MOSPEC

COMPLEMENTARY SILICON PLASTIC POWER TRANSISTORS

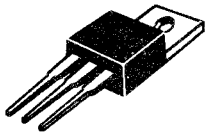
... designed for low power amplifier and low current, high speed switching applications.

FEATURES:

* Collector-Emitter Sustaining Voltage-
  $V_{CEO(sus)}$ = 40 V (Min) - MJE170,MJE180
  = 60 V (Min) - MJE171,MJE181
  = 80 V (Min) - MJE172,MJE182
* DC Current Gain-
  hFE=30(Min) @ I_C = 0.5 A
  =12(Min) @ I_C = 1.5 A

PNP	NPN
MJE170	MJE180
MJE171	MJE181
MJE172	MJE182

3.0 AMPERE
COMPLEMENTARY SILICON
POWER TRANSISTORS
40-80 Volts
12.5 Watts



TO-220

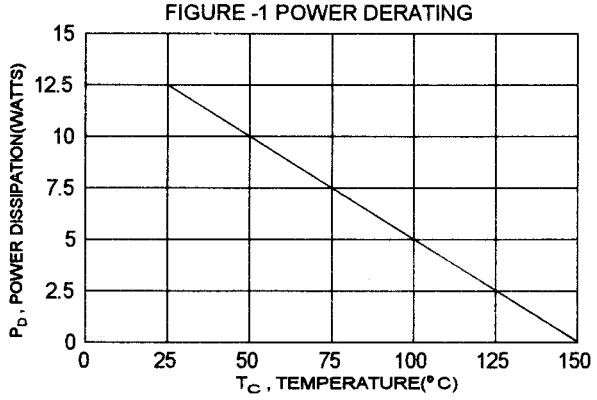
MAXIMUM RATINGS

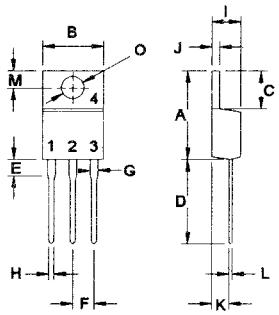
Characteristic	Symbol	MJE170 MJE180	MJE171 MJE181	MJE172 MJE182	Unit
Collector-Emitter Voltage	V_{CEO}	40	60	80	V
Collector-Base Voltage	V_{CBO}	60	80	100	V
Emitter-Base Voltage	V_{EBO}	7.0			V
Collector Current - Continuous - Peak	I_C	3.0 6.0			A
Base Current	I_B	1.0			A
Total Power Dissipation@T_C = 25°C Derate above 25°C	P_D	12.5 0.10			W 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	Rθjc	10	°C/W

FIGURE -1 POWER DERATING





PIN 1.BASE
2.COLLECTOR
3.EMITTER
4.COLLECTOR(CASE)

DIM	MILLIMETERS	
	MIN	MAX
A	14.68	15.31
B	9.78	10.42
C	5.01	6.52
D	13.06	14.62
E	3.57	4.07
F	2.42	3.66
G	1.12	1.36
H	0.72	0.96
I	4.22	4.98
J	1.14	1.38
K	2.20	2.97
L	0.33	0.55
M	2.48	2.98
O	3.70	3.90

