

# TIP47G, TIP48G, TIP50G

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Sustaining Voltage (Note 1) (I <sub>C</sub> = 30 mAdc, I <sub>B</sub> = 0)	TIP47 TIP48 TIP50 V <sub>CEO(sus)</sub>	250 300 400	– – –	Vdc
Collector Cutoff Current (V <sub>CE</sub> = 150 Vdc, I <sub>B</sub> = 0) (V <sub>CE</sub> = 200 Vdc, I <sub>B</sub> = 0) (V <sub>CE</sub> = 300 Vdc, I <sub>B</sub> = 0)	TIP47 TIP48 TIP50 I <sub>CEO</sub>	– – –	1.0 1.0 1.0	mAdc
Collector Cutoff Current (V <sub>CE</sub> = 350 Vdc, V <sub>BE</sub> = 0) (V <sub>CE</sub> = 400 Vdc, V <sub>BE</sub> = 0) (V <sub>CE</sub> = 500 Vdc, V <sub>BE</sub> = 0)	TIP47 TIP48 TIP50 I <sub>CES</sub>	– – –	1.0 1.0 1.0	mAdc
Emitter Cutoff Current (V <sub>BE</sub> = 5.0 Vdc, I <sub>C</sub> = 0)	I <sub>EBO</sub>	–	1.0	mAdc

## ON CHARACTERISTICS (Note 1)

DC Current Gain (I <sub>C</sub> = 0.3 Adc, V <sub>CE</sub> = 10 Vdc) (I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 10 Vdc)	h <sub>FE</sub>	30 10	150 –	–
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 1.0 Adc, I <sub>B</sub> = 0.2 Adc)	V <sub>CE(sat)</sub>	–	1.0	Vdc
Base–Emitter On Voltage (I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 10 Vdc)	V <sub>BE(on)</sub>	–	1.5	Vdc

## DYNAMIC CHARACTERISTICS

Current–Gain – Bandwidth Product (I <sub>C</sub> = 0.1 Adc, V <sub>CE</sub> = 10 Vdc, f = 2.0 MHz)	f <sub>T</sub>	10	–	MHz
Small–Signal Current Gain (I <sub>C</sub> = 0.2 Adc, V <sub>CE</sub> = 10 Vdc, f = 1.0 kHz)	h <sub>fe</sub>	25	–	–

1. Pulse Test: Pulse width ≤ 300 μs, Duty Cycle ≤ 2.0%.

## ORDERING INFORMATION

Device	Package	Shipping
TIP47	TO–220	50 Units / Rail
TIP47G	TO–220 (Pb–Free)	50 Units / Rail
TIP48	TO–220	50 Units / Rail
TIP48G	TO–220 (Pb–Free)	50 Units / Rail
TIP49	TO–220	50 Units / Rail
TIP49G	TO–220 (Pb–Free)	50 Units / Rail
TIP50	TO–220	50 Units / Rail
TIP50G	TO–220 (Pb–Free)	50 Units / Rail

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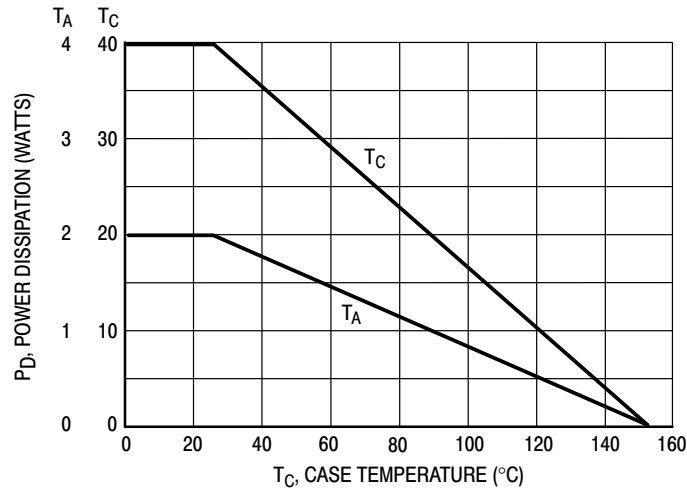
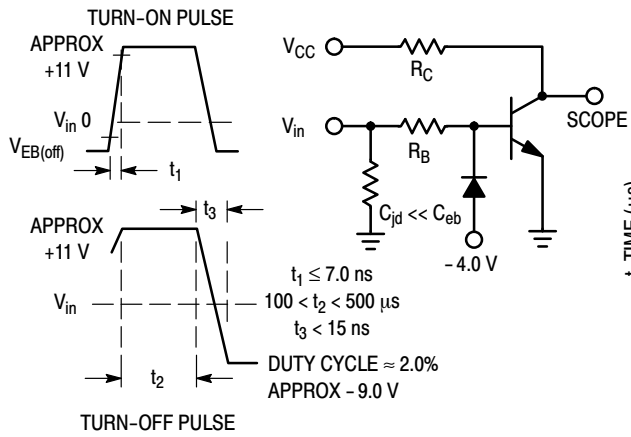


