A TIP36A	TIP35B TIP36B	TIP35C TIP36C	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	$I_C$	25 40				A
Base Current	$I_B$	5.0				A
Total Power Dissipation@ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	125 1.0				W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +150				$^\circ\text{C}$



TO-247(3P)



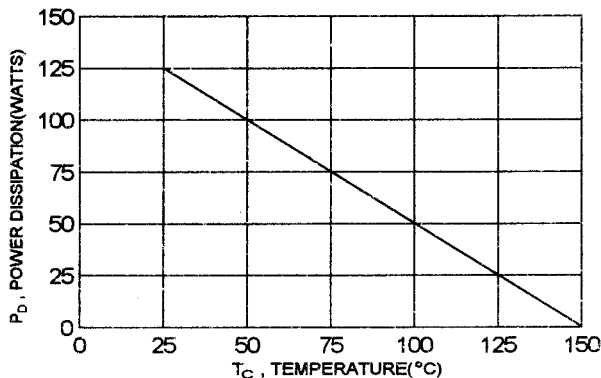
PIN 1.BASE  
2.COLLECTOR  
3.EMITTER

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.0	$^\circ\text{C/W}$

DIM	MILLIMETERS	
	MIN	MAX
A	20.63	22.38
B	15.38	16.20
C	1.90	2.70
D	5.10	6.10
E	14.81	15.22
F	11.72	12.84
G	4.20	4.50
H	1.82	2.46
I	2.92	3.23
J	0.89	1.53
K	5.26	5.66
L	18.50	21.50
M	4.68	5.36
N	2.40	2.80
O	3.25	3.65
P	0.55	0.70

FIGURE -1 POWER DERATING



**TIP35, TIP35A, TIP35B, TIP35C NPN / TIP36, TIP36A, TIP36B, TIP36C 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) ( $I_C = 30\text{ mA}$ , $I_B = 0$ )	TIP35, TIP36 TIP35A, TIP36A TIP35B, TIP36B TIP35C, TIP36C	$V_{CEO(sus)}$	40 60 80 100	V
Collector Cutoff Current ( $V_{CE} = 30\text{ V}$ , $I_B = 0$ ) ( $V_{CE} = 60\text{ V}$ , $I_B = 0$ )	TIP35, TIP36, TIP35A, TIP36A TIP35B, TIP36B, TIP35C, TIP36C	$I_{CEO}$	1.0 1.0	mA
Collector Cutoff Current ( $V_{CE} = 40\text{ V}$ , $V_{EB} = 0$ ) ( $V_{CE} = 60\text{ V}$ , $V_{EB} = 0$ ) ( $V_{CE} = 80\text{ V}$ , $V_{EB} = 0$ ) ( $V_{CE} = 100\text{ V}$ , $V_{EB} = 0$ )	TIP35, TIP36 TIP35A, TIP36A TIP35B, TIP36B TIP35C, TIP36C	$I_{CES}$	0.7 0.7 0.7 0.7	mA
Emitter Cutoff Current ( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )		$I_{EBO}$	1.0	mA

**ON CHARACTERISTICS (1)**

DC Current Gain ( $I_C = 1.5\text{ A}$ , $V_{CE} = 4.0\text{ V}$ , ) ( $I_C = 15\text{ A}$ , $V_{CE} = 4.0\text{ V}$ , )	$h_{FE}$	25 15	75	
Collector-Emitter Saturation Voltage ( $I_C = 15\text{ A}$ , $I_B = 1.5\text{ A}$ ) ( $I_C = 25\text{ A}$ , $I_B = 5.0\text{ A}$ )	$V_{CE(sat)}$		1.8 4.0	V
Base-Emitter On Voltage ( $I_C = 15\text{ A}$ , $V_{CE} = 4.0\text{ V}$ ) ( $I_C = 25\text{ A}$ , $V_{CE} = 4.0\text{ V}$ )	$V_{BE(on)}$		2.0 4.0	V

**DYNAMIC CHARACTERISTICS**

Current Gain - Bandwidth Product (2) ( $I_C = 1.0\text{ A}$ , $V_{CE} = 10\text{ V}$ , $f_{TEST} = 1\text{ MHz}$ )	$f_T$	3.0		MHz
Small Signal Current Gain ( $I_C = 1.0\text{ A}$ , $V_{CE} = 10\text{ V}$ , $f = 1\text{ kHz}$ )	$h_{fe}$	25		

