

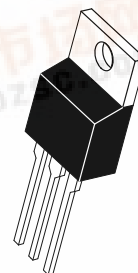
## High Voltage PNP Silicon Power Transistors

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

- 300 V to 400 V (Min) —  $V_{CEO(sus)}$
- 1.0 A Rated Collector Current
- Popular TO-220 Plastic Package
- PNP Complements to the TIP47 thru TIP50 Series

**MJE5730  
MJE5731  
MJE5731A**

**1.0 AMPERE  
POWER TRANSISTORS  
PNP SILICON  
300–350–400 VOLTS  
40 WATTS**



**CASE 221A-06  
TO-220AB**

### MAXIMUM RATINGS

Rating	Symbol	MJE5730	MJE5731	MJE5731A	Unit
Collector–Emitter Voltage	$V_{CEO}$	300	350	375	Vdc
Collector–Base Voltage	$V_{CB}$	300	350	375	Vdc
Emitter–Base Voltage	$V_{EB}$	5.0			Vdc
Collector Current — Continuous Peak	$I_C$	1.0 3.0			Adc
Base Current	$I_B$	1.0			Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	40 0.32			Watts W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	2.0 0.016			Watts W/ $^\circ\text{C}$
Unclamped Inducting Load Energy (See Figure 10)	$E$	20			mJ
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	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Sustaining Voltage (1) (I <sub>C</sub> = 30 mAdc, I <sub>B</sub> = 0)	V <sub>CEO(sus)</sub>	300 350 375	—	Vdc
Collector Cutoff Current (V <sub>CE</sub> = 200 Vdc, I <sub>B</sub> = 0) (V <sub>CE</sub> = 250 Vdc, I <sub>B</sub> = 0) (V <sub>CE</sub> = 300 Vdc, I <sub>B</sub> = 0)	I <sub>CEO</sub>	— — —	1.0 1.0 1.0	mAdc
Collector Cutoff Current (V <sub>CE</sub> = 300 Vdc, V <sub>BE</sub> = 0) (V <sub>CE</sub> = 350 Vdc, V <sub>BE</sub> = 0) (V <sub>CE</sub> = 400 Vdc, V <sub>BE</sub> = 0)	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
<b>ON CHARACTERISTICS (1)</b>				
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
<b>DYNAMIC CHARACTERISTICS</b>				
Current Gain — Bandwidth Product (I <sub>C</sub> = 0.2 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%.

