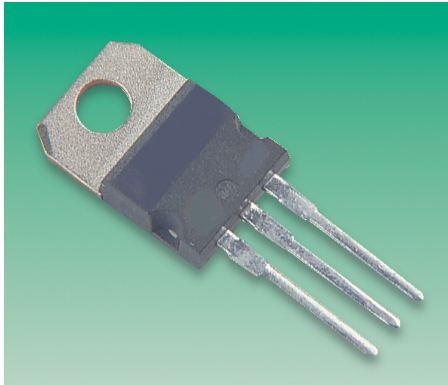


# TIP47, 50

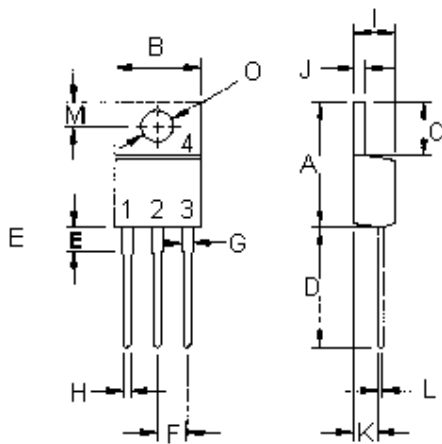
## High Voltage Power Transistors



High Voltage NPN Silicon Power Transistors are designed for line operated audio output amplifier, and switching power supply drivers applications.

### Features:

- Collector-Emitter sustaining voltage- 250 - 400V (Minimum).
- 1A Rated collector current.
- $f_T = 10\text{MHz}$  (Minimum) at  $I_C = 200\text{mA}$ .



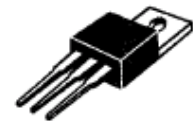
- Pin 1. Base  
2. Collector  
3. Emitter  
4. Collector(Case).

Dimensions	Minimum	Maximum
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

Dimensions : Millimetres

**NPN**  
**TIP47**  
**TIP50**

1 Ampere  
Power  
Transistors  
250 - 400 Volts  
40 Watts



**TO-220**



# TIP47, 50

## High Voltage Power Transistors



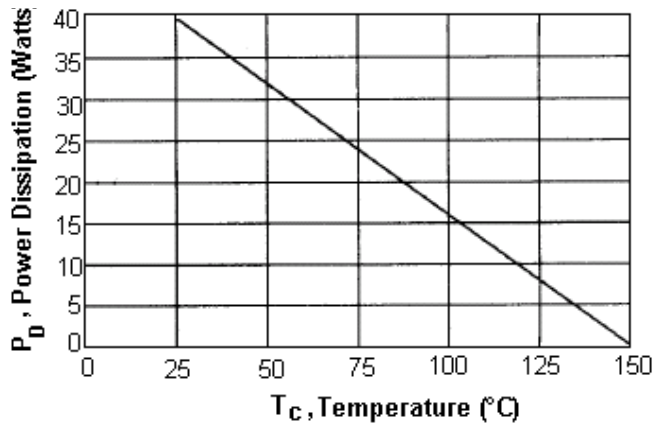
### Maximum Ratings

Characteristic	Symbol	TIP47	TIP50	Unit
Collector-Emitter Voltage	$V_{CEO}$	250	400	V
Collector-Base Voltage	$V_{CBO}$	350	500	
Emitter-Base Voltage	$V_{EBO}$	5.0		
Collector Current-Continuous -Peak	$I_C$	1.0 2.0		A
Base Current	$I_B$	0.6		
Total Power Dissipation at $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	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	Maximum	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	3.125	$^\circ\text{C}/\text{W}$

Figure - 1 Power Derating



# TIP47, 50

## High Voltage Power Transistors



### Electrical Characteristics ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Minimum	Maximum	Unit
<b>Off Characteristics</b>				
Collector-Emitter Sustaining Voltage (1) ( $I_C = 30\text{mA}$ , $I_B = 0$ ) TIP47 TIP50	$V_{CEO(sus)}$	250 400	-	V
Collector Cut off Current ( $V_{CE} = 150\text{V}$ , $I_B = 0$ ) ( $V_{CE} = 300\text{V}$ , $I_B = 0$ ) TIP47 TIP50	$I_{CEO}$	-	1.0	mA
Collector Cut off Current ( $V_{CE} = 350\text{V}$ , $V_{BE} = 0$ ) ( $V_{CE} = 500\text{V}$ , $V_{BE} = 0$ ) TIP47 TIP50	$I_{CES}$	-	1.0	
Emitter Cut off Current ( $V_{EB} = 5.0\text{V}$ , $I_C = 0$ )	$I_{EBO}$	-	1.0	

### 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	
<b>Dynamic Characteristics</b>				
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)  $f_T = |h_{fe}| \cdot f_{test}$ .

