

HIGH VOLTAGE NPN SILICON POWER TRANSISTORS

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

FEATURES:

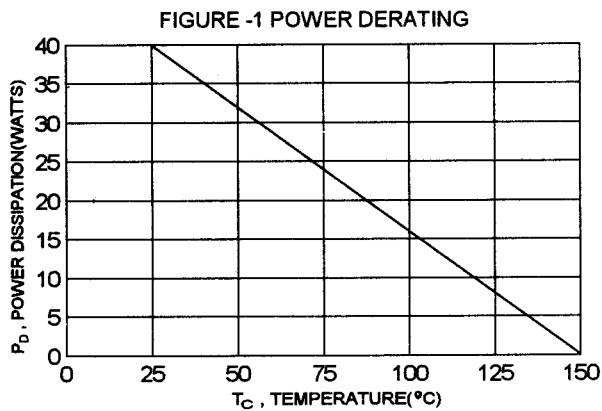
- * Collector-Emitter Sustaining Voltage -250-400V(Min)
- * 1 A Rated Collector Current
- * $f_T = 10\text{MHz}(\text{Min}) @ I_C = 200\text{mA}$

MAXIMUM RATINGS

Characteristic	Symbol	TIP47	TIP48	TIP49	TIP50	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	1.0 2.0				A
Base Current	I_B	0.6				A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	40 0.32				W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +150				$^\circ\text{C}$

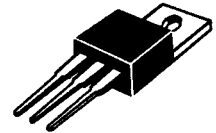
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	3.125	$^\circ\text{C/W}$

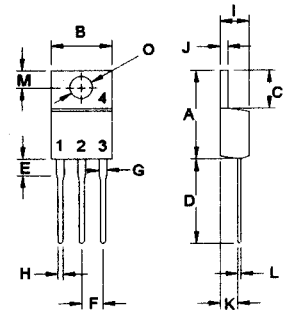


NPN
TIP47
TIP48
TIP49
TIP50

1.0 AMPER
POWER
TRANSISTORS
250 -400 VOLTS
40 WATTS



TO-220



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

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

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) ($I_C = 30\text{ mA}$, $I_B = 0$)	TIP47 TIP48 TIP49 TIP50	$V_{CEO(sus)}$	250 300 350 400	V
Collector Cutoff Current ($V_{CE} = 150\text{ V}$, $I_B = 0$) ($V_{CE} = 200\text{ V}$, $I_B = 0$) ($V_{CE} = 250\text{ V}$, $I_B = 0$) ($V_{CE} = 300\text{ V}$, $I_B = 0$)	TIP47 TIP48 TIP49 TIP50	I_{CEO}		1.0 1.0 1.0 1.0 mA
Collector Cutoff Current ($V_{CE} = 350\text{ V}$, $V_{BE} = 0$) ($V_{CE} = 400\text{ V}$, $V_{BE} = 0$) ($V_{CE} = 450\text{ V}$, $V_{BE} = 0$) ($V_{CE} = 500\text{ V}$, $V_{BE} = 0$)	TIP47 TIP48 TIP49 TIP50	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 ($I_C = 0.3\text{ A}$, $V_{CE} = 10\text{ V}$) ($I_C = 1.0\text{ A}$, $V_{CE} = 10\text{ V}$)	h_{FE}	30 10	150	
Collector-Emitter Saturation Voltage ($I_C = 1.0\text{ A}$, $I_B = 200\text{ mA}$)	$V_{CE(sat)}$		1.0	V
Base-Emitter On Voltage ($I_C = 1.0\text{ A}$, $V_{CE} = 10\text{ V}$)	$V_{BE(on)}$		1.5	V

DYNAMIC CHARACTERISTICS

Current Gain - Bandwidth Product (2) ($I_C = 200\text{ mA}$, $V_{CE} = 10\text{ V}$, $f_{TEST} = 2.0\text{ MHz}$)	f_T	10		MHz
Small Signal Current Gain ($I_C = 200\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ kHz}$)	h_{fe}	25		

(1) Pulse Test: Pulse width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$ (2) $f_T = |h_{fe}| \cdot f_{TEST}$