Figure 1. Power Derating



$R_B$  and  $R_C$  VARIED TO OBTAIN DESIRED CURRENT LEVELS.

Figure 2. Switching Time Equivalent Circuit

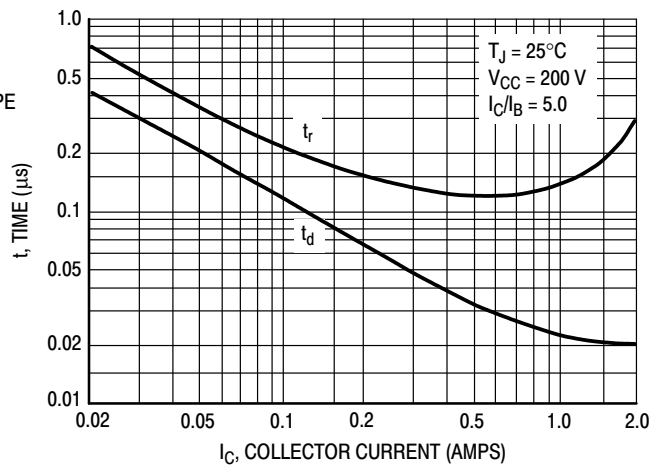


Figure 3. Turn-On Time

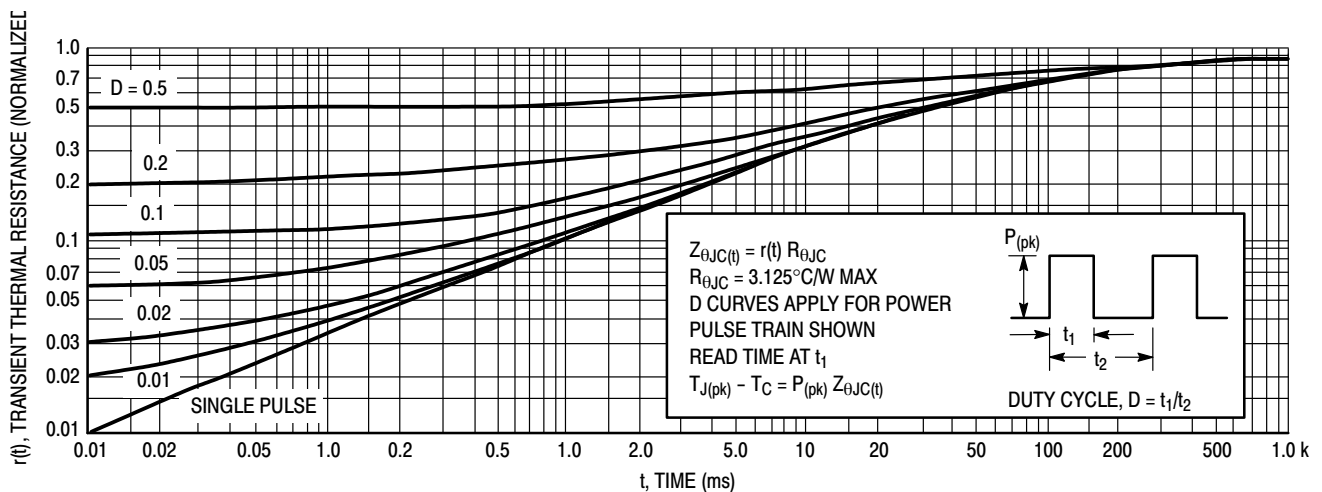


Figure 4. Thermal Response

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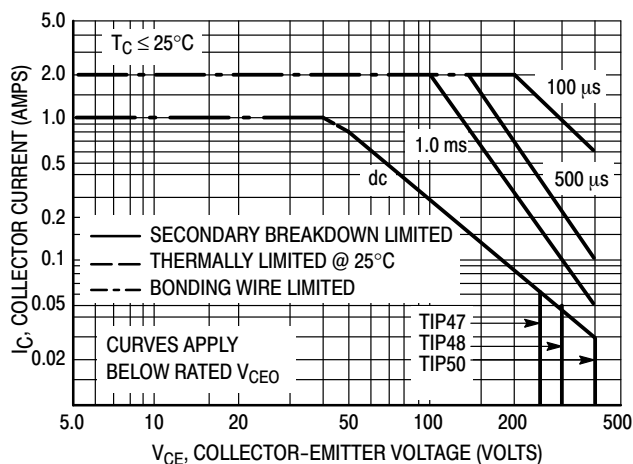