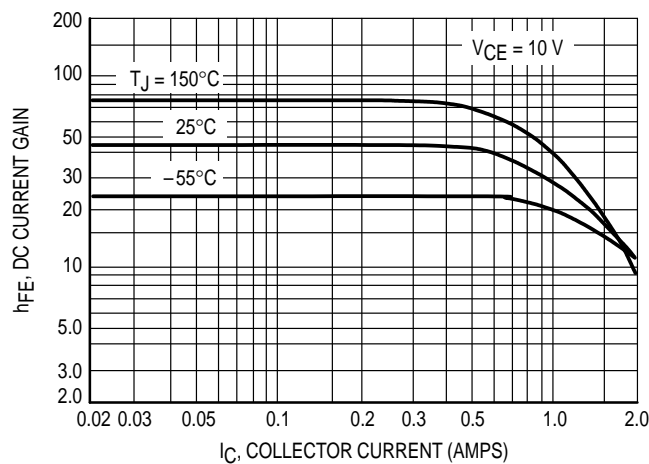


Figure 1. DC Current Gain

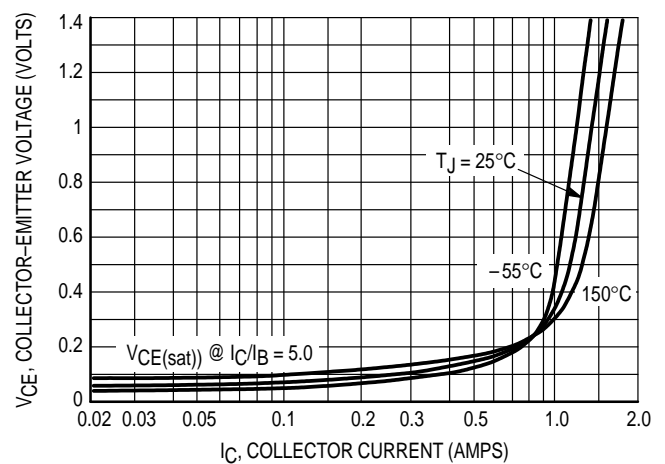


Figure 2. Collector–Emitter Saturation Voltage

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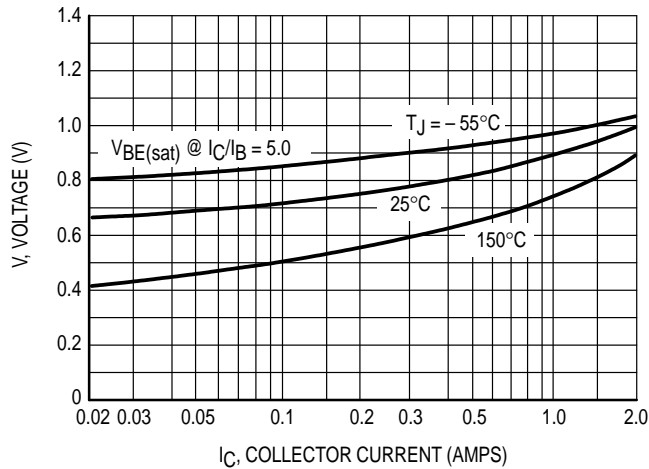


Figure 3. Base-Emitter Voltage

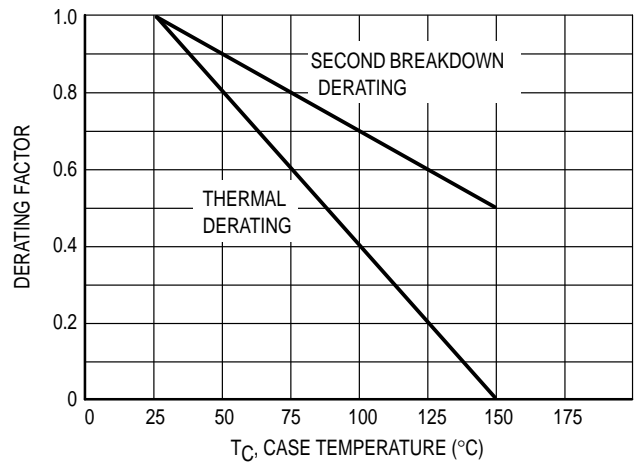


Figure 4. Normalized Power Derating

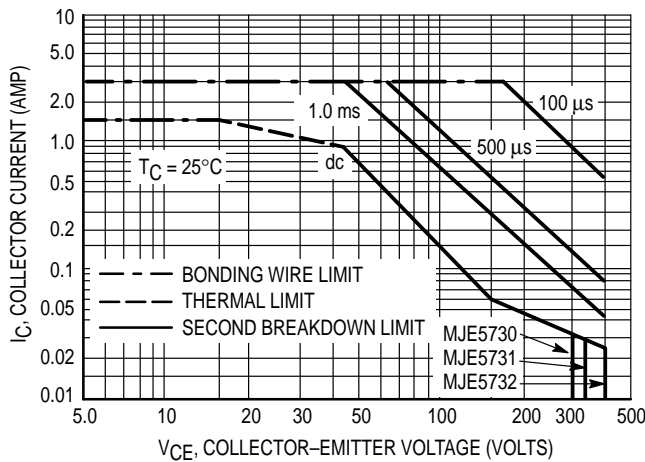


Figure 5. Forward Bias Safe Operating Area

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 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 6. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

