

ALPHANUMERIC INDEX — CROSS-REFERENCE (Continued)

Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number	Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number
MJE3738		TIP47	3-1087	MJE5655		TIP47	3-1087
MJE3739		TIP48	3-1087	MJE5656		TIP48	3-1087
MJE41		TIP41	3-1083	MJE5657		TIP49	3-1087
MJE41A		TIP41A	3-1083	MJE5730		MJE5850	3-918
MJE41B		TIP41B	3-1083	MJE5731		MJE5851	3-918
MJE41C		TIP41C	3-1083	MJE5732		MJE5852	3-918
MJE42		TIP42	3-1083	MJE5740	MJE5740		3-914
MJE42A		TIP42A	3-1083	MJE5741	MJE5741		3-914
MJE42B		TIP42B	3-1083	MJE5742	MJE5742		3-914
MJE42C		TIP42C	3-1083	MJE5850	MJE5850		3-918
MJE4340	MJE4340		3-910	MJE5851	MJE5851		3-918
MJE4341	MJE4341		3-910	MJE5852	MJE5852		3-918
MJE4342	MJE4342		3-910	MJE5960		2N6489	3-207
MJE4343	MJE4343		3-910	MJE5974		TIP42	3-1083
MJE4350	MJE4350		3-910	MJE5975		TIP42A	3-1083
MJE4351	MJE4351		3-910	MJE5976		TIP42B	3-1083
MJE4352	MJE4352		3-910	MJE5977		TIP41	3-1083
MJE4353	MJE4353		3-910	MJE5978		TIP41A	3-1083
MJE47		TIP47	3-1087	MJE5979		TIP41B	3-1083
MJE48		TIP48	3-1087	MJE5980		2N6489	3-207
MJE482		2N5190	3-85	MJE5981		2N6490	3-207
MJE483		2N5191	3-85	MJE5982		2N6491	3-207
MJE484		2N5192	3-85	MJE5983		2N6486	3-207
MJE488		2N5191	3-85	MJE5984		2N6487	3-207
MJE49		TIP49	3-1087	MJE5985		2N6488	3-207
MJE4918		TIP30	3-1071	MJE6040	MJE6040		3-139
MJE4919		TIP30A	3-1071	MJE6041	MJE6041		3-139
MJE492		2N5193	3-89	MJE6042		MJE6041	3-139
MJE4920		TIP30B	3-1071	MJE6043	MJE6043		3-139
MJE4921		TIP29	3-1071	MJE6044	MJE6044		3-139
MJE4922		TIP29A	3-1071	MJE6045	MJE6045		3-139
MJE4923		TIP29B	3-1071	MJE700	MJE700		3-888
MJE493		2N5194	3-89	MJE700T	MJE700T		3-888
MJE494		2N5195	3-89	MJE701	MJE701		3-888
MJE51		2N6497	3-211	MJE701T		TIP125	3-1098
MJE5170		MJE15031	3-972	MJE702	MJE702		3-888
MJE5171		MJE15031	3-972	MJE702T		TIP126	3-1098
MJE5172		MJE15031	3-972	MJE703	MJE703		3-888
MJE5180		MJE15030	3-972	MJE703T		TIP126	3-1098
MJE5181		MJE15030	3-972	MJE710		2N4918	3-75
MJE5182		MJE15030	3-972	MJE711		2N4919	3-75
MJE5190		2N6121	3-154	MJE712		2N4920	3-75
MJE5191		2N6122	3-154	MJE720		2N4921	3-79
MJE5192		2N6123	3-154	MJE721		2N4923	3-79
MJE5193		2N6124	3-154	MJE722		2N4923	3-79
MJE5194		2N6125	3-154	MJE800	MJE800		3-888
MJE5195		TIP32C	3-1073	MJE800T	MJE800T		3-888
MJE51T		2N6497	3-211	MJE801	MJE801		3-888
MJE52		2N6498	3-211	MJE801T		TIP120	3-1098
MJE520	MJE520		3-886	MJE802	MJE802		3-888
MJE520K		TIP31	3-1073	MJE802T		TIP121	3-1098
MJE521	MJE521		—	MJE803	MJE803		3-888
MJE521K		TIP31	3-1073	MJE803T		TIP121	3-1098
MJE5220	MJE5221		—	MJE8500	MJE8500		3-924
MJE5221	MJE5221		—	MJE8501	MJE8501		3-924
MJE5230	MJE5230		—	MJE8502	MJE8502		3-930
MJE5231	MJE5231		—	MJE8503	MJE8503		3-930
MJE52T		2N6498	3-211	MJF102	MJF102		3-1011
MJE53		MJE13005	3-944	MJF107	MJF107		3-1011
MJE53T		MJE13005	3-944	MJF122	MJF122		3-1016

*Consult Motorola if a direct replacement is necessary.

