MJE200 – NPN,   MJE210 – PNP

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

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

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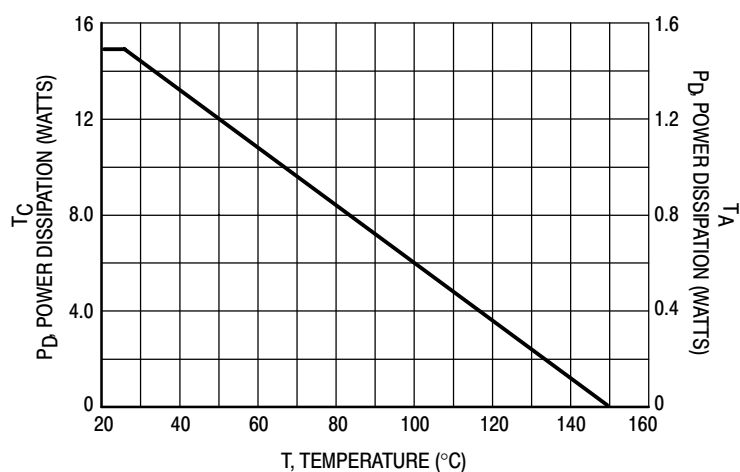
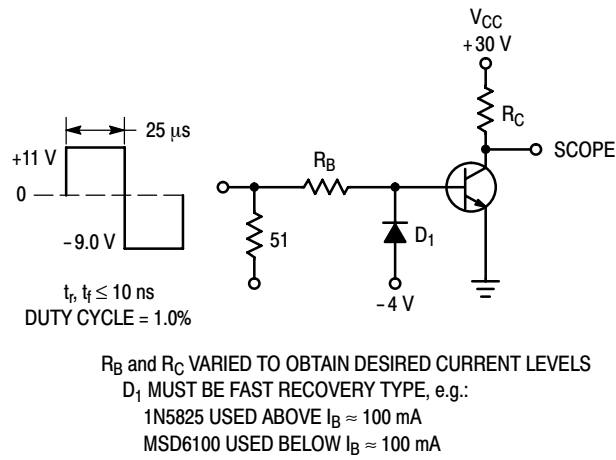**Figure 1. Power Derating**

MJE200 – NPN,   MJE210 – PNP

t_r, $t_f \leq 10$ ns
DUTY CYCLE = 1.0%

R_B and R_C VARIED TO OBTAIN DESIRED CURRENT LEVELS
D_1 MUST BE FAST RECOVERY TYPE, e.g.:
1N5825 USED ABOVE $I_B \approx 100$ mA
MSD6100 USED BELOW $I_B \approx 100$ mA

Figure 2. Switching Time Test Circuit

$V_{CC} = 30$ V
$I_C/I_B = 10$
$T_J = 25°C$
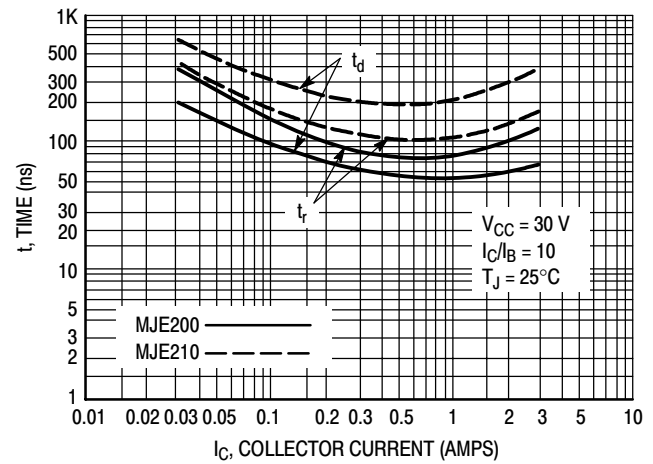
MJE200 ———
MJE210 – – –