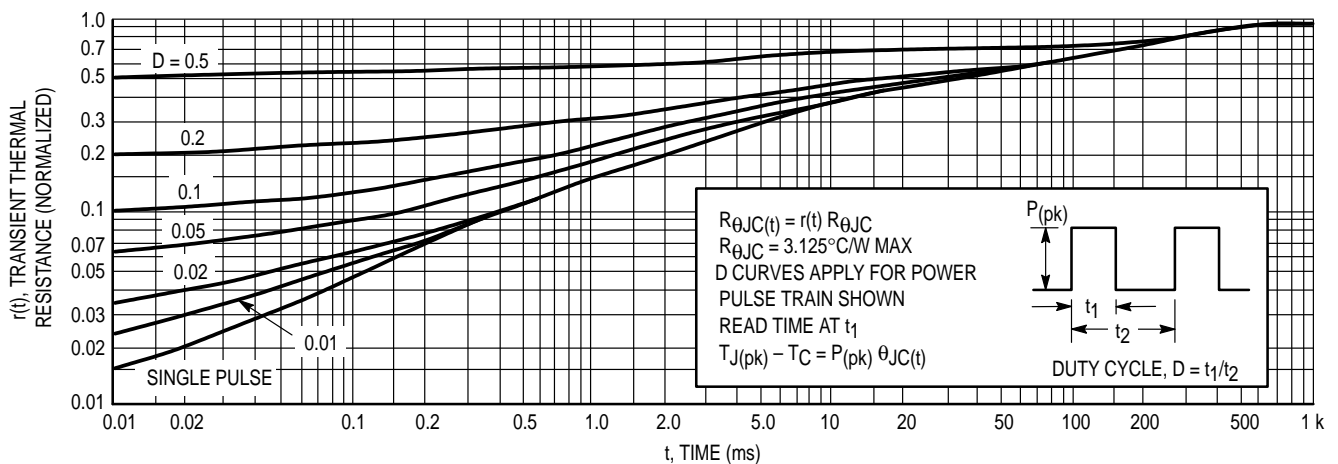


Figure 6. Thermal Response

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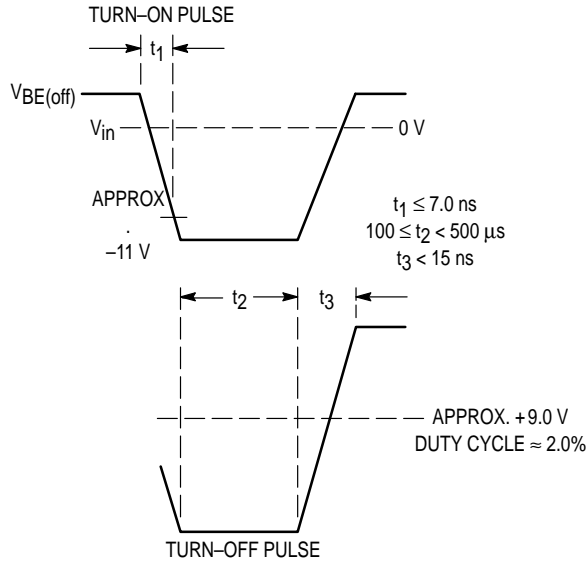


Figure 7. Switching Time Equivalent Circuit

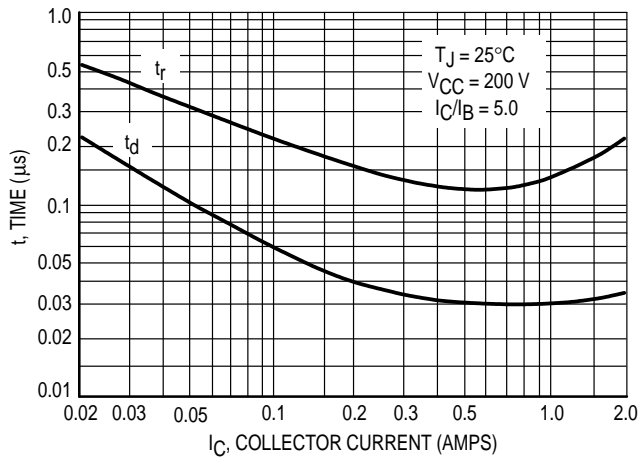
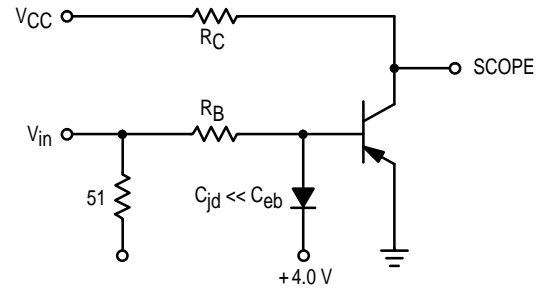