TABLE 7 — PLASTIC TO-225 Type (continued)

I _C Cont Amps Max	V _{CEO(sus)} Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	Resistive Switching			f _T MHz Min	P _D (Case) Watts @ 25°C
		NPN	PNP			t _s μs Max	t _f μs Max	@ I _C Amp		
3	45		BD176 BD176.6 BD176.10 BD176.16	40/250 40/100 63/160 100/250	0.15 0.15 0.15 0.15				3 3 3 3	30 30 30 30
		MJE181	MJE171	50/250	0.1	0.6 typ	0.12 typ	0.1	50	12.5
		BD179 BD179.6 BD179.10 BD179.16 MJE182	BD180 BD180.6 BD180.10 BD180.16 MJE172	40/250 40/100 63/160 100/250 50/250	0.15 0.15 0.15 0.15 0.1				3 3 3 3 50	30 30 30 30 12.5
		BUY49P		30 min	0.5				25	20
	200									
4	30	BD185		15 min	2				20	40
	40	2N5190 MJE521 2N6037##	2N5193 MJE371 2N6034##	25/100 40 min 750/18k	1.5 1 2	0.4 typ 1.7 typ	0.4 typ 1.2 typ	1.5 2	2 25	40 40 40
		BD437 BD675## BD675A## BD785	BD438 BD676## BD676A## BD786 BD776##	40 min 750 min 750 min 20 min 750 min	2 1.5 2 2 2				3 50 20	36 40 40 15 15
	60	BD189		15 min	2				20	40
		BD677## BD677A## BD787 BD777## 2N5191 MJE800## MJE801## 2N6038##	BD440 BD678## BD678A## BD788 BD778## 2N5194 MJE700## MJE701## 2N6035##	25 min 750 min 750 min 20 min 750 min 25/100 750 min 750 min 750/18k	2 1.5 2 2 2 1.5 1.5 2 2				3 50 20 2 1# 1# 25	36 40 40 15 15 40 40 40
						0.4 typ	0.4 typ	1.5		
						1.7 typ	1.2 typ	2		
	80	2N5192 BD441 BD679## BD679A## BD789 BD779## MJE240 MJE241 MJE802## MJE803## 2N6039##	2N5195 BD442 BD680## BD680A## BD790 BD780## MJE250 MJE251 MJE702## MJE703## 2N6036##	25/100 15 min 750 min 750 min 10 min 750 min 40/200 40/120 750 min 750 min 750/18k	1.5 2 1.5 2 2 2 0.2 0.2 1.5 2 2	0.4 typ 0.15 typ 0.15 typ 1.7 typ	0.4 typ 0.07 typ 0.07 typ 1.2 typ	1.5 2 2 2	2 3 40 20 40 40 1# 1# 25	40 36 40 40 15 15 15 15 40 40 40
	100	BD681## BD791 MJE243 MJE244	BD682## BD792 MJE253 MJE254	750 min 10 min 40/120 25 min	1.5 2 0.2 0.2				40 40 40 40	40 15 15 15
5	25	MJE200	MJE210	45/180	2	0.13 typ	0.035 typ	2	65	15

● Case 77 (Style 3), # |h_{FE}| @ 1 MHz, ## Darlington

TABLE 12 — POWER DARLINGTONS (continued)

