TIP47, 50

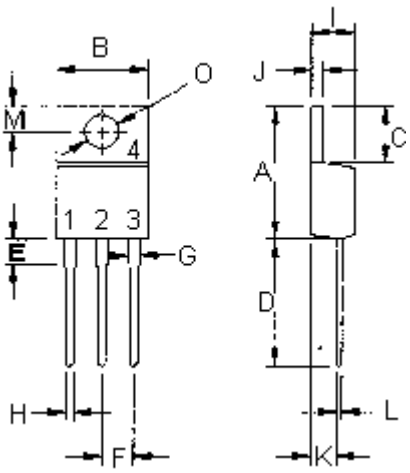
High Voltage Power Transistors

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

NPN
TIP47
TIP50

1 Ampere Power Transistors
250 - 400 Volts
40 Watts

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

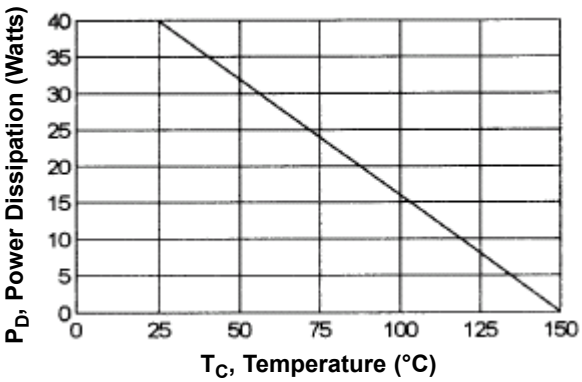
Maximum Ratings

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°C derate above 25°C	P_D	40 0.32		W W/°C
Operating and storage junction temperature range	T_J, T_{STG}	-65 to +150		°C

Thermal Characteristics

Characteristic	Symbol	Maximum	Unit
Thermal resistance junction to case	Rθjc	3.125	°C/W

Figure - 1 Power Derating



Electrical Characteristics (T_C = 25°C Unless Otherwise Noted)

Characteristic		Symbol	Minimum	Maximum	Unit
OFF Characteristics					
Collector - emitter sustaining voltage (1) (I_C = 30 mA, I_B = 0)	TIP47 TIP50	$V_{CEO\ (SUS)}$	250 400	-	V
Collector cut off current (V_{CE} = 1500V, I_B = 0) (V_{CE} = 300V, I_B = 0)	TIP47 TIP50	I_{CEO}	-	1	mA
Collector cut off current (V_{CE} = 350 V, V_{BE} = 0) (V_{CE} = 500 V, V_{BE} = 0)	TIP47 TIP50	I_{CES}	-	1	
Emitter cut off current (V_{EB} = 5 V, I_C = 0)		I_{EBO}	-	1	
ON Characteristics (1)					
DC current gain (I_C = 0.3 A, V_{CE} = 10 V) (I_C = 1 A, V_{CE} = 10 V)		h_{FE}	30 10	150	-
Collector - emitter saturation voltage (I_C = 1 A, I_B = 200 mA)		$V_{CE\ (sat)}$	-	1	V
Base - emitter on voltage (I_C = 1 A, V_{CE} = 10 V)		$V_{BE\ (on)}$	-	1.5	
Dynamic Characteristics					
Current gain - bandwidth product (2) (I_C = 200 mA, V_{CE} = 10 V, f_{TEST} = 2 MHz)		f_T	10	-	MHz
Small - signal current gain (I_C = 200 mA, V_{CE} = 10 V, f = 1 kHz)		h_{fe}	25	-	-

(1) Pulse Test : Pulse width ≤ 300 µs, duty cycle ≤ 2%
(2) $f_T = |h_{fe}| \bullet f_{test}$

