

TIP47, 50

High Voltage Power Transistors

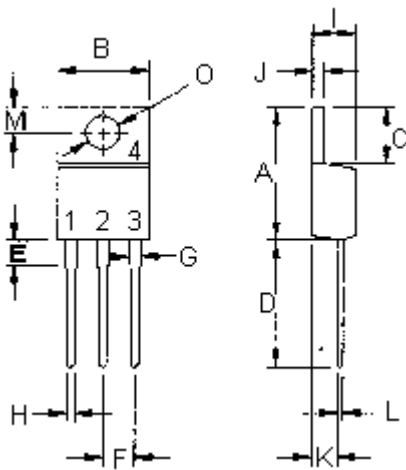


High Voltage NPN Silicon Power Transistors are designed for line operated audio output amplifier, and switching power supply drivers applications

Features:

- Collector - emitter sustaining voltage -voltage- 250 - 400 V (Minimum)
- 1 A Rated collector current
- $f_T = 10$ MHz (Minimum) at $I_C = 200$ mA

TO-220



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	2.2	2.97
L	0.33	0.55
M	2.48	2.98
O	3.7	3.9

Dimensions : Millimetres

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

**NPN
TIP47
TIP50**
1 Ampere
Power
Transistors
250 - 400 Volts
40 Watts

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		A
Collector current - continuous - peak	I_C	1 2		
Base current	I_B	0.6		
Total power dissipation at $T_C = 25^\circ\text{C}$ 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		$^\circ\text{C}$

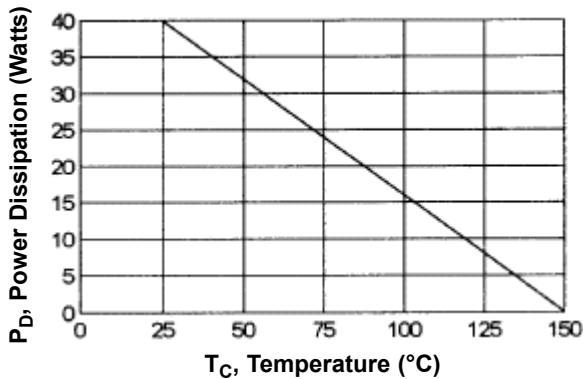
Thermal Characteristics

Characteristic	Symbol	Maximum	Unit
Thermal resistance junction to case	$R_{\theta jc}$	3.125	$^\circ\text{C}/\text{W}$

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Figure - 1 Power Derating



Electrical Characteristics ($T_C = 25^\circ\text{C}$ Unless Otherwise Noted)

Characteristic	Symbol	Minimum	Maximum	Unit
OFF Characteristics				
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 ($V_{CE} = 1500\text{V}$, $I_B = 0$) ($V_{CE} = 300\text{V}$, $I_B = 0$)	TIP47 TIP50 I_{CEO}	-	1	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	
Emitter cut off current ($V_{EB} = 5\text{ V}$, $I_C = 0$)	I_{EBO}	-	1	
ON Characteristics (1)				
DC current gain ($I_C = 0.3\text{ A}$, $V_{CE} = 10\text{ V}$) ($I_C = 1\text{ A}$, $V_{CE} = 10\text{ V}$)	h_{FE}	30 10	150	-
Collector - emitter saturation voltage ($I_C = 1\text{ A}$, $I_B = 200\text{ mA}$)	$V_{CE(sat)}$	-	1	V
Base - emitter on voltage ($I_C = 1\text{ A}$, $V_{CE} = 10\text{ V}$)	$V_{BE(on)}$	-	1.5	
Dynamic Characteristics				
Current gain - bandwidth product (2) ($I_C = 200\text{ mA}$, $V_{CE} = 10\text{ V}$, $f_{TEST} = 2\text{ MHz}$)	f_T	10	-	MHz
Small - signal current gain ($I_C = 200\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$)	h_{fe}	25	-	-