I _C Cont Amps Max	V _{CEO} (sus) Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	Resistive Switching			h _{FE} @ 1 MHz Min	P _D (Case) Watts @ 25°C	Case JEDEC/MOT
		NPN	PNP			t _s μs Max	t _f μs Max	@ I _C Amp			
4	40	MJE3300 2N6037	MJE3310 2N6034	1k min 750/1k	1 2				20 25	15 40	TO-225AA/77R TO-225AA/77
		BD675 BD675A	BD676 BD676A BD776	750 min 750 min 750 min	1.5 2 2					40 40 15	TO-225AA/77 TO-225AA/77 TO-225AA/77
	60	BD677 BD677A BD777	BD678 BD678A BD778	750 min 750 min 750 min	1.5 2 2					15 40 40	TO-225AA/77 TO-225AA/77 TO-225AA/77
		MJE3301 MJE800 MJE800T	MJE700 MJE700T	1k min 750 min 750 min	1 1.5 1.5				20 20 1	15 40 40	TO-225AA/77R TO-225AA/77 TO-225AA/77
		MJE801 2N6038 2N6294	MJE701 2N6035 2N6296	750 min 750/18k 750/18k	2 2 2	1.7 typ 0.9 typ	1.2 typ 0.7 typ	2 2	1 25 4	40 40 50	TO-225AA/77 TO-225AA/77 TO-213AA/80
		BD679 BD679A BD779	BD680 BD680A BD780	750 min 750 min 750 min	1.5 2 2					40 40 15	TO-225AA/77 TO-225AA/77 TO-225AA/77
		MJD6039 MJE802 MJE803	MJD6036 MJE702 MJE703	1k/12k 750 min 750 min	2 1.5 2	1.7 typ 1.7 typ	1.2 typ 1.2 typ	2 2	20 25 4	15 20 40	TO-252/369A-04 TO-225AA/77 TO-225AA/77
		2N6039 2N6295	2N6036 2N6297	750/18k 750/18k	2 2	0.9 typ 0.7 typ	0.7 typ 0.7 typ	2 2	25 4	40 50	TO-225AA/77 TO-213AA/80
	100	BD681	BD682	750 min	1.5					40	TO-225AA/77
5	60	MJE1100 MJE1101 TIP120	MJE1090 MJE1091 TIP125	750 min 750 min 1k min	3A 4A 3				1 1 4	70 70 65	TO-225AB/90 TO-225AB/90 TO-220/221A
		MJE1102 MJE1103 TIP121	MJE1092 MJE1102 TIP126	750 min 750 min 1k min	3A 4A 3	1.5 typ 1.5 typ	1.5 typ 1.5 typ	3 3	1 1 4	70 70 65	TO-225AB/90 TO-225AB/90 TO-220/221A
	100	MJF122 TIP122	MJF127 TIP127	2k min 1k min	3 3	1.5 typ 1.5 typ	1.5 typ 1.5 typ	3 3	4 4	28 65	—/221C-02 TO-220/221A
7	300	MJ3041		250 min	2.5					100	TO-204/1
	350	MJ3042		250 min	2.5					100	TO-204/1
	375	BU522		250 min	2.5				7.5	75	TO-220/221A
	425	BU522A		250 min	2.5				7.5	75	TO-220/221A
	450	BU522B		250 min	2.5				7.5	75	TO-220/221A
8	40	2N6386		1k/20k	3				20	65	TO-220/221A
	45	BDX53 BD895 BD895A	BDX54 BD896 BD896A	750 min 750 min 750 min	3 3 4				4 1 1	60 70 70	TO-220/221A TO-220/221A TO-220/221A
		BDX53A BD897 BD897A	BDX54A BD898 BD898A	750 min 750 min 750 min	3 3 4				4 1 1	60 70 70	TO-220/221A TO-220/221A TO-220/221A
		MJ1000 TIP100 2N6043	MJ900 TIP105 2N6040	1k min 1k/20k 1k/10k	3 3 4	1.5 typ 1.5 typ	1.5 typ 1.5 typ	3 3	4 4 4	90 80 75	TO-204/1 TO-220/221A TO-220/221A
	60	2N6300 2N6055 MJE6043	2N6298 2N6053 MJE6040	750k/18k 750k/18k 1k/20k	4 4 4	1.5 typ 1.5 typ 1.5 typ	1.5 typ 1.5 typ 1.5 typ	4 4 4	4 4 2	75 100 75	TO-213AA/80 TO-204/1 TO-225AB/90
		BDX53B BD899 BD899A	BDX54B BD900 BD900A	750 min 750 min 750 min	3 3 4				4 1 1	60 70 70	TO-220/221A TO-220/221A TO-220/221A
	80										
	100										

(continued)

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

PNP
MJE700,T
thru
MJE703

NPN
MJE800,T
thru
MJE803

PLASTIC DARLINGTON COMPLEMENTARY SILICON POWER TRANSISTORS

... designed for general-purpose amplifier and low-speed switching applications.