Figure 3. Turn–On Time

$\theta_{JC}(t) = r(t)\ \theta_{JC}$
$\theta_{JC} = 8.34°C/W$ MAX
D CURVES APPLY FOR POWER
PULSE TRAIN SHOWN
READ TIME AT t_1
$T_{J(pk)} - T_C = P_{(pk)}\ \theta_{JC}(t)$

DUTY CYCLE, D = t_1/t_2
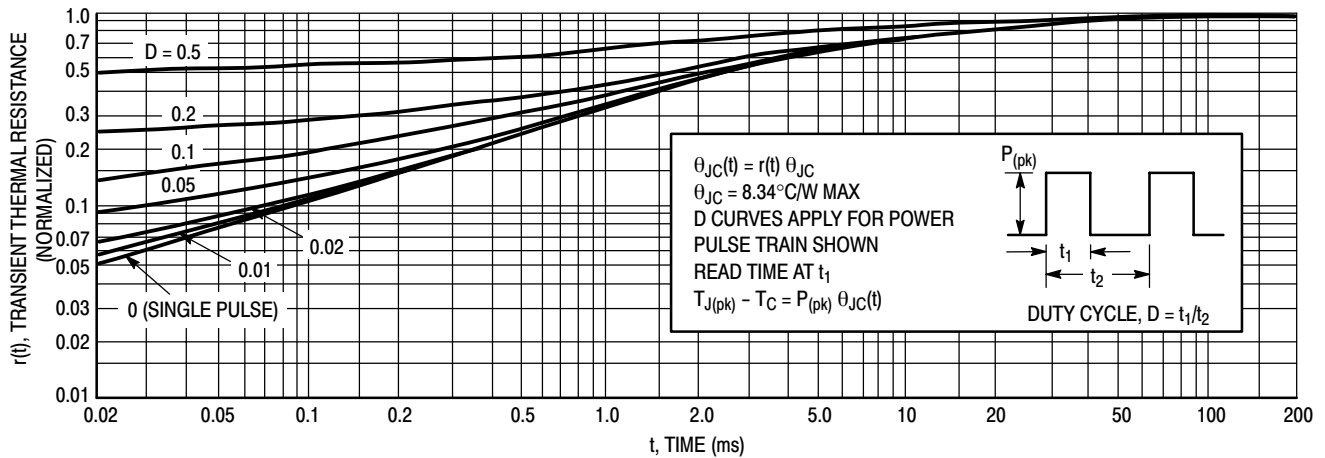
Figure 4. Thermal Response

MJE200 – NPN,   MJE210 – PNP
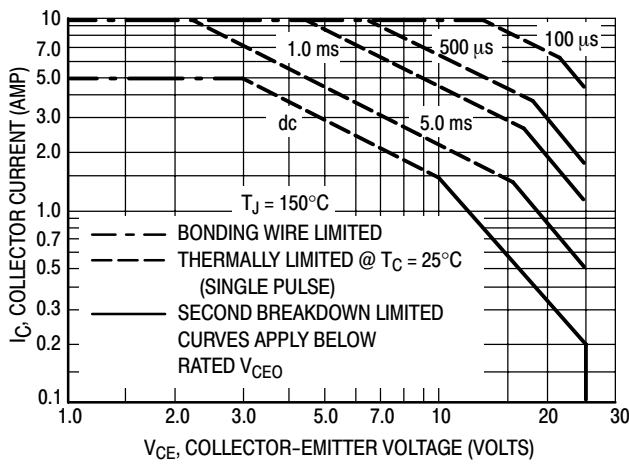
Figure 5. Active Region Safe Operating Area

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 $T_{J(pk)} \leq 150°C$. $T_{J(pk)}$ 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

