

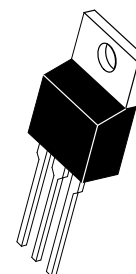
High Voltage PNP Silicon Power Transistors

... 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°C	P_D	40 0.32			Watts W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°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	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Sustaining Voltage (1) (I _C = 30 mAdc, I _B = 0)	V _{CEO(sus)}	300 350 375	—	Vdc
Collector Cutoff Current (V _{CE} = 200 Vdc, I _B = 0) (V _{CE} = 250 Vdc, I _B = 0) (V _{CE} = 300 Vdc, I _B = 0)	I _{CEO}	— — —	1.0 1.0 1.0	mAdc
Collector Cutoff Current (V _{CE} = 300 Vdc, V _{BE} = 0) (V _{CE} = 350 Vdc, V _{BE} = 0) (V _{CE} = 400 Vdc, V _{BE} = 0)	I _{CES}	— — —	1.0 1.0 1.0	mAdc
Emitter Cutoff Current (V _{BE} = 5.0 Vdc, I _C = 0)	I _{EBO}	—	1.0	mAdc

ON CHARACTERISTICS (1)

DC Current Gain (I _C = 0.3 Adc, V _{CE} = 10 Vdc) (I _C = 1.0 Adc, V _{CE} = 10 Vdc)	h _{FE}	30 10	150 —	—
Collector–Emitter Saturation Voltage (I _C = 1.0 Adc, I _B = 0.2 Adc)	V _{CE(sat)}	—	1.0	Vdc
Base–Emitter On Voltage (I _C = 1.0 Adc, V _{CE} = 10 Vdc)	V _{BE(on)}	—	1.5	Vdc

DYNAMIC CHARACTERISTICS

Current Gain — Bandwidth Product (I _C = 0.2 Adc, V _{CE} = 10 Vdc, f = 2.0 MHz)	f _T	10	—	MHz
Small–Signal Current Gain (I _C = 0.2 Adc, V _{CE} = 10 Vdc, f = 1.0 kHz)	h _{fe}	25	—	—

