

Complementary Plastic Silicon Power Transistors

... designed for low power audio amplifier and low current, high speed switching applications.

- Collector-Emitter Sustaining Voltage —
 $V_{CEO(sus)} = 60 \text{ Vdc}$ — MJE171, MJE181
 $= 80 \text{ Vdc}$ — MJE172, MJE182
- DC Current Gain —
 $h_{FE} = 30 \text{ (Min) @ } I_C = 0.5 \text{ Adc}$
 $= 12 \text{ (Min) @ } I_C = 1.5 \text{ Adc}$
- Current-Gain — Bandwidth Product —
 $f_T = 50 \text{ MHz (Min) @ } I_C$
 $= 100 \text{ mAdc}$
- Annular Construction for Low Leakages —
 $I_{CBO} = 100 \text{ nA (Max) @ Rated } V_{CB}$

MAXIMUM RATINGS

Rating	Symbol	MJE171 MJE181	MJE172 MJE182	Unit
Collector-Base Voltage	V_{CB}	80	100	Vdc
Collector-Emitter Voltage	V_{CEO}	60	80	Vdc
Emitter-Base Voltage	V_{EB}	7.0		Vdc
Collector Current — Continuous Peak	I_C	3.0 6.0		Adc
Base Current	I_B	1.0		Adc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 0.012		Watts W/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	12.5 0.1		Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150		$^\circ\text{C}$

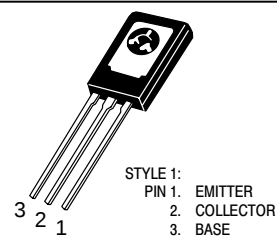
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	10	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	θ_{JA}	83.4	$^\circ\text{C/W}$

PNP
MJE171*
MJE172*
NPN
MJE181*
MJE182*

*ON Semiconductor Preferred Device

**3 AMPERE
 POWER TRANSISTORS
 COMPLEMENTARY
 SILICON
 60-80 VOLTS
 12.5 WATTS**



**CASE 77-09
 TO-225AA**

Preferred devices are ON Semiconductor recommended choices for future use and best overall value.

