JSMICRO SEMICONDUCTOR

MJE200

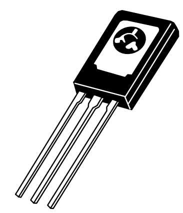
Complementary Silicon Power Plastic Transistors

. . . designed for low voltage, low–power, high–gain audio amplifier applications.

- Collector–Emitter Sustaining Voltage — $V_{CEO(sus)}$ = 25 Vdc (Min) @ I_C = 10 mAdc
- High DC Current Gain — h_{FE} = 70 (Min) @ I_C = 500 mAdc
= 45 (Min) @ I_C = 2.0 Adc
= 10 (Min) @ I_C = 5.0 Adc
- Low Collector–Emitter Saturation Voltage — $V_{CE(sat)}$ = 0.3 Vdc (Max) @ I_C = 500 mAdc
= 0.75 Vdc (Max) @ I_C = 2.0 Adc
- High Current–Gain — Bandwidth Product — f_T = 65 MHz (Min) @ I_C = 100 mAdc
- Annular Construction for Low Leakage — I_{CBO} = 100 nAdc @ Rated V_{CB}

*Motorola Preferred Device

5 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 25 VOLTS 15 WATTS



CASE 77–08 TO–126

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Base Voltage	V_{CB}	40	Vdc
Collector–Emitter Voltage	V_{CEO}	25	Vdc
Emitter–Base Voltage	V_{EB}	8.0	Vdc
Collector Current — Continuous Peak	I_C	5.0 10	Adc
Base Current	I_B	1.0	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	15 0.12	Watts W/°C
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	1.5 0.012	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	8.34	°C/W
Thermal Resistance, Junction to Ambient	θ_{JA}	83.4	°C/W

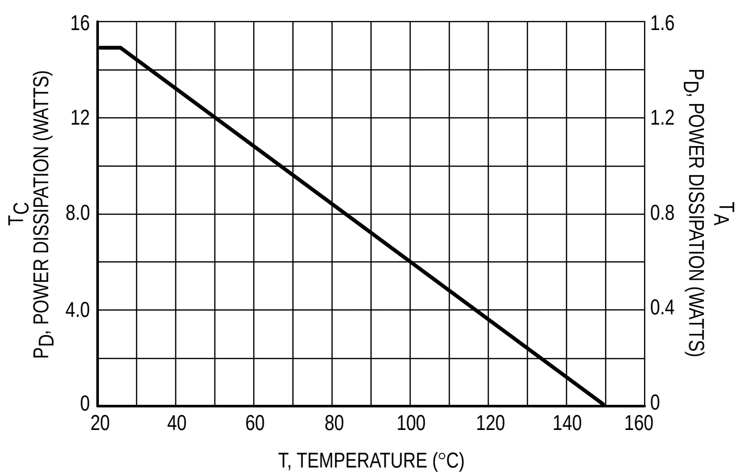


Figure 1. Power Derating

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Sustaining Voltage (1) (I_C = 10 mAdc, I_B = 0)		$V_{CEO(sus)}$	25	—	Vdc
Collector Cutoff Current		I_{CBO}			
(V_{CB} = 40 Vdc, I_E = 0)			—	100	nAdc
(V_{CB} = 40 Vdc, I_E = 0, T_J = 125°C)			—	100	μAdc
Emitter Cutoff Current (V_{BE} = 8.0 Vdc, I_C = 0)		I_{EBO}	—	100	nAdc
ON CHARACTERISTICS					
DC Current Gain (1)		h_{FE}			—
(I_C = 500 mAdc, V_{CE} = 1.0 Vdc)			70	—	
(I_C = 2.0 Adc, V_{CE} = 1.0 Vdc)			45	180	
(I_C = 5.0 Adc, V_{CE} = 2.0 Vdc)			10	—	
Collector–Emitter Saturation Voltage (1)		$V_{CE(sat)}$			Vdc
(I_C = 500 mAdc, I_B = 50 mAdc)			—	0.3	
(I_C = 2.0 Adc, I_B = 200 mAdc)			—	0.75	
(I_C = 5.0 Adc, I_B = 1.0 Adc)			—	1.8	
Base–Emitter Saturation Voltage (1) (I_C = 5.0 Adc, I_B = 1.0 Adc)		$V_{BE(sat)}$	—	2.5	Vdc
Base–Emitter On Voltage (1) (I_C = 2.0 Adc, V_{CE} = 1.0 Vdc)		$V_{BE(on)}$	—	1.6	Vdc
DYNAMIC CHARACTERISTICS					
Current–Gain — Bandwidth Product (2) (I_C = 100 mAdc, V_{CE} = 10 Vdc, f_{test} = 10 MHz)		f_T	65	—	MHz
Output Capacitance		C_{ob}			pF
(V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz)	MJE200		—	80	
	MJE210		—	120	

