

HIGH VOLTAGE NPN SILICON POWER TRANSISTORS

... designed for line operated audio output amplifier, and switching power supply drivers applications.

FEATURES:

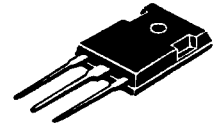
- * Collector-Emitter Sustaining Voltage -250-400V(Min)
- * 3 A Rated Collector Current
- * $f_T = 2.5\text{MHz(Min)}$ @ $I_C = 200\text{mA}$

MAXIMUM RATINGS

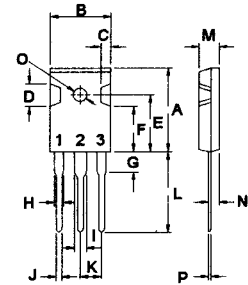
Characteristic	Symbol	TIP51	TIP52	TIP53	TIP54	Unit
Collector-Emitter Voltage	V_{CEO}	250	300	350	400	V
Collector-Base Voltage	V_{CBO}	350	400	450	500	V
Emitter-Base Voltage	V_{EBO}	5.0				V
Collector Current - Continuous - Peak	I_C	3.0 5.0				A
Base Current	I_B	0.6				A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	100 0.8				W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +150				$^\circ\text{C}$

NPN
TIP51
TIP52
TIP53
TIP54

3.0 AMPER
POWER TRANSISTORS
250 -400 VOLTS
100 WATTS



TO-247(3P)



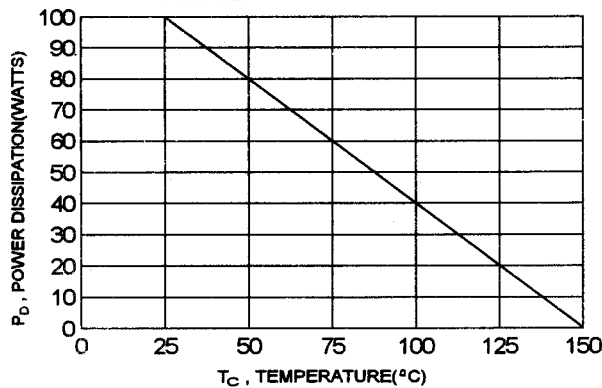
PIN 1.BASE
2.COLLECTOR
3.EMITTER

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.25	$^\circ\text{C/W}$

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



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) ($I_C = 30\text{ mA}$, $I_B = 0$)	TIP51 TIP52 TIP53 TIP54	$V_{CEO(sus)}$	250 300 350 400	V
Collector Cutoff Current ($V_{CE} = 150\text{ V}$, $I_B = 0$) ($V_{CE} = 200\text{ V}$, $I_B = 0$) ($V_{CE} = 250\text{ V}$, $I_B = 0$) ($V_{CE} = 300\text{ V}$, $I_B = 0$)	TIP51 TIP52 TIP53 TIP54	I_{CEO}		1.0 1.0 1.0 1.0 mA
Collector Cutoff Current ($V_{CE} = 350\text{ V}$, $V_{BE} = 0$) ($V_{CE} = 400\text{ V}$, $V_{BE} = 0$) ($V_{CE} = 450\text{ V}$, $V_{BE} = 0$) ($V_{CE} = 500\text{ V}$, $V_{BE} = 0$)	TIP51 TIP52 TIP53 TIP54	I_{CES}		1.0 1.0 1.0 1.0 mA
Emitter Cutoff Current ($V_{EB} = 5.0\text{ V}$, $I_C = 0$)		I_{EBO}		1.0 mA

ON CHARACTERISTICS (1)

DC Current Gain ($I_C = 0.3\text{ A}$, $V_{CE} = 10\text{ V}$) ($I_C = 3.0\text{ A}$, $V_{CE} = 10\text{ V}$)	h_{FE}	30 10	150	
Collector-Emitter Saturation Voltage ($I_C = 3.0\text{ A}$, $I_B = 600\text{ mA}$)	$V_{CE(sat)}$		1.5	V
Base-Emitter On Voltage ($I_C = 3.0\text{ A}$, $V_{CE} = 10\text{ V}$)	$V_{BE(on)}$		1.5	V