MJE171 MJE172 MJE181 MJE182

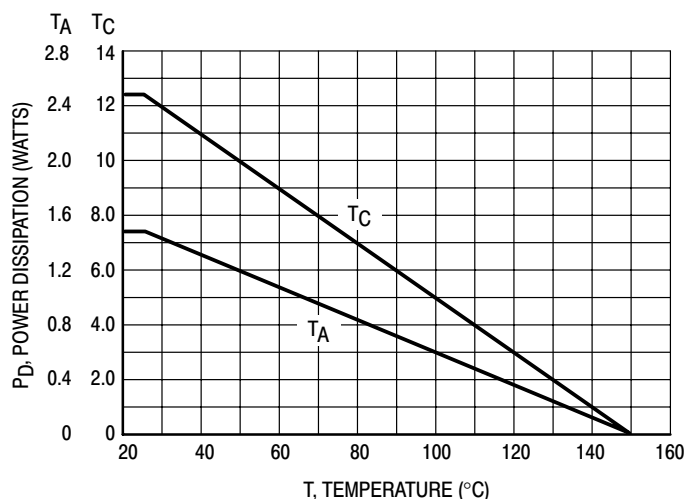


Figure 1. Power Derating

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage ($I_C = 10\text{ mAdc}$, $I_B = 0$)	MJE171, MJE181 MJE172, MJE182	$V_{CEO(sus)}$	60 80	— —	Vdc
Collector Cutoff Current ($V_{CB} = 80\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 100\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 80\text{ Vdc}$, $I_E = 0$, $T_C = 150^\circ\text{C}$) ($V_{CB} = 100\text{ Vdc}$, $I_E = 0$, $T_C = 150^\circ\text{C}$)	MJE171, MJE181 MJE172, MJE182 MJE171, MJE181 MJE172, MJE182	I_{CBO}	— — — —	0.1 0.1 0.1 0.1	μAdc mAdc
Emitter Cutoff Current ($V_{BE} = 7.0\text{ Vdc}$, $I_C = 0$)		I_{EBO}	—	0.1	μAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 100\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 500\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 1.5\text{ Adc}$, $V_{CE} = 1.0\text{ Vdc}$)	h_{FE}	50 30 12	250 — —	—
Collector–Emitter Saturation Voltage ($I_C = 500\text{ mAdc}$, $I_B = 50\text{ mAdc}$) ($I_C = 1.5\text{ Adc}$, $I_B = 150\text{ mAdc}$) ($I_C = 3.0\text{ Adc}$, $I_B = 600\text{ mAdc}$)	$V_{CE(sat)}$	— — —	0.3 0.9 1.7	Vdc
Base–Emitter Saturation Voltage ($I_C = 1.5\text{ Adc}$, $I_B = 150\text{ mAdc}$) ($I_C = 3.0\text{ Adc}$, $I_B = 600\text{ mAdc}$)	$V_{BE(sat)}$	— —	1.5 2.0	Vdc
Base–Emitter On Voltage ($I_C = 500\text{ mAdc}$, $V_{CE} = 1.0\text{ Vdc}$)	$V_{BE(on)}$	—	1.2	Vdc

DYNAMIC CHARACTERISTICS

Current–Gain — Bandwidth Product (1) ($I_C = 100\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $f_{test} = 10\text{ MHz}$)	f_T	50	—	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 0.1\text{ MHz}$)	C_{ob}	— —	60 40	pF