- High DC Current Gain —
 $h_{FE} = 2000$ (Typ) @ $I_C = 2.0$ Adc
- Monolithic Construction with Built-in Base-Emitter Resistors to Limit Leakage Multiplication
- Choice of Packages —
MJE700 and MJE800 series
TO220AB, MJE700T and MJE800T

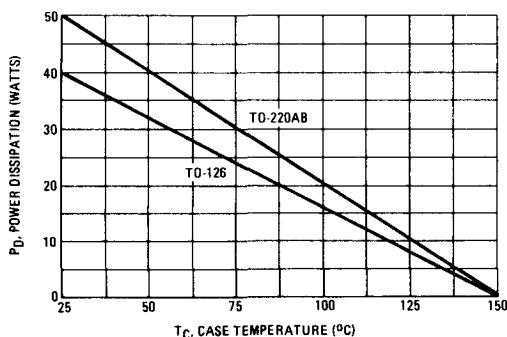
MAXIMUM RATINGS

Rating	Symbol	MJE700, T MJE701 MJE800, T MJE801	MJE702 MJE703 MJE802 MJE803	Unit
Collector-Emitter Voltage	V _{CEO}	60	80	V _{dc}
Collector-Base Voltage	V _{CB}	60	80	V _{dc}
Emitter-Base Voltage	V _{EB}	5.0		V _{dc}
Collector Current	I _C	4.0		A _{dc}
Base Current	I _B	0.1		A _{dc}
Total Power Dissipation @ T _C = 25°C Derate above 25°C	P _D	CASE 77	TO-220	Watts W/°C
		40	50	
		0.32	0.40	
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-55 to +150		°C

THERMAL CHARACTERISTICS

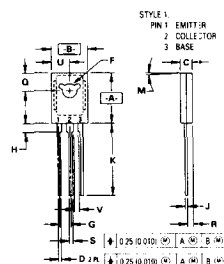
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case CASE 77	$R_{\theta JC}$	3.13	$^\circ\text{C/W}$
TO-220		2.50	

FIGURE 1 — POWER DERATING



4.0 AMPERE DARLINGTON POWER TRANSISTORS COMPLEMENTARY SILICON

40 WATT
50 WATT

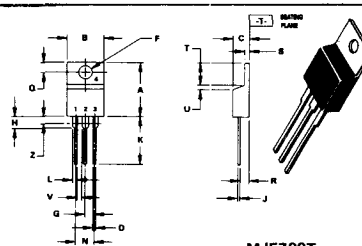


MJE700-703
MJE800-803

	MILLIMETERS			INCHES		
DIM	MIN	MAX	MIN	MAX	MIN	MAX
A	12.92	13.04	0.425	0.430		
B	7.50	7.74	0.295	0.305		
C	2.42	2.66	0.095	0.105		
D	0.51	0.66	0.020	0.025		
E	2.82	3.17	0.115	0.125		
F	2.39	BSC	0.094	BSC		
G	1.27	2.41	0.050	0.095		
H	0.39	0.63	0.015	0.025		
J	14.61	19.63	0.575	0.655		
K	3.75	4.01	0.148	0.158		
L	1.15	1.39	0.045	0.055		
M	0.94	0.98	0.037	0.039		
N	3.69	3.93	0.145	0.155		
P	1.02	—	0.040	—		