Figure 8. Turn-On Resistive Switching Times

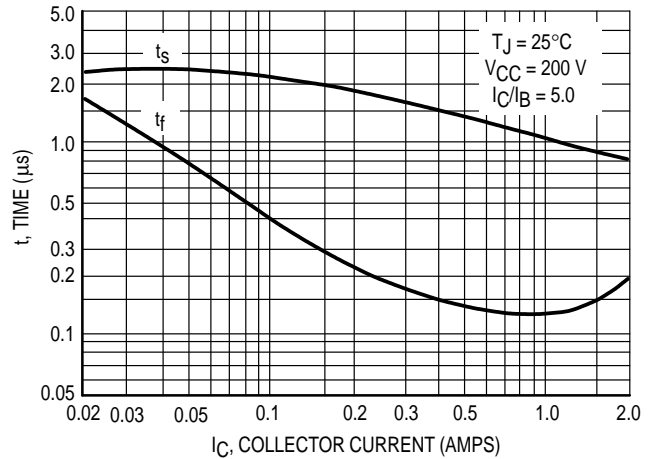
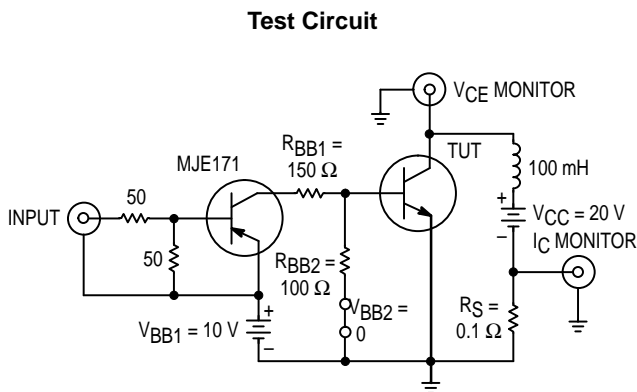


Figure 9. Resistive Turn-Off Switching Times



### Voltage and Current Waveforms

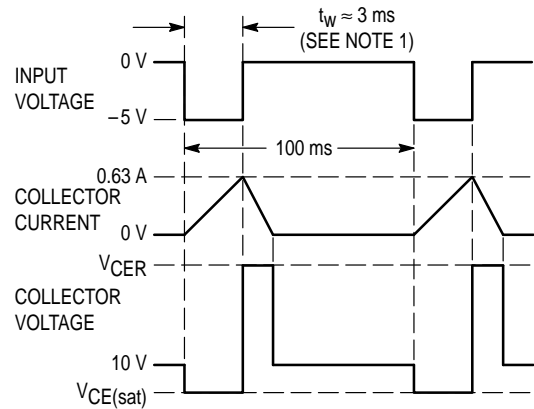
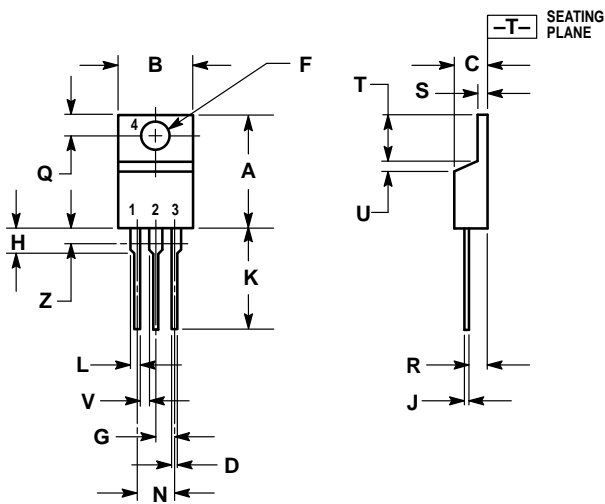


Figure 10. Inductive Load Switching

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PACKAGE DIMENSIONS




- 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	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	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
  - 2. COLLECTOR
  - 3. EMITTER
  - 4. COLLECTOR

CASE 221A-06  
TO-220AB  
ISSUE Y

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