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

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

TIP35, TIP35A, TIP35B, TIP35C NPN / TIP36, TIP36A, TIP36B, TIP36C PNP

FIG-2 DC CURRENT GAIN

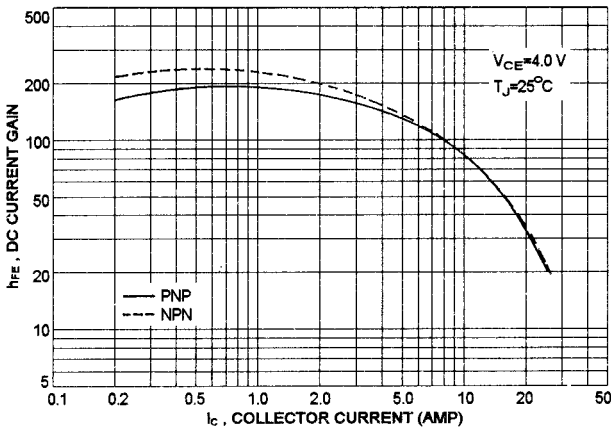


FIG-3 TURN-OFF TIME

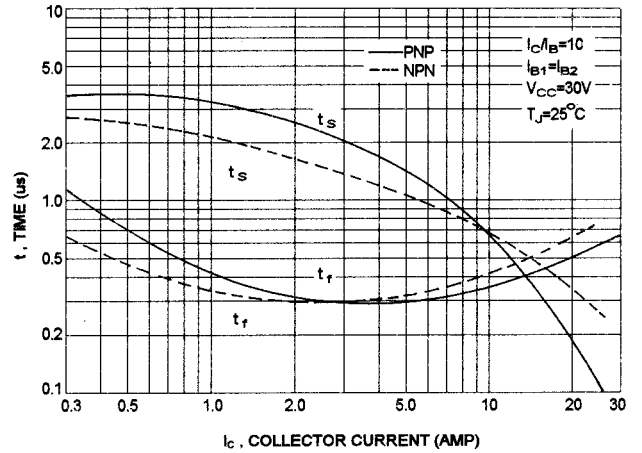


FIG-4 TURN-ON TIME

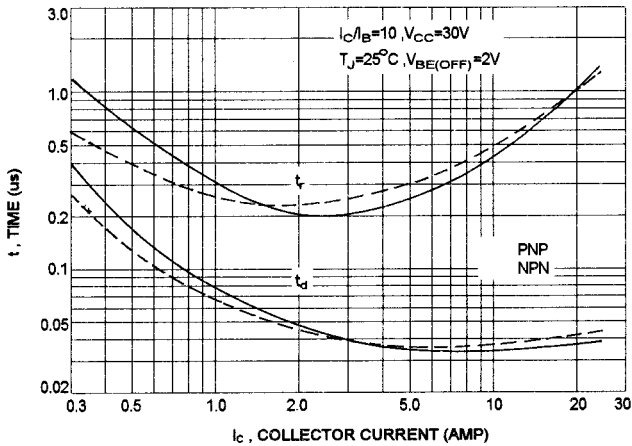


FIG-5 REVERSE BIASE SAFE OPERATING AREA

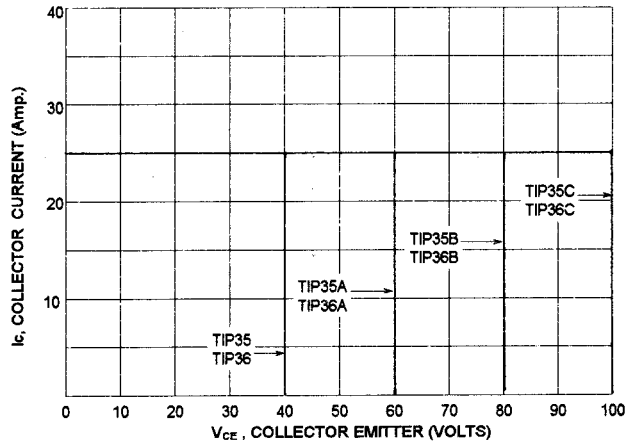
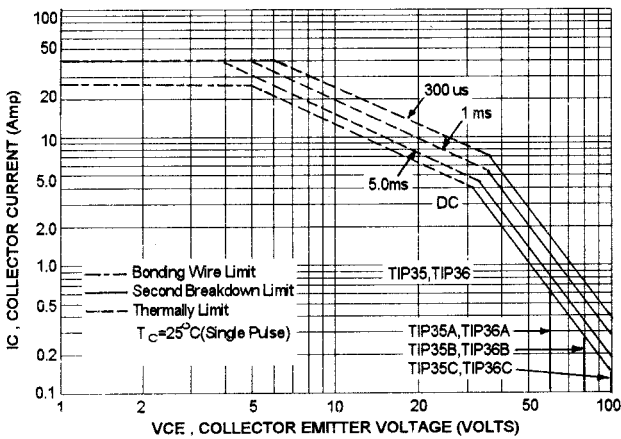


FIG-6 ACTIVE REGION SAFE OPERATING AREA



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 is base on  $T_c = 25^\circ C$ ;  $T_{J(PK)}$  is variable depending on power level. second breakdown pulse limits are valid for duty cycles to 10% but must be derated when  $T_c \geq 25^\circ C$ , second breakdown limitations do not derate the same as thermal limitation.