Figure 5. Active Region Safe Operating Area

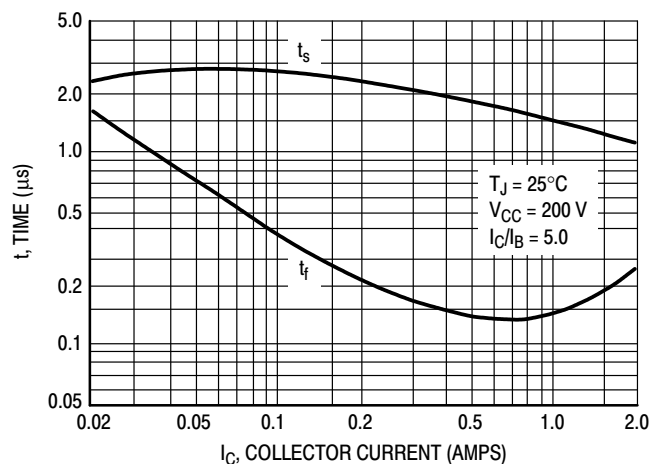


Figure 6. Turn-Off Time

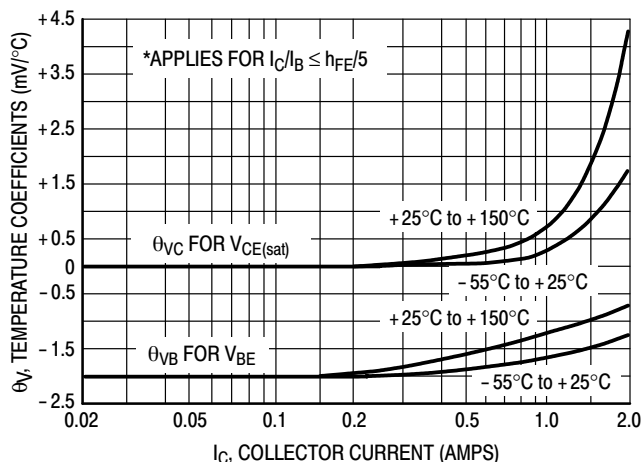
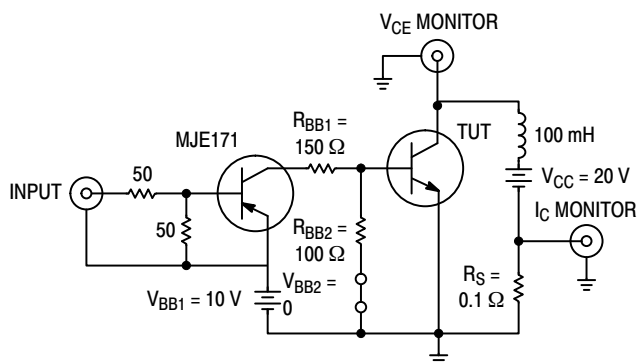


Figure 7. Temperature Coefficients



Note A: Input pulse width is increased until  $I_{CM} = 0.63\text{ A}$ .