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

MJE171 MJE172 MJE181 MJE182

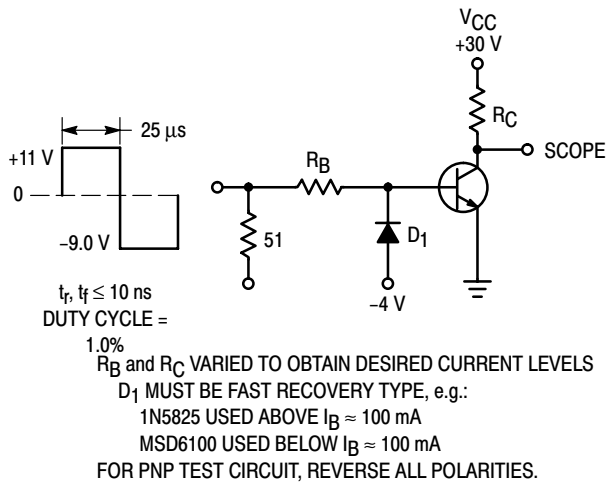


Figure 2. Switching Time Test Circuit

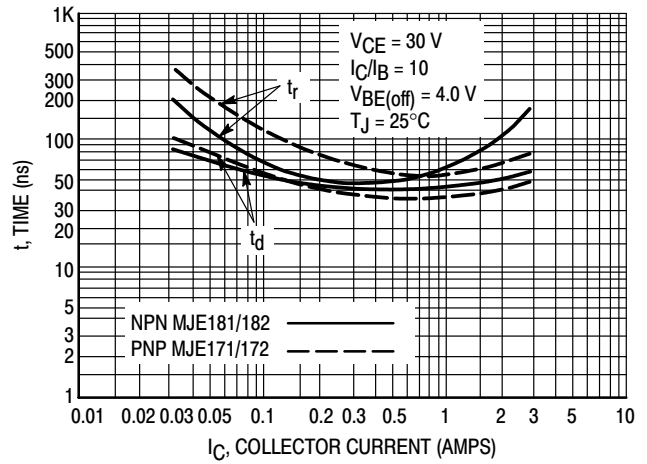


Figure 3. Turn-On Time

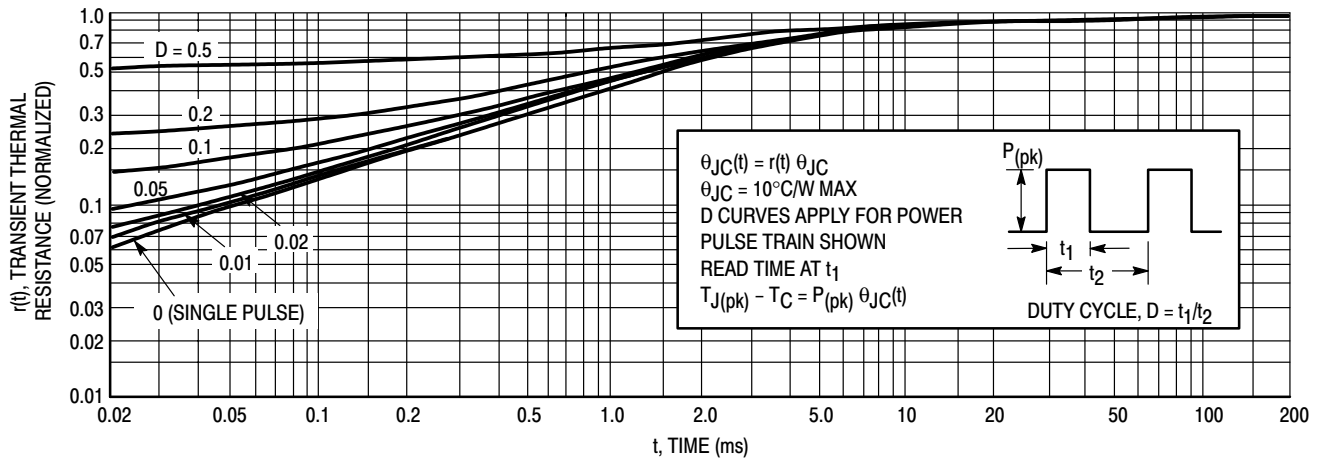


Figure 4. Thermal Response

MJE171 MJE172 MJE181 MJE182

ACTIVE-REGION SAFE OPERATING AREA

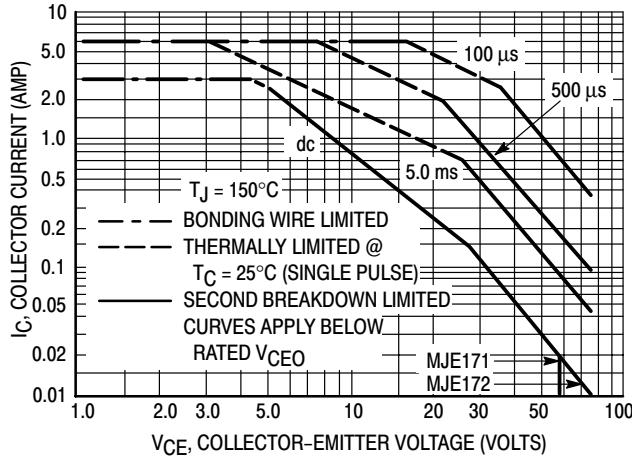


Figure 5. MJE171, MJE172

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 Figures 5 and 6 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown

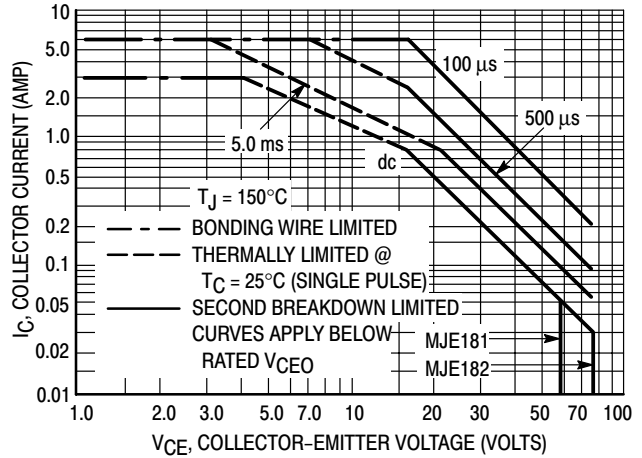


Figure 6. MJE181, MJE182

pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} < 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperature, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