MJE200 – NPN, MJE210 – PNP

NPN
MJE200

PNP
MJE210
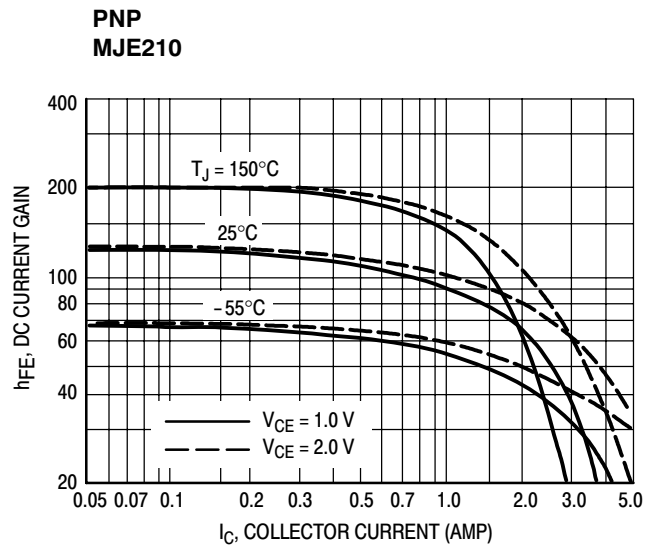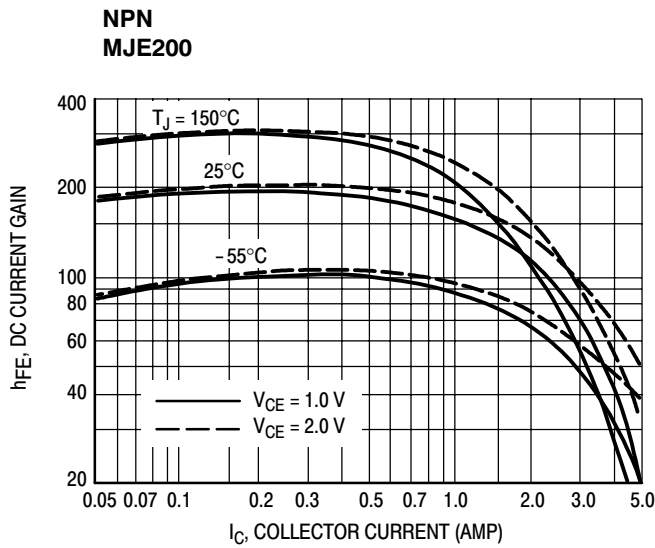
Figure 8. DC Current Gain
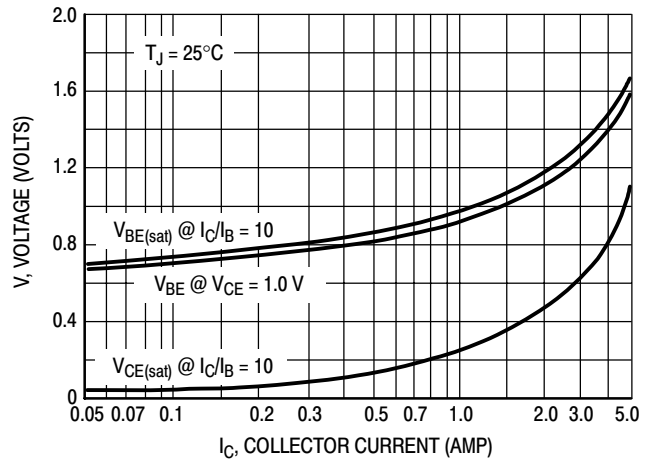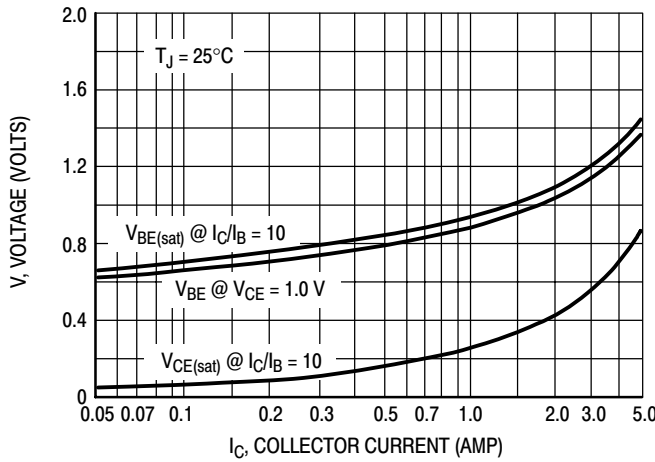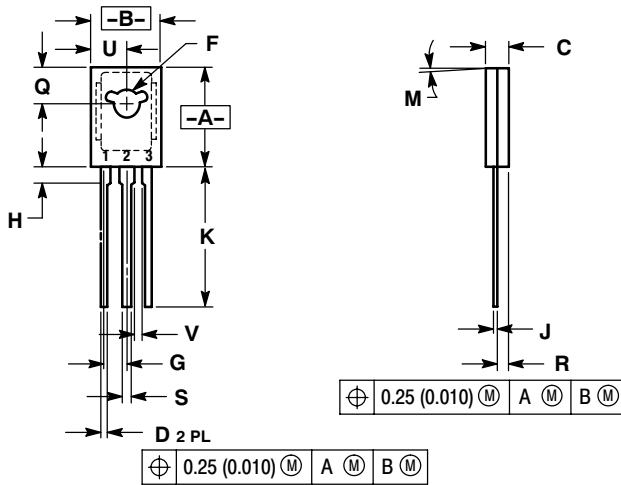