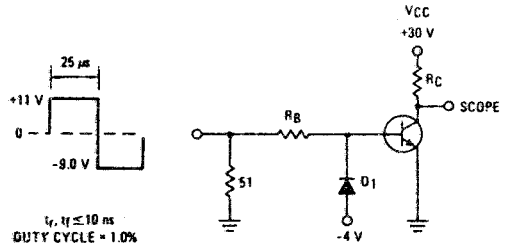
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector - Emitter Sustaining Voltage (1) (I_C = 10 mA, I_B = 0)	MJE170,MJE180 MJE171,MJE181 MJE172,MJE182	$V_{CEO(SUS)}$	 40 60 80		V
Collector Cutoff Current (V_{CE} = 60 V, I_E = 0) (V_{CE} = 80 V, I_E = 0) (V_{CE} = 100 V, I_E = 0) (V_{CE} = 60 V, I_E = 0, T_C= 150°C) (V_{CE} = 80 V, I_E = 0, T_C = 150°C) (V_{CE} = 100 V, I_E = 0, T_C = 150°C)	 MJE170,MJE180 MJE171,MJE181 MJE172,MJE182 MJE170,MJE180 MJE171,MJE181 MJE172,MJE182	I_{CBO}		 10 10 10 100 100 100	uA
Emitter Cutoff Current (V_{EB} = 7.0 V , I_C = 0)		I_{EBO}		10	uA
ON CHARACTERISTICS (1)					
DC Current Gain (I_C = 100 mA, V_{CE} = 1.0 V) (I_C = 500 mA, V_{CE} = 1.0 V) (I_C = 1.5 A, V_{CE} = 1.0 V)		hFE	 50 30 12	250	
Collector-Emitter Saturation Voltage (I_C = 500 mA, I_B = 50 mA) (I_C = 1.5 A, I_B = 150 m A) (I_C = 3.0 A, I_B = 600 m A)		$V_{CE(sat)}$		 0.3 0.9 1.7	V
Base-Emitter Saturation Voltage (I_C = 1.5 A, I_B = 150 m A) (I_C = 3.0 A, I_B = 600 m A)		$V_{BE(sat)}$		 1.5 2.0	V
Base-Emitter On Voltage (I_C = 500 mA, V_{CE} = 1.0 V)		$V_{BE(on)}$		1.2	V
DYNAMIC CHARACTERISTICS					
Current-Gain-Bandwidth Product (2) (I_C = 100 mA, V_{CE} = 10 V, f = 10 MHz)		f_T	50		MHz
Output Capacitance (V_{CB} = 10 V, I_E = 0, f = 0.1 MHz)	MJE170/MJE172 MJE180/MJE182	C_{ob}		60 50	pF

(1) Pulse Test: Pulse width = 300 us , Duty Cycle ≦ 2.0%

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

FIGURE 2 – SWITCHING TIME TEST CIRCUIT



RB and RC VARIED TO OBTAIN DESIRED CURRENT LEVELS

D1 MUST BE FAST RECOVERY TYPE, eg:
MBD5300 USED ABOVE IB ≈ 100 mA
MSD6100 USED BELOW IB ≈ 100 mA
For PNP test circuit, reverse all polarities.