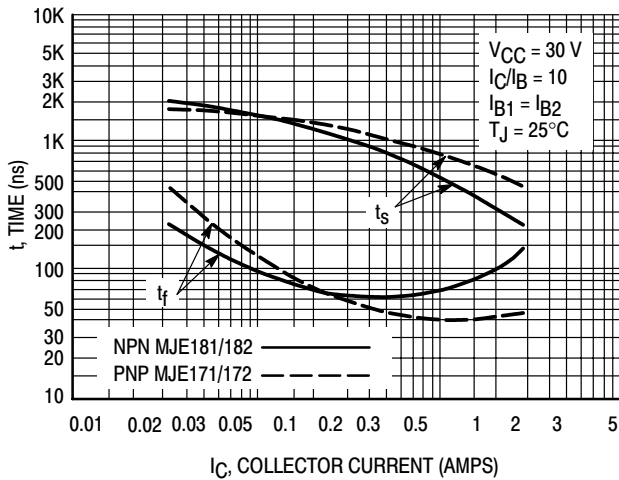


Figure 7. Turn-Off Time

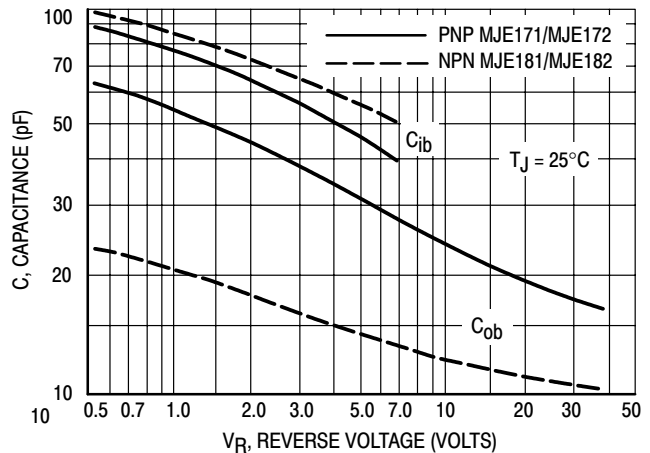
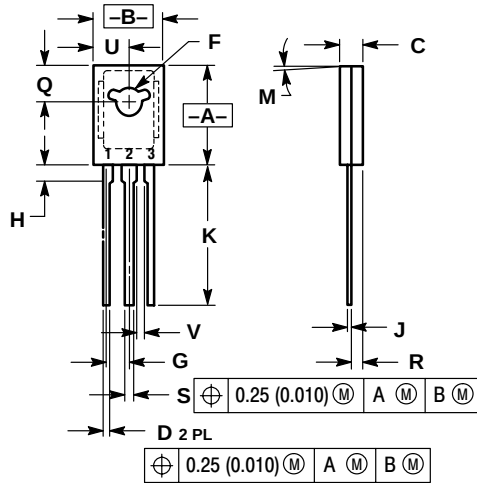


Figure 8. Capacitance

MJE171 MJE172 MJE181 MJE182

PACKAGE DIMENSIONS

TO-225AA
CASE 77-09
ISSUE W



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.425	0.435	10.80	11.04
B	0.295	0.305	7.50	7.74
C	0.095	0.105	2.42	2.66
D	0.020	0.026	0.51	0.66
F	0.115	0.130	2.93	3.30
G	0.094 BSC		2.39 BSC	
H	0.050	0.095	1.27	2.41
J	0.015	0.025	0.39	0.63
K	0.575	0.655	14.61	16.63
M	5° TYP		5° TYP	
Q	0.148	0.158	3.76	4.01
R	0.045	0.065	1.15	1.65
S	0.025	0.035	0.64	0.88
U	0.145	0.155	3.69	3.93
V	0.040	---	1.02	---

STYLE 1:
PIN 1. EMITTER
2. COLLECTOR
3. BASE

Notes

Notes

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