DYNAMIC CHARACTERISTICS

Current Gain - Bandwidth Product (2) ($I_C = 200\text{ mA}$, $V_{CE} = 10\text{ V}$, $f_{TEST} = 1.0\text{ MHz}$)	f_T	2.5		MHz
Small Signal Current Gain ($I_C = 200\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ kHz}$)	h_{fe}	30		

(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 DC CURRENT GAIN

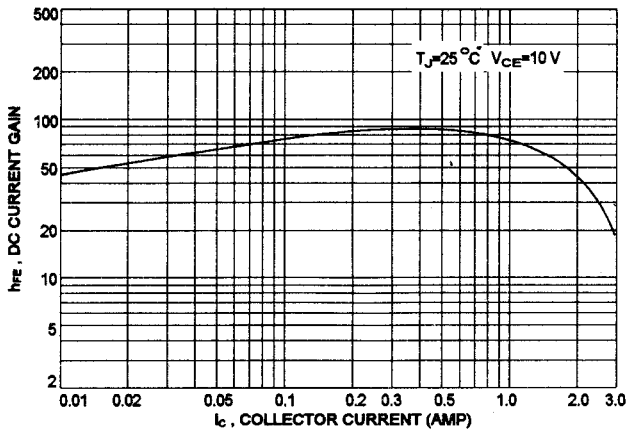


FIG-3 BASE-EMITTER VOLTAGE

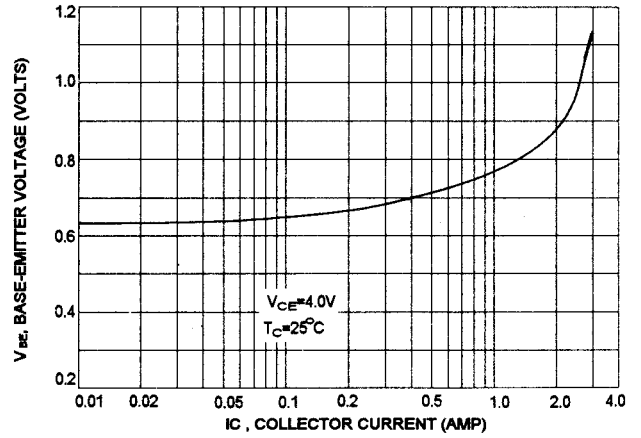


FIG-4 COLLECTOR-EMITTER SATURATION VOLTAGE

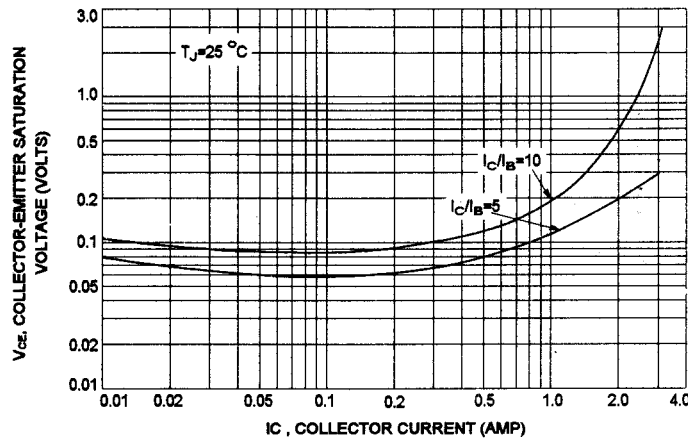
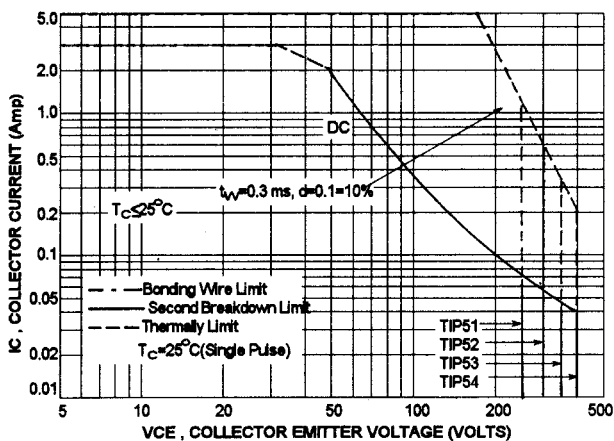


FIG-5 ACTIVE REGION SAFE OPERATING AREA



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-5 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.