FIG-3 TURN-ON TIME

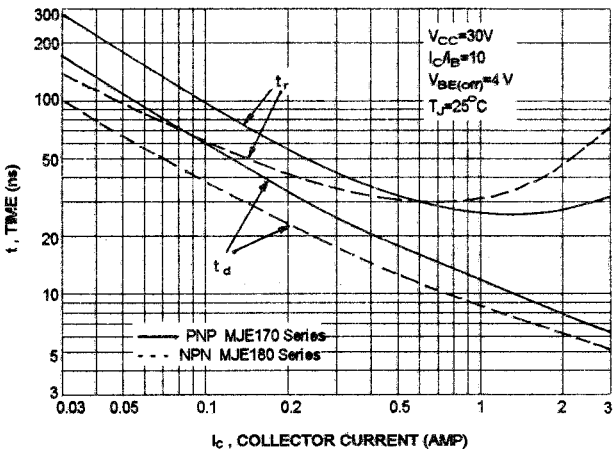


FIG-4 TURN-OFF TIME

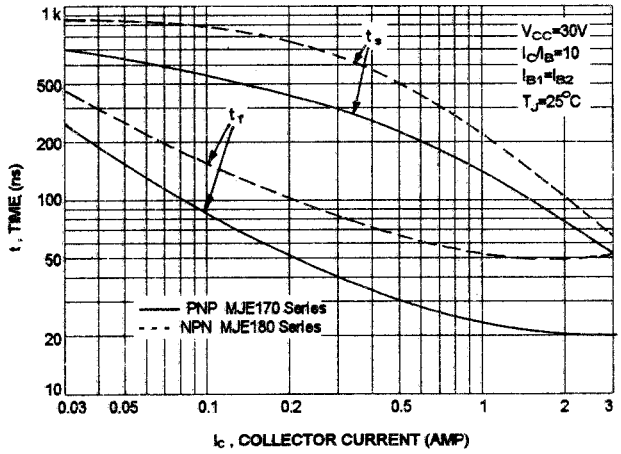


FIG-5 ACTIVE REGION SAFE OPERATING AREA

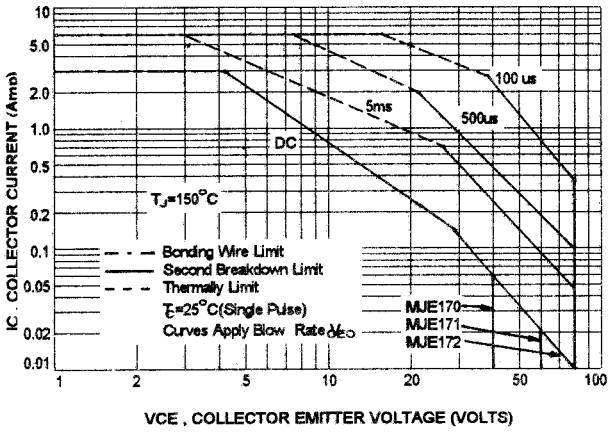
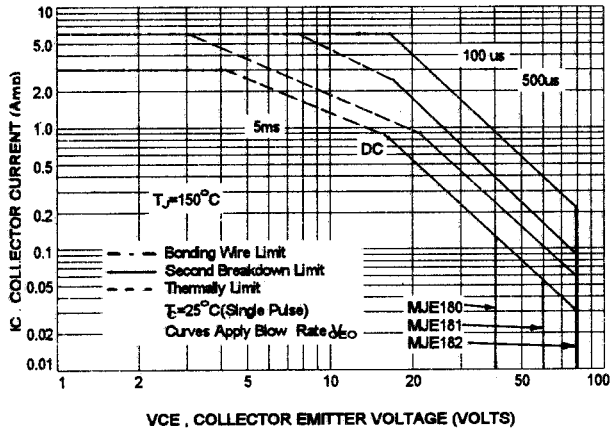


FIG-6 ACTIVE REGION SAFE OPERATING AREA

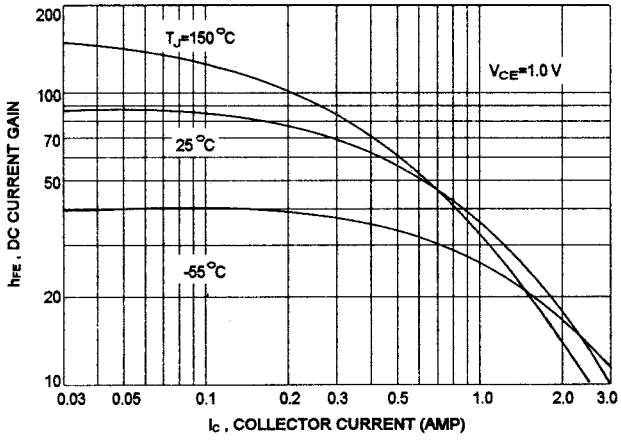


There are two limitation on the power handling ability of a transistor:average junction temperature and second breakdown safe operating area curves indicate I_C-V_{CE} limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than curves indicate.