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

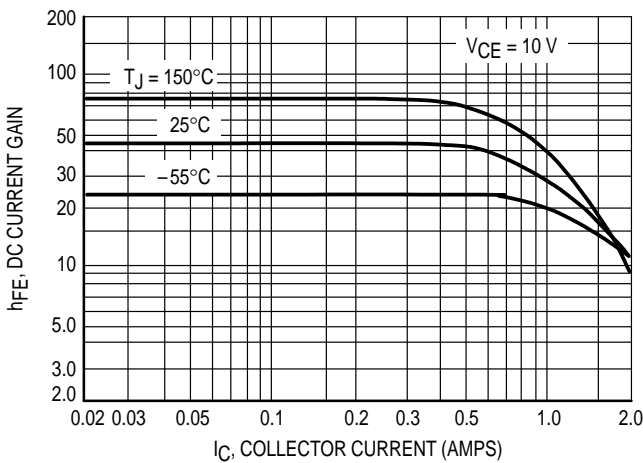


Figure 1. DC Current Gain

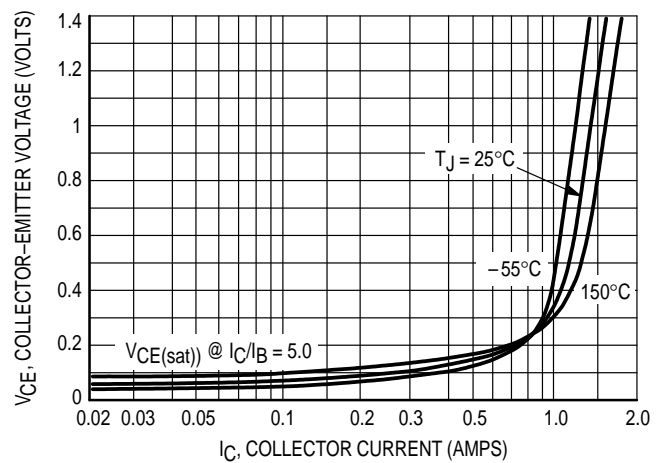


Figure 2. Collector–Emitter Saturation Voltage

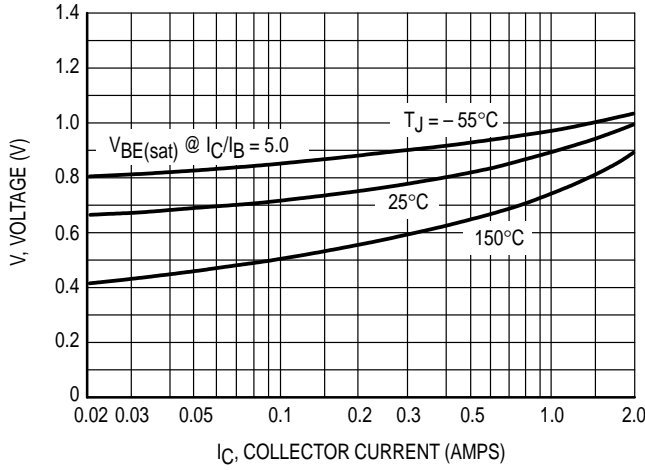


Figure 3. Base-Emitter Voltage

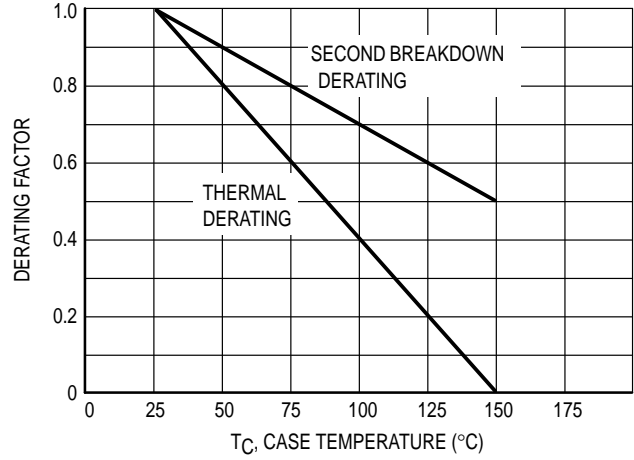


Figure 4. Normalized Power Derating

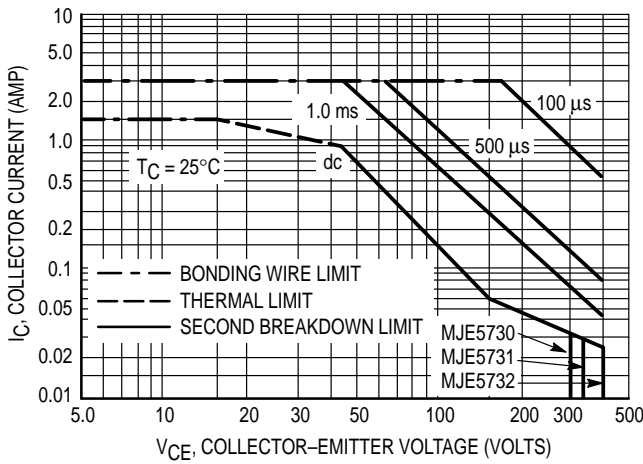


Figure 5. Forward Bias Safe Operating Area

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.