Figure 9. "On" Voltage
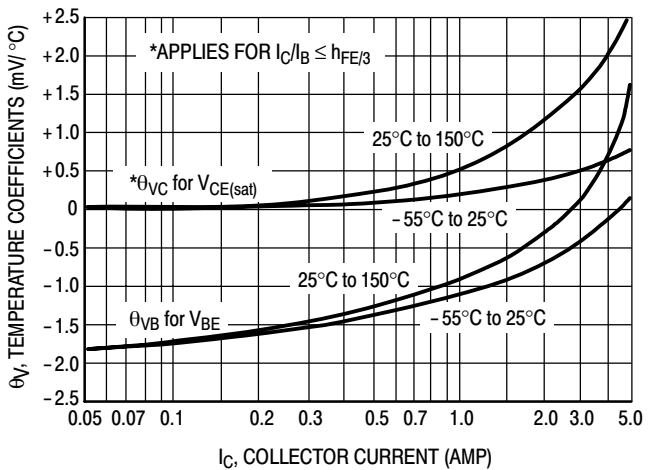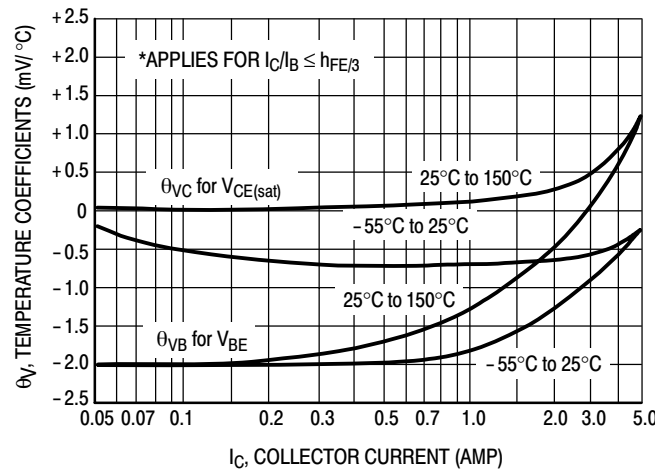
Figure 10. Temperature Coefficients

MJE200 – NPN,   MJE210 – PNP

PACKAGE DIMENSIONS

TO–225
CASE 77–09
ISSUE Z

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 077–01 THRU –08 OBSOLETE, NEW STANDARD 077–09.

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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

MJE200/D