(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle ≈ 2.0%.
(2) $f_T = |h_{fe}| \bullet f_{test}$.

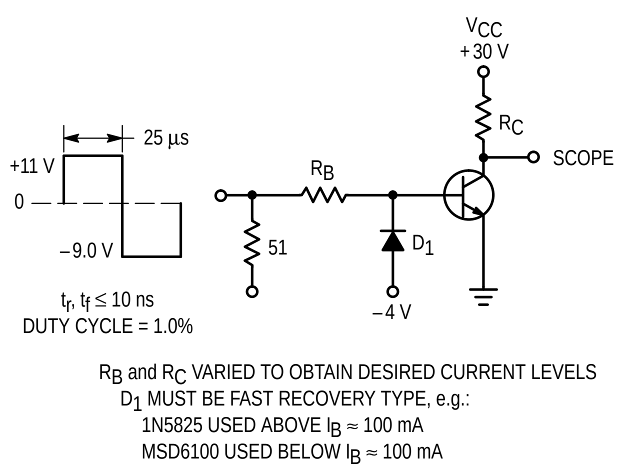


Figure 2. Switching Time Test Circuit

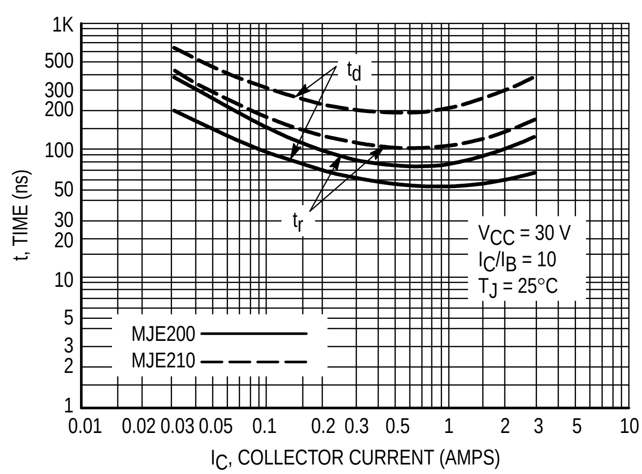


Figure 3. Turn–On Time

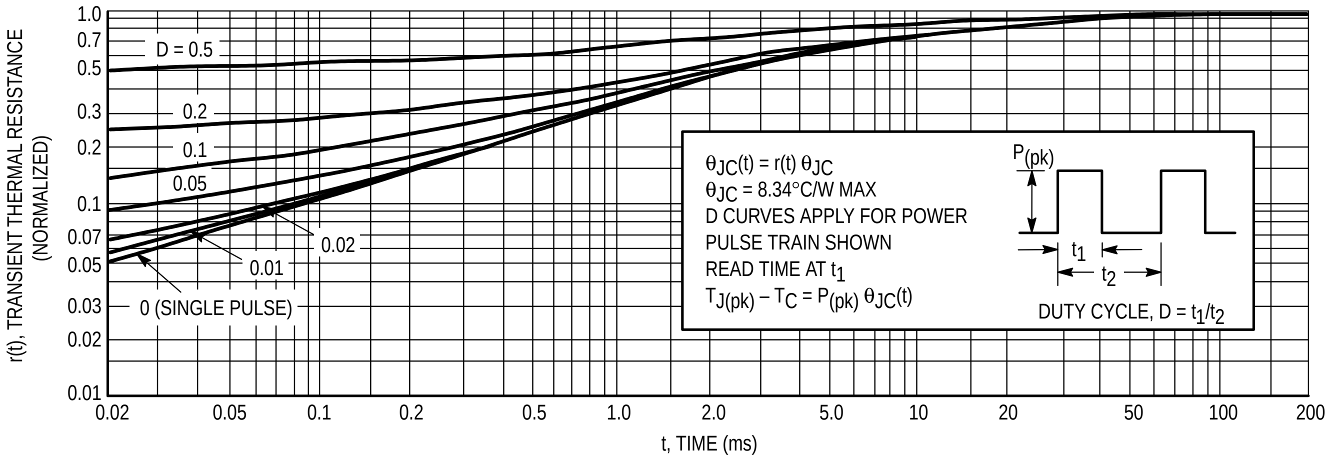


Figure 4. Thermal Response

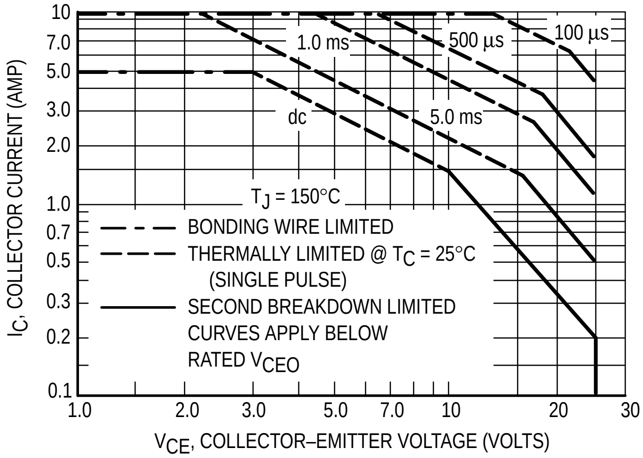


Figure 5. Active Region Safe Operating Area

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 5 is based on $T_{J(pk)}$ = 150°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)}$ ≤ 150°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.