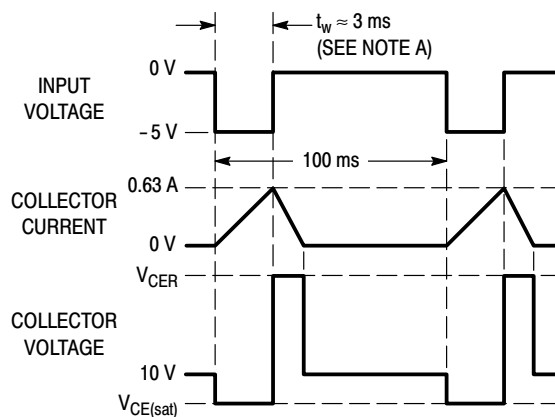


Figure 8. Inductive Load Switching

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 5 is based on  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

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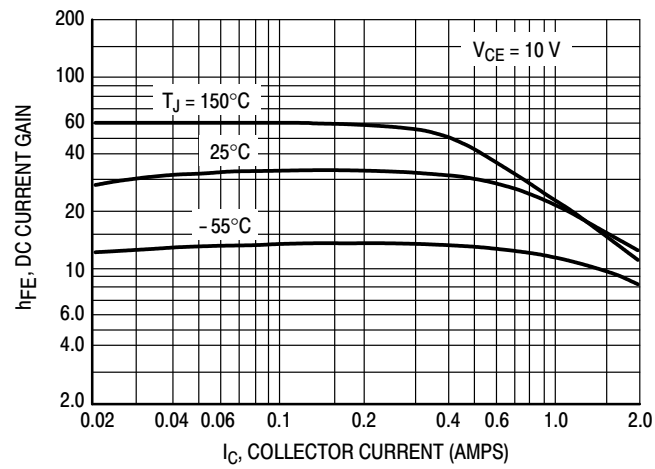


Figure 9. DC Current Gain

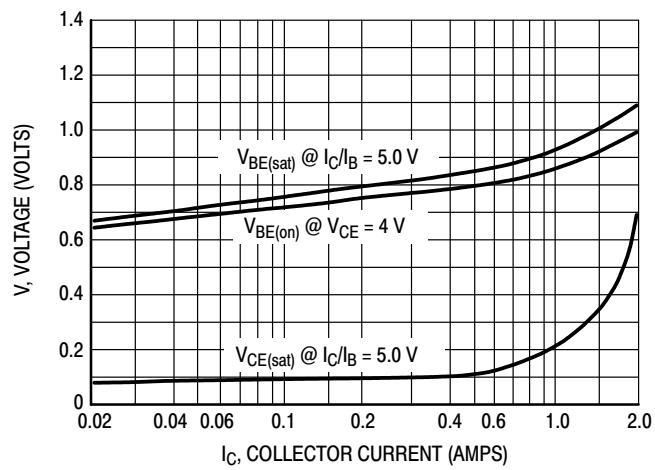
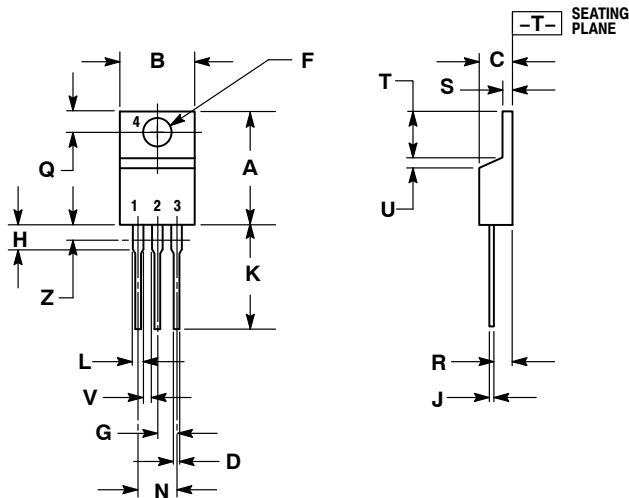


Figure 10. "On" Voltages

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## PACKAGE DIMENSIONS


TO-220  
CASE 221A-09  
ISSUE AG



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.036	0.64	0.91
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.025	0.36	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

- STYLE 1:
- PIN 1. BASE
  - COLLECTOR
  - EMITTER
  - COLLECTOR

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