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

CASE 77-06
TO-225AA TYPE



MJE700T
MJE800T

	MILLIMETERS			INCHES		
DIM	MIN	MAX	MIN	MAX	MIN	MAX
A	14.48	15.75	0.570	0.620		
B	5.65	10.20	0.220	0.400		
C	4.07	4.82	0.160	0.190		
D	0.94	0.98	0.037	0.039		
E	3.61	3.72	0.142	0.147		
F	2.42	2.60	0.095	0.105		
G	2.80	3.80	0.110	0.150		
H	0.46	0.71	0.018	0.028		
J	12.70	14.27	0.500	0.562		
K	1.15	1.39	0.045	0.055		
L	4.83	5.30	0.190	0.210		
M	2.24	2.66	0.088	0.105		
N	3.66	4.25	0.144	0.167		
P	1.15	1.39	0.045	0.055		
Q	0.97	0.97	0.038	0.038		
R	0.92	1.24	0.036	0.049		
S	1.15	—	0.045	—		
T	—	2.26	—	0.090		

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM J DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

CASE 221A-04
TO-220AB

PNP MJE700,T thru MJE703

NPN MJE800,T thru MJE803

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (1) (I _C = 50 mAdc, I _B = 0)	MJE700,T MJE701, MJE800,T MJE801 MJE702, MJE703, MJE802, MJE803	V _{(BR)CEO}	60 80	-- -- Vdc
Collector Cutoff Current (V _{CE} = 60 Vdc, I _B = 0) (V _{CE} = 80 Vdc, I _B = 0)	MJE700,T MJE701, MJE800,T, MJE801 MJE702, MJE703, MJE802, MJE803	I _{CEO}	-- --	100 100 μAdc
Collector Cutoff Current (V _{CB} = Rated BV _{CEO} , I _E = 0) (V _{CB} = Rated BV _{CEO} , I _E = 0, T _C = 100°C)		I _{CBO}	-- --	100 500 μAdc
Emitter Cutoff Current (V _{BE} = 5.0 Vdc, I _C = 0)		I _{EBO}	--	2.0 mAdc
ON CHARACTERISTICS				
DC Current Gain (1) (I _C = 1.5 Adc, V _{CE} = 3.0 Vdc) (I _C = 2.0 Adc, V _{CE} = 3.0 Vdc) (I _C = 4.0 Adc, V _{CE} = 3.0 Vdc)	MJE700,T MJE702, MJE800,T MJE802 MJE701, MJE703, MJE801, MJE803 All devices	h _{FE}	750 750 100	-- -- --
Collector-Emitter Saturation Voltage (1) (I _C = 1.5 Adc, I _B = 30 mAdc) (I _C = 2.0 Adc, I _B = 40 mAdc) (I _C = 4.0 Adc, I _B = 40 mAdc)	MJE700,T MJE702, MJE800,T MJE802 MJE701, MJE703, MJE801, MJE803 All devices	V _{CE(sat)}	-- -- --	2.5 2.8 3.0 Vdc
Base-Emitter On Voltage (1) (I _C = 1.5 Adc, V _{CE} = 3.0 Vdc) (I _C = 2.0 Adc, V _{CE} = 3.0 Vdc) (I _C = 4.0 Adc, V _{CE} = 3.0 Vdc)	MJE700,T MJE702, MJE800,T MJE802 MJE701, MJE703, MJE801, MJE803 All devices	V _{BE(on)}	-- -- --	2.5 2.5 3.0 Vdc
DYNAMIC CHARACTERISTICS				
Small-Signal Current Gain (I _C = 1.5 Adc, V _{CE} = 3.0 Vdc, f = 1.0 MHz)		h _{fe}	1.0	-- --