# TIP47, 50

## High Voltage Power Transistors



Figure - 2 DC Current Gain

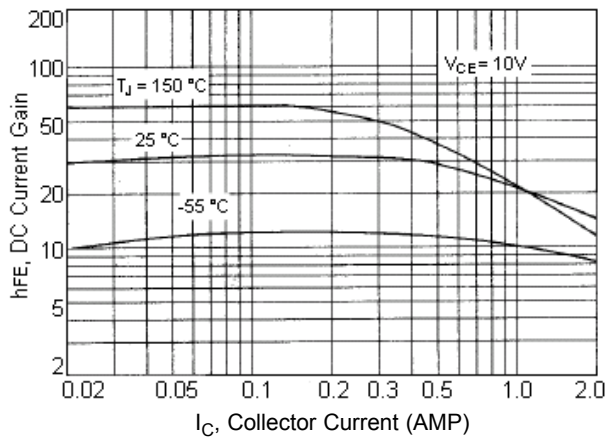


Figure - 3 Turn-On Time

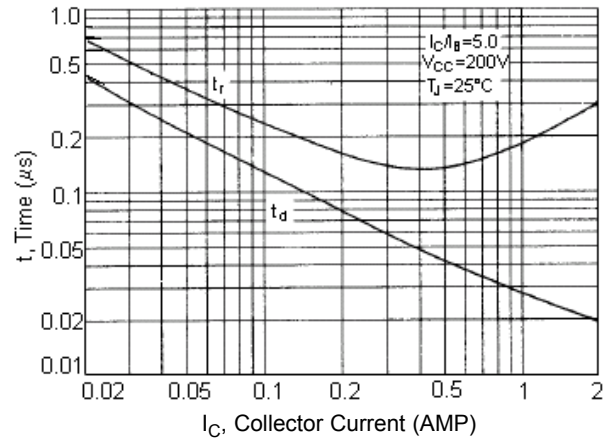


Figure - 4 "ON" Voltages

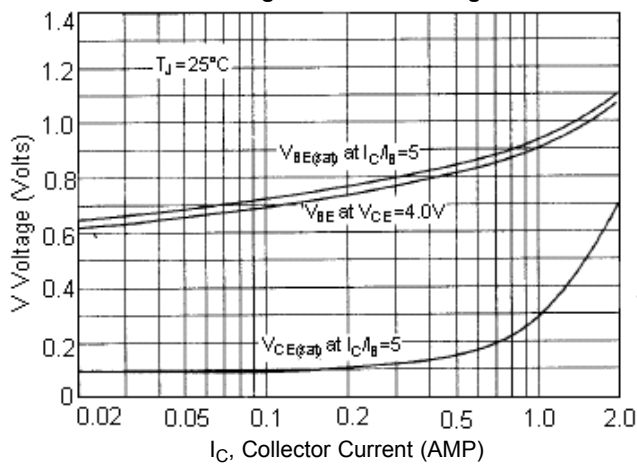


Figure - 5 Turn-Off Time

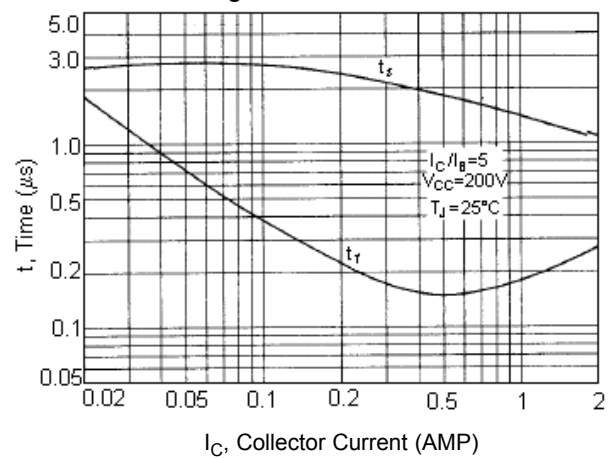
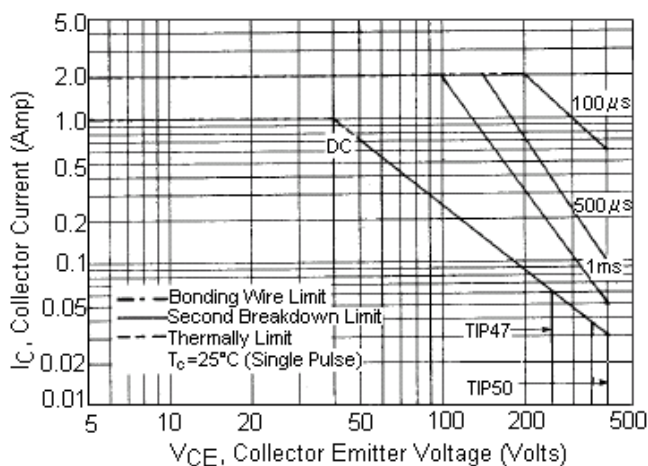


Figure - 6 Active Region Safe Operating Area



There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate I<sub>C</sub>-V<sub>CE</sub> limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure - 6 curve is based on T<sub>J(PK)</sub> = 150 °C; T<sub>C</sub> is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10% provided T<sub>J(PK)</sub> ≤ 150 °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.



# TIP47, 50

## High Voltage Power Transistors



### Specifications

$I_{C(av)}$ maximum (A)	$V_{CEO}$ maximum (V)	$V_{CBO}$ maximum (V)	$V_{CE(sat)}$ (V) at $I_C = 1A$	$P_{tot}$ at 25°C (W)	Package	Type	Part Number
1	250	350	1	40	TO-220	NPN	TIP47
	400	500					TIP50



# TIP47, 50

## High Voltage Power Transistors



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