The data of Fig-5 and Fig-6 is base 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 $T_{J(PK)} \leq 150°C$,At high case temperatures, thermal limita - tion will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

FIG-7 DC CURRENT GAIN

PNP MJE170, MJE171, MJE172



NPN MJE180, MJE181, MJE182

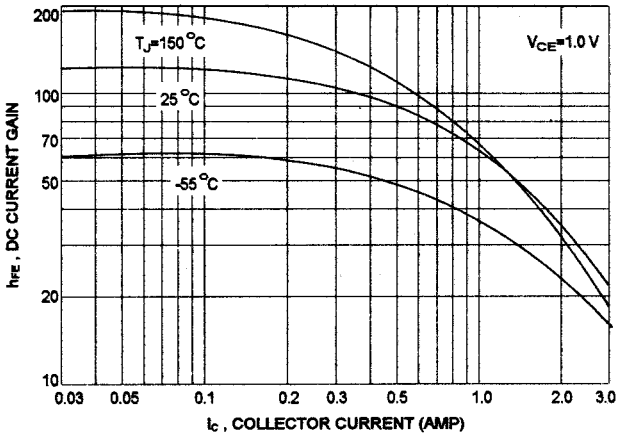
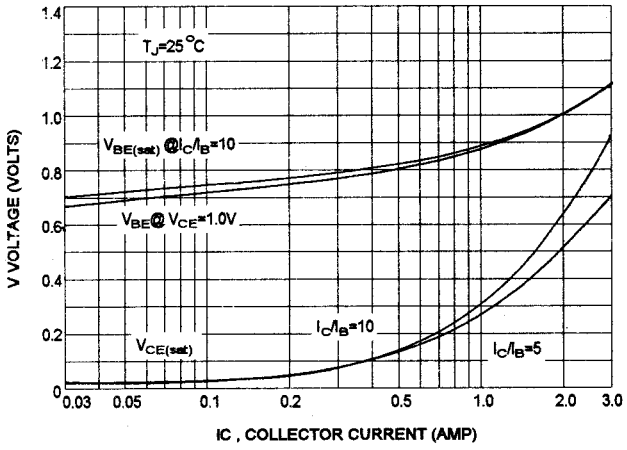


FIG-8 "ON" VOLTAGE

PNP MJE170, MJE171, MJE172



NPN MJE180, MJE181, MJE182

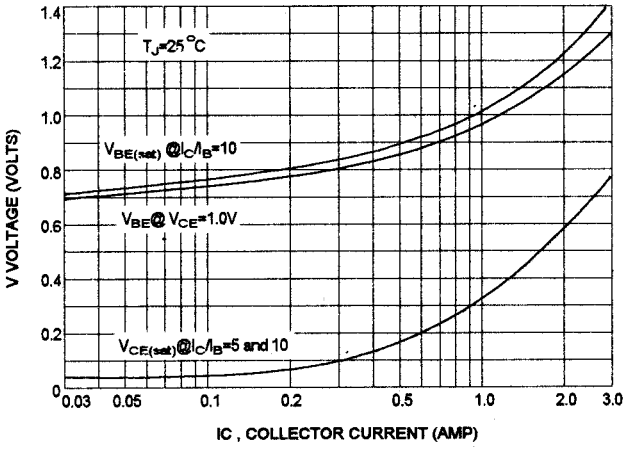
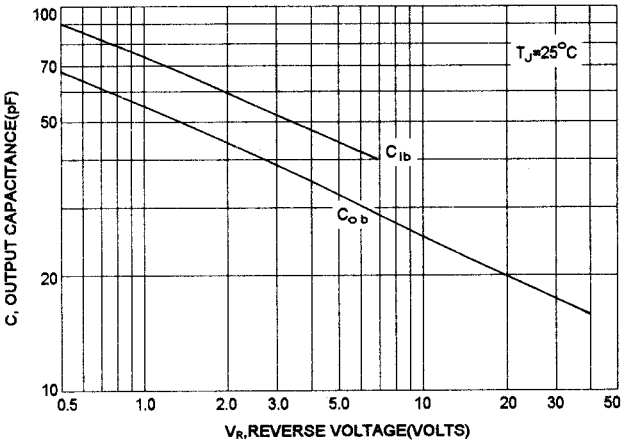


FIG-9 CAPACITANCE

PNP MJE170, MJE171, MJE172



NPN MJE180, MJE181, MJE182