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

FIGURE 2 – SWITCHING TIMES TEST CIRCUIT

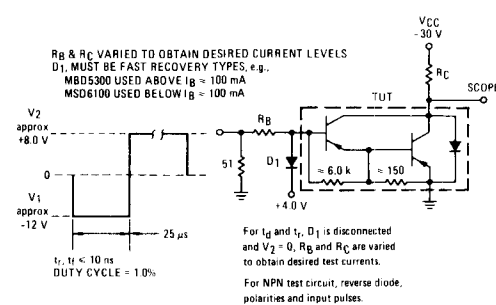


FIGURE 3 – SWITCHING TIMES

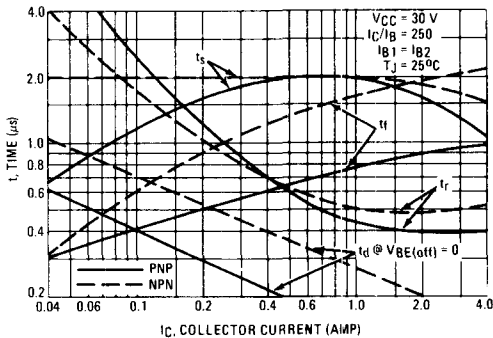
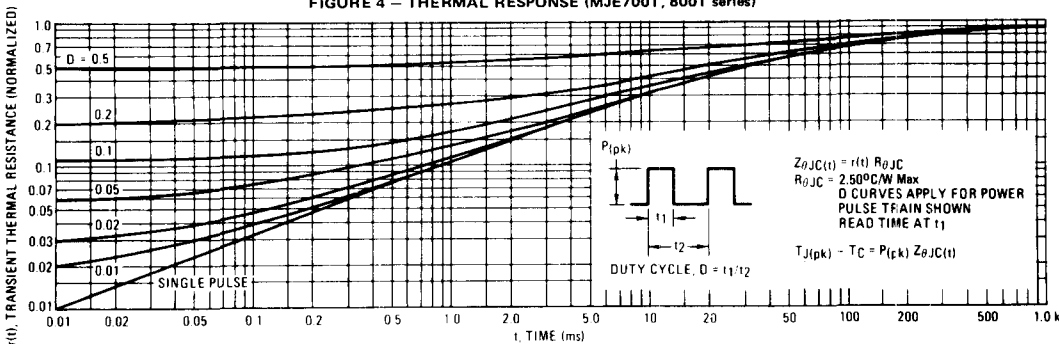
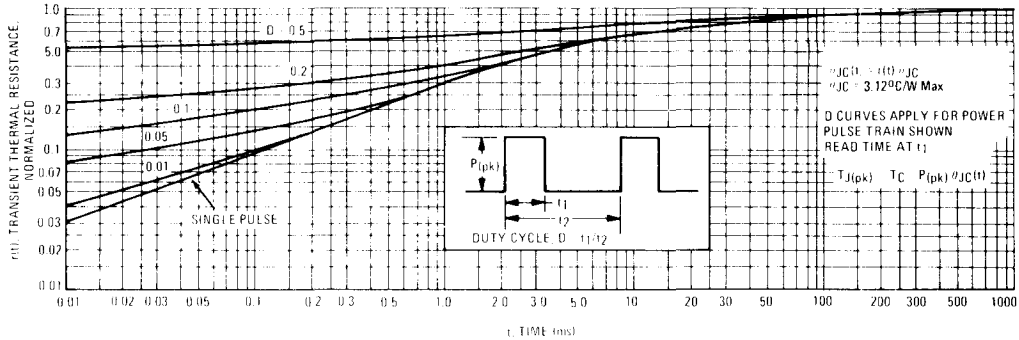


FIGURE 4 – THERMAL RESPONSE (MJE700T, 800T series)



PNP MJE700,T thru MJE703 NPN MJE800,T thru MJE803

FIGURE 5 — THERMAL RESPONSE (MJE700, 800 series)



ACTIVE-REGION SAFE-OPERATING AREA

FIGURE 6 — MJE700 series

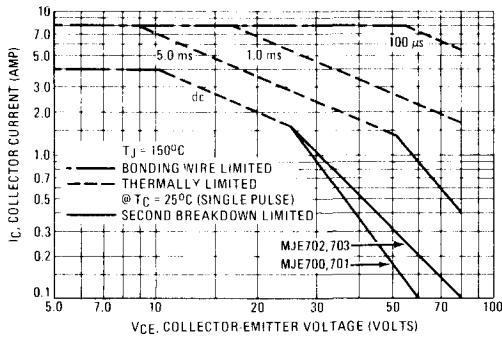
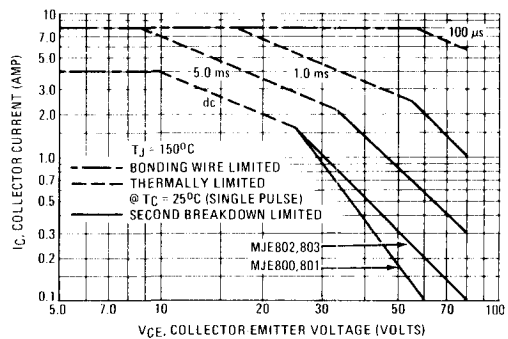