FIG-2 DC CURRENT GAIN

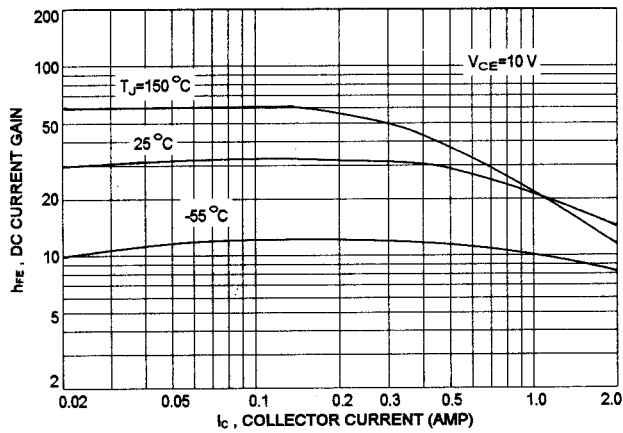


FIG-3 TURN-ON TIME

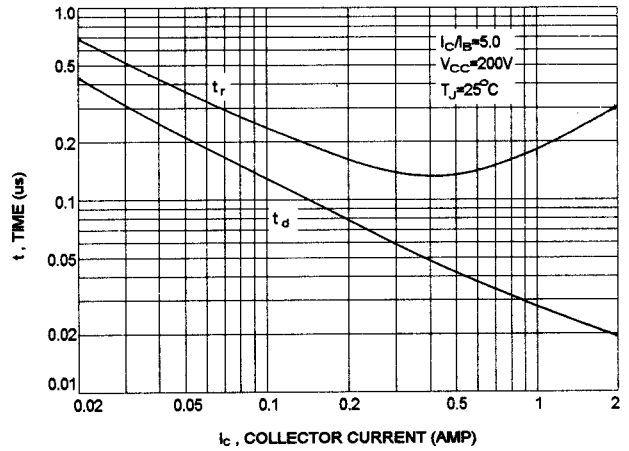


FIG-4 "ON" VOLTAGES

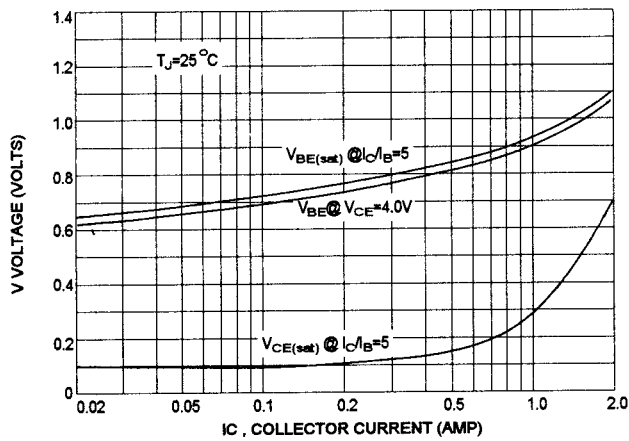


FIG-5 TURN-OFF TIME

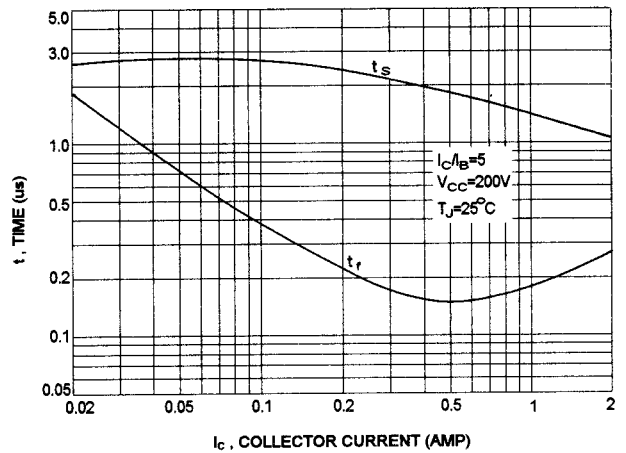
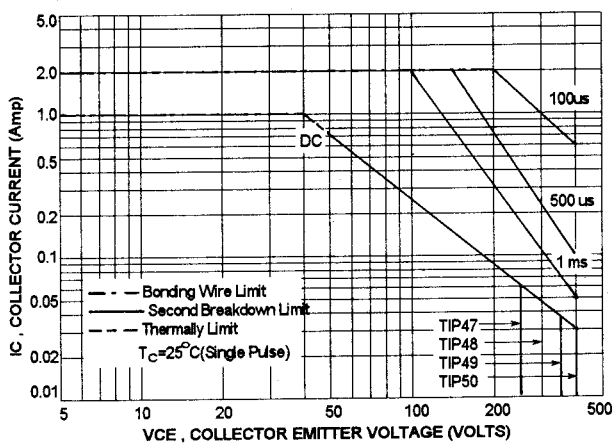


FIG-6 ACTIVE REGION SAFE OPERATING AREA



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 $T_{J(PK)} = 150^\circ C$; T_C is variable depending on power level. second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(PK)} \leq 150^\circ C$. At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.