(1) Pulse Test : Pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$

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

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Figure - 2 DC Current Gain

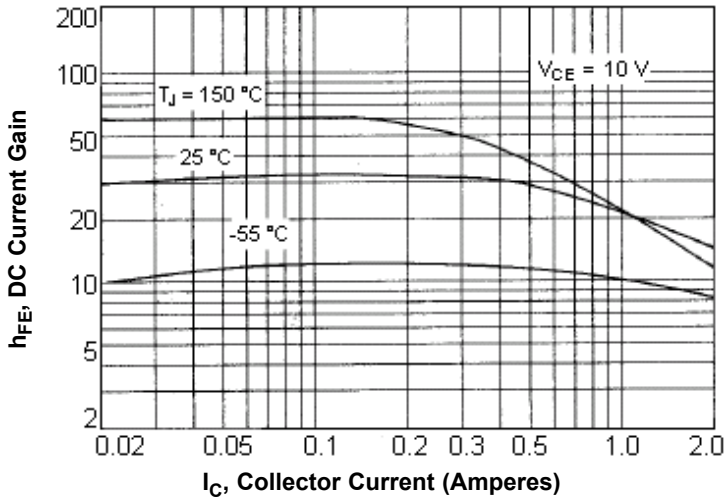


Figure - 3 Turn-On Time

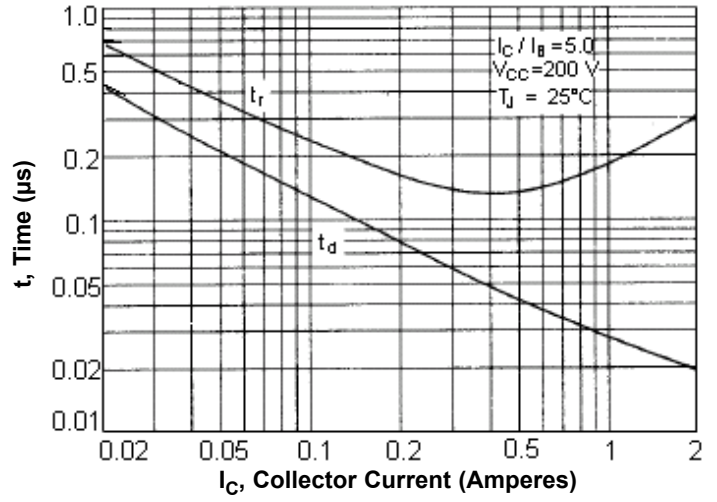


Figure - 4 "ON" Voltages

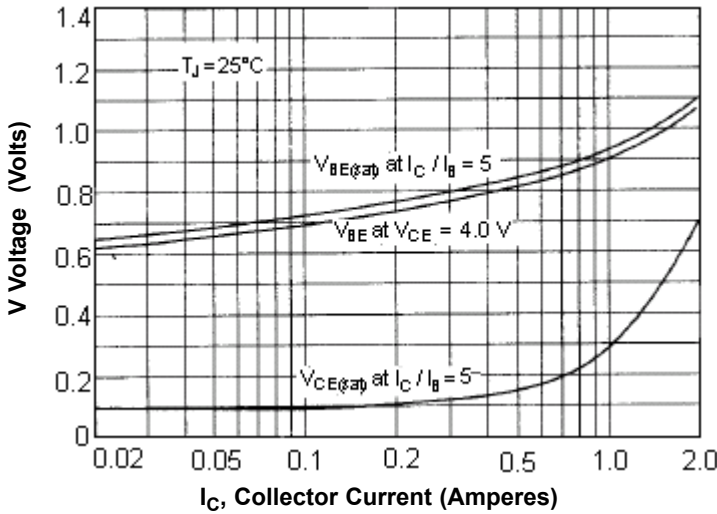


Figure - 5 Turn-Off Time

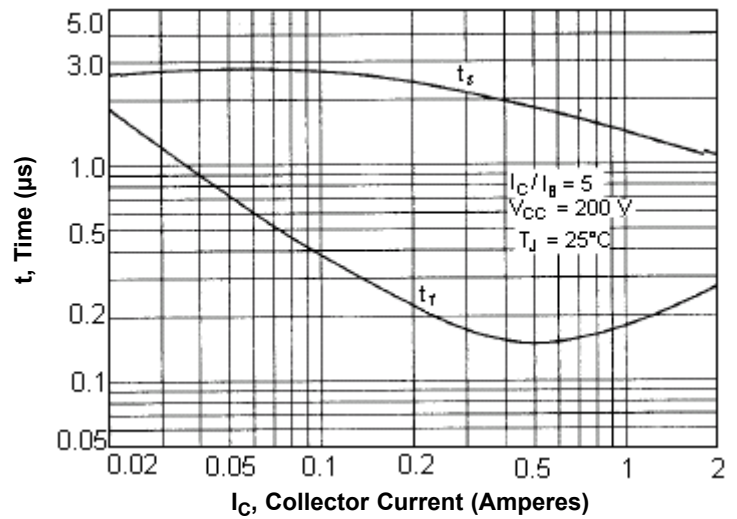
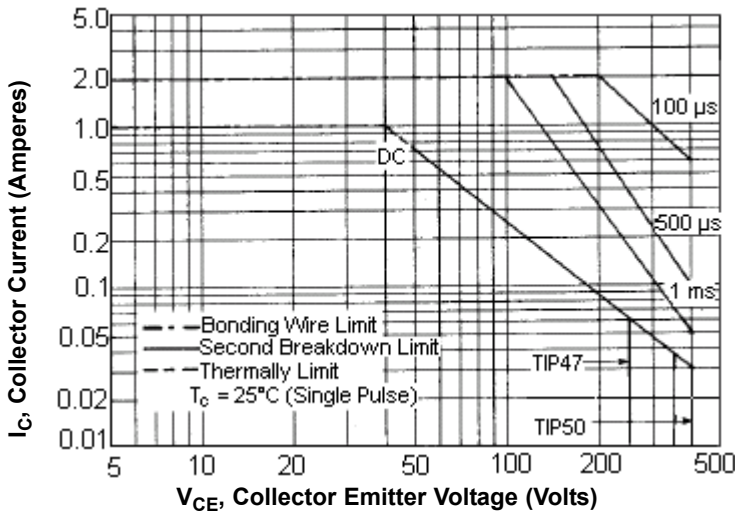


Figure - 6 Active Region Safe Operating Area



There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate I_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 the curves indicate

The data of Figure - 6 curve is based 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 $T_{J(PK)} = 150^\circ\text{C}$. At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

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Specification Table

Description	$I_{C(av)}$ Maximum (A)	V_{CEO} Maximum (V)	V_{CBO} Maximum (V)	$h_{CE(sat)}$ (V) at $I_C = 1\text{ A}$	P_{tot} at 25°C (W)	Package	Type	Part Number
High Voltage Power Transistor	1	250	350	1	40	TO-220	NPN	TIP47
High Voltage Power Transistor		400	500					TIP50

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