FIGURE 7 — MJE800 series



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 6 and 7 are 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 $T_{J(pk)} < 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 4 or 5. 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 8 — MJE700T

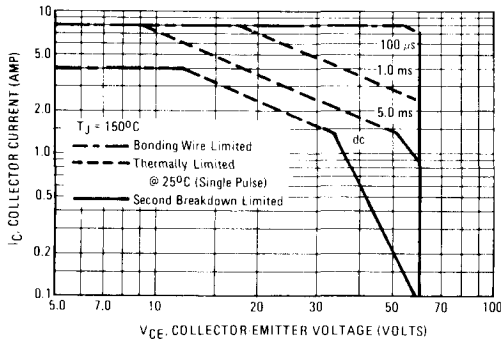
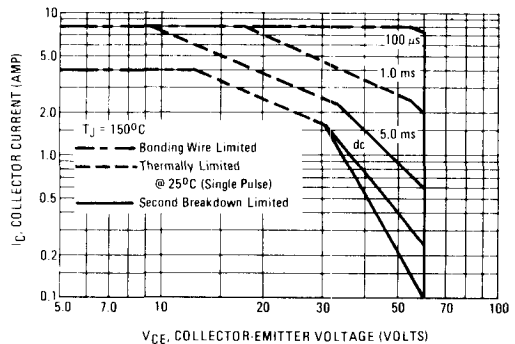


FIGURE 9 — MJE800T



PNP MJE700,T thru MJE703 NPN MJE800,T thru MJE803

PNP
MJE700,T series

NPN
MJE800,T series

FIGURE 10 – DC CURRENT GAIN

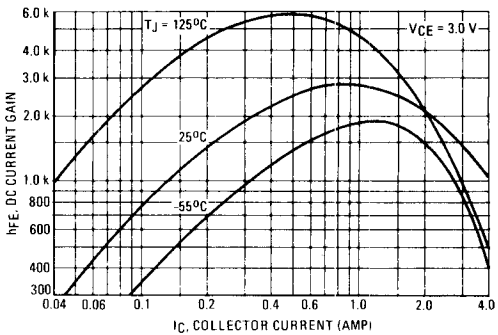
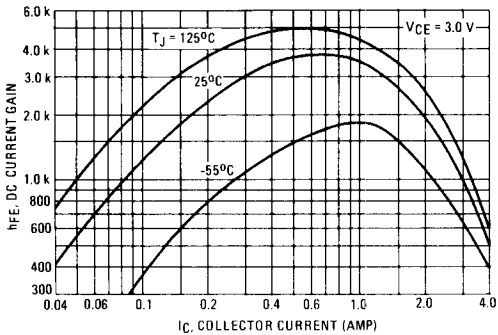


FIGURE 11 – COLLECTOR SATURATION REGION

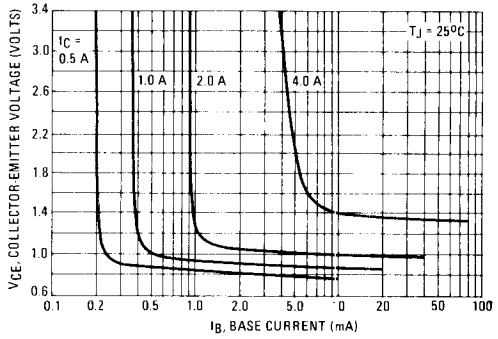
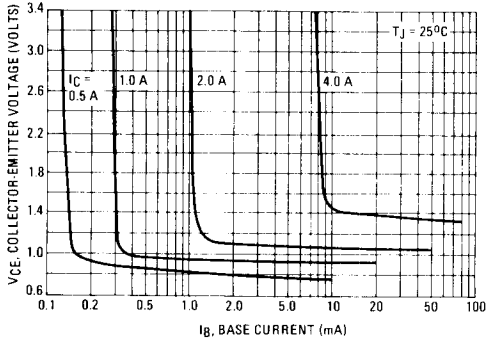


FIGURE 12 – “ON” VOLTAGES