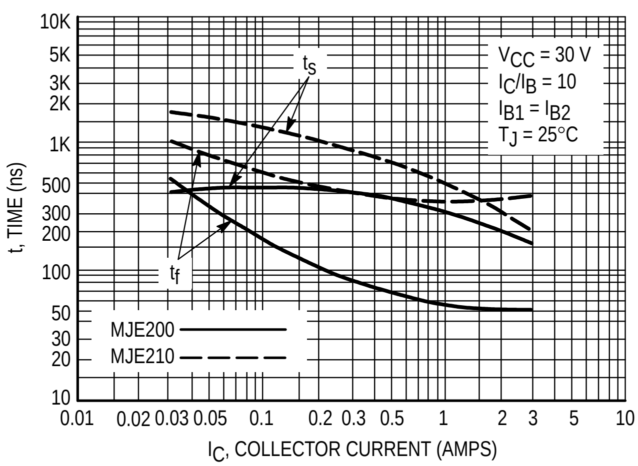


Figure 6. Turn–Off Time

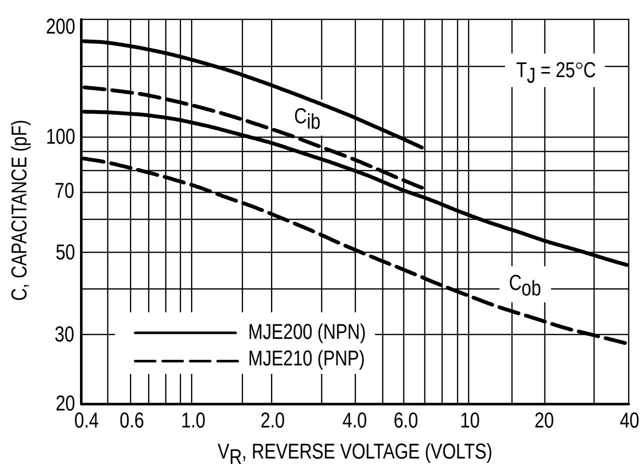


Figure 7. Capacitance

NPN
MJE200

PNP
MJE210

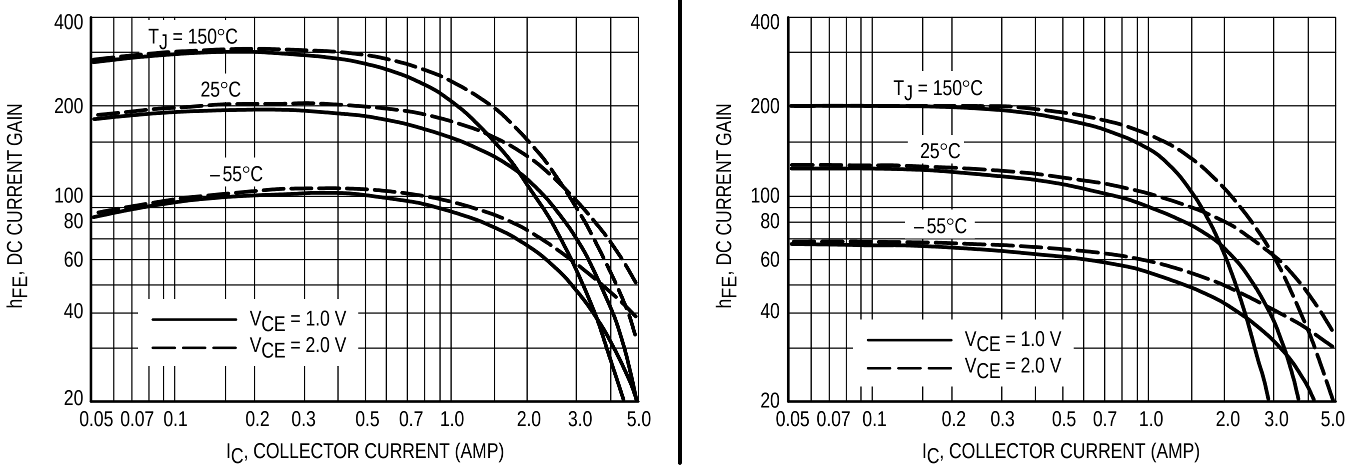