Figure - 2 DC Current Gain

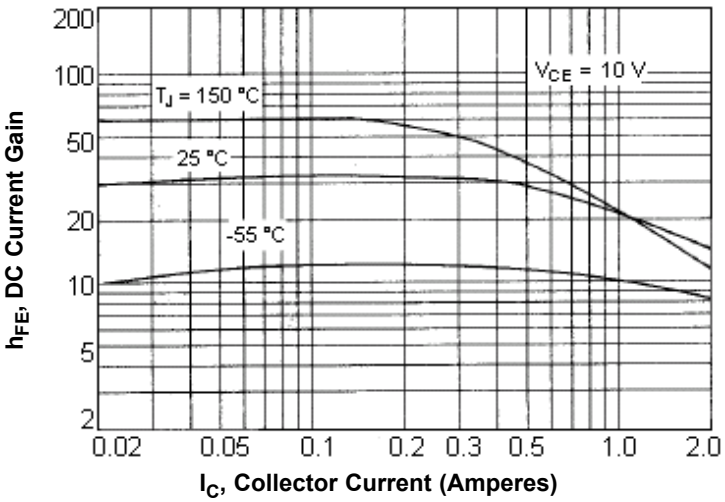


Figure - 3 Turn-On Time

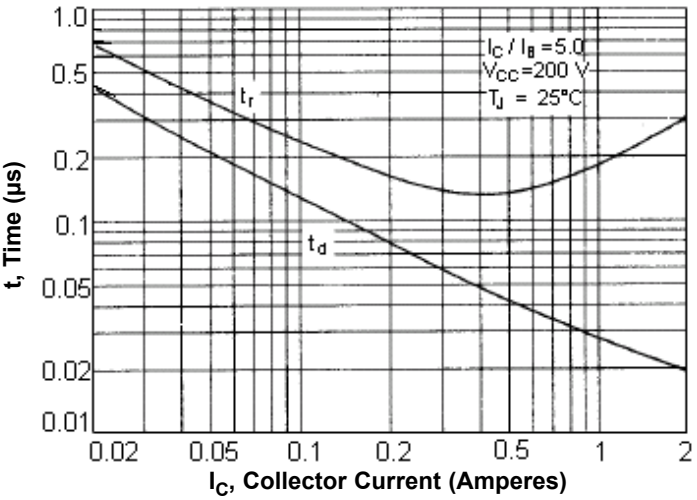


Figure - 4 "ON" Voltages

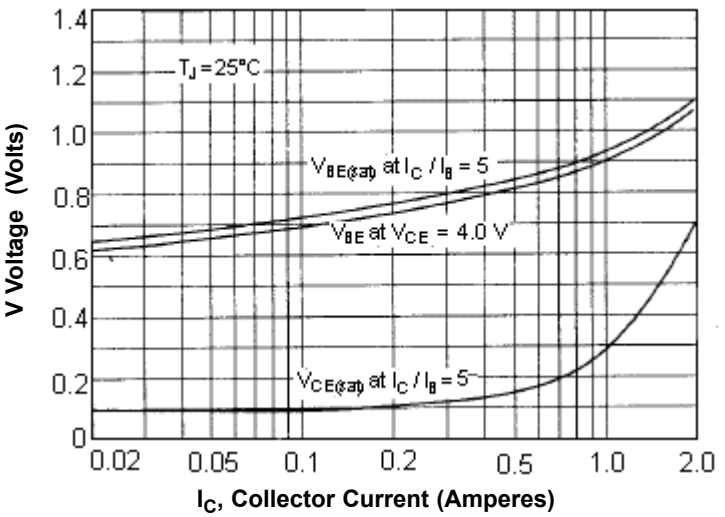


Figure - 5 Turn-Off Time

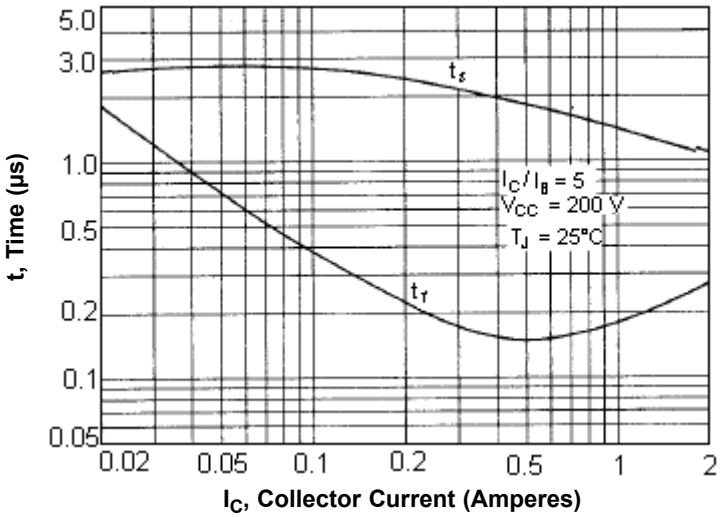
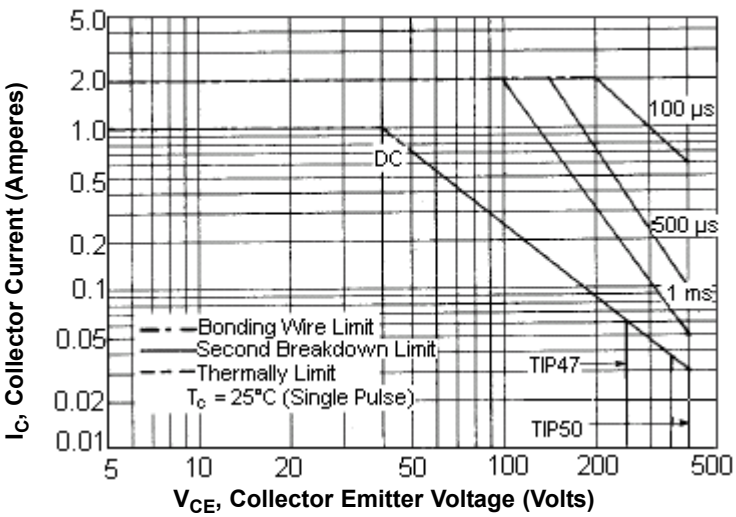


Figure - 6 Active Region Safe Operating Area



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°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°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

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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 A	P_{tot} at 25°C (W)	Package	Type	Part Number
High Voltage Power Trasnsitor	1	250	350	1	40	TO-220	NPN	TIP47
High Voltage Power Trasnsitor		400	500					TIP50