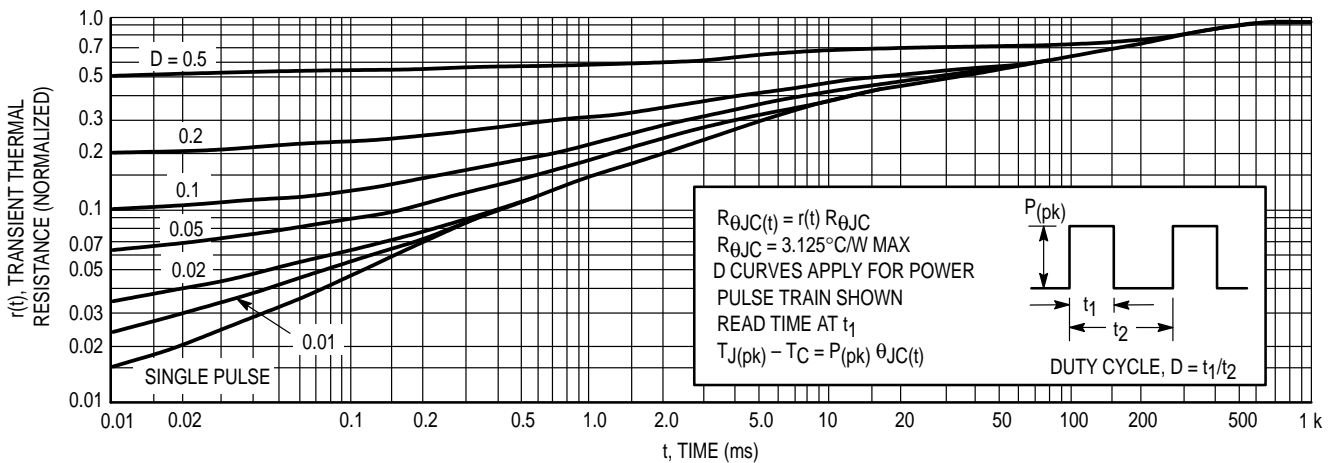


Figure 6. Thermal Response

MJE5730 MJE5731 MJE5731A

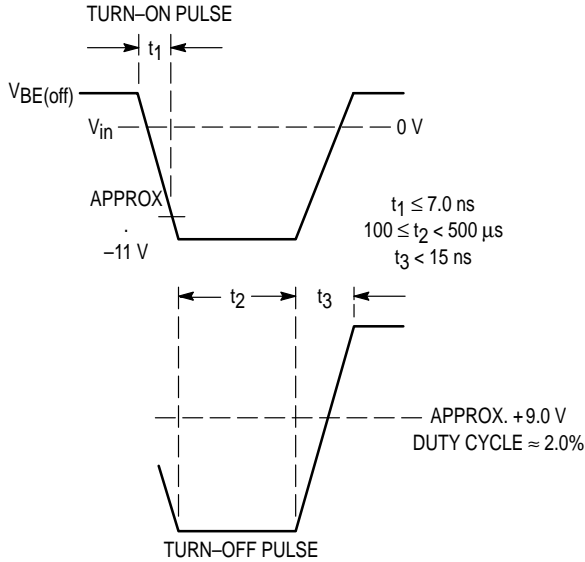


Figure 7. Switching Time Equivalent Circuit

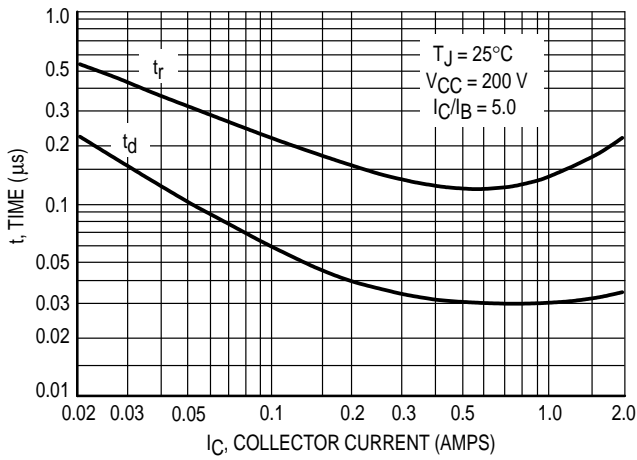


Figure 8. Turn-On Resistive Switching Times

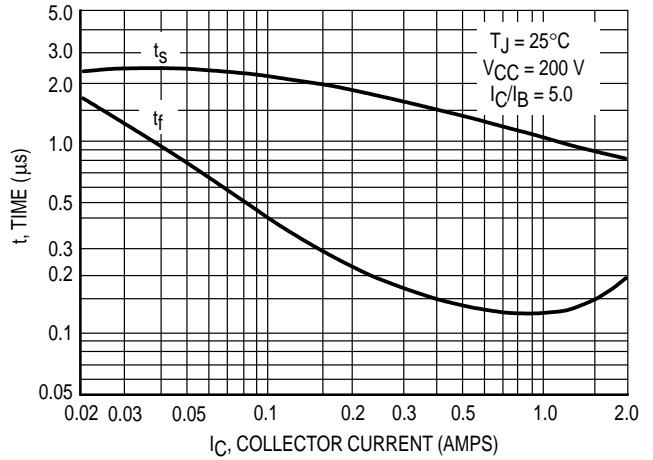


Figure 9. Resistive Turn-Off Switching Times

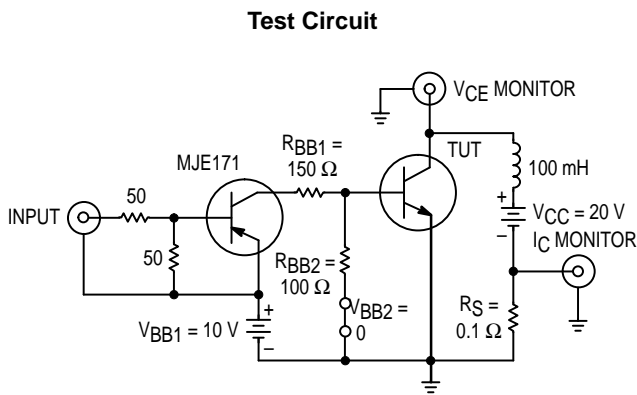
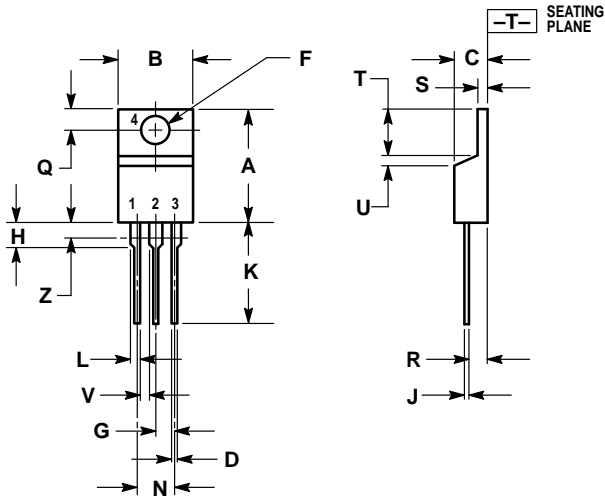


Figure 10. Inductive Load Switching

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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