Figure 8. DC Current Gain

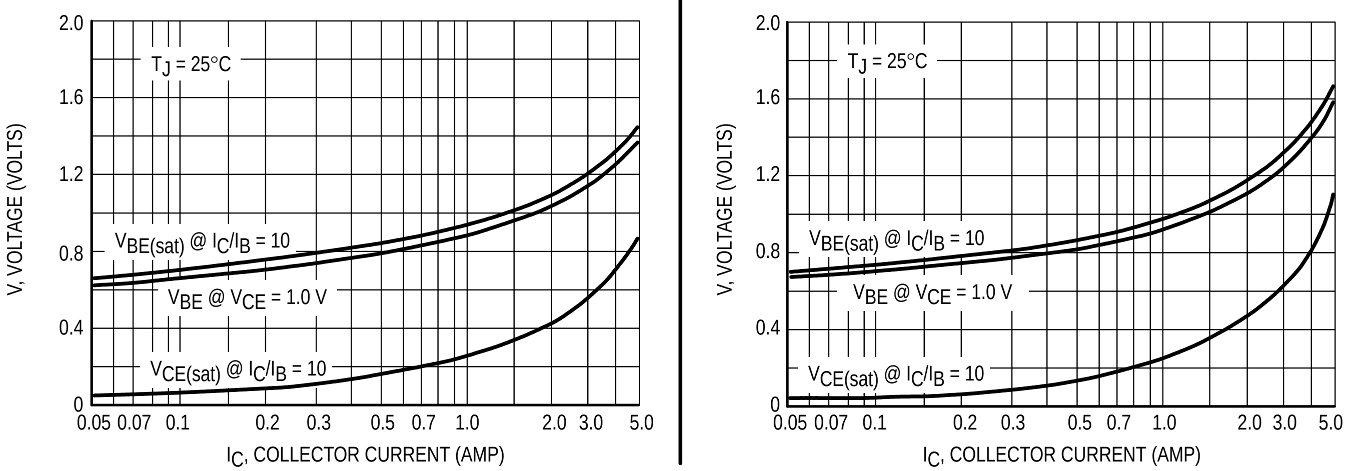


Figure 9. “On” Voltage

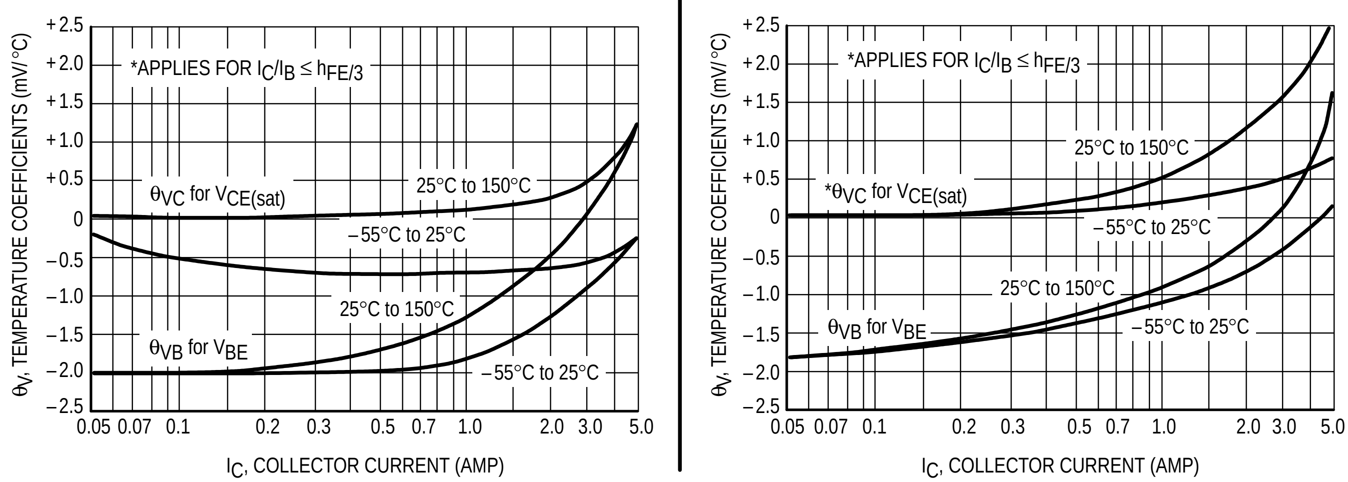
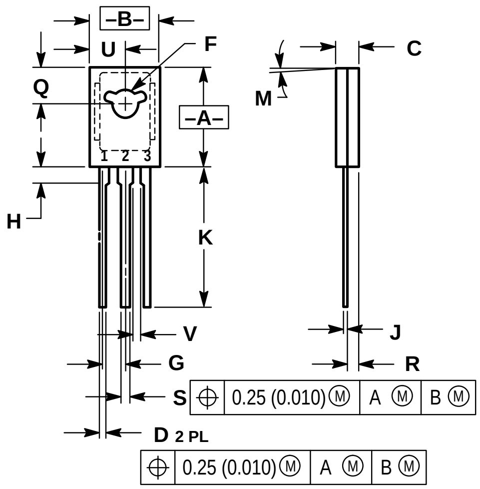


Figure 10. Temperature Coefficients



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	0.055	1.15	1.39
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

CASE 77–08
TO–126AA
ISSUE V