

SWITCHMODE SERIES NPN POWER TRANSISTORS

... designed for use in high-voltage, high-speed, power switching in inductive circuit, they are particularly suited for 115 and 220 V switchmode applications such as switching regulator's, inverters, DC -DC converter, Motor control, Solenoid/Relay drivers and deflection circuits.

FEATURES:

*Collector-Emitter Sustaining Voltage-

$$V_{CEO(sus)} = 400 \text{ V and } 300 \text{ V}$$

* Collector-Emitter Saturation Voltage -

$$V_{CE(sat)} = 1.0 \text{ V (Max.) @ } I_C = 1.0 \text{ A, } I_B = 0.25 \text{ A}$$

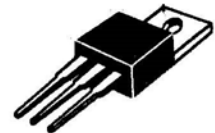
* Switching Time - $t_f = 0.7 \text{ us (Max.) @ } I_C = 1.0 \text{ A}$

NPN
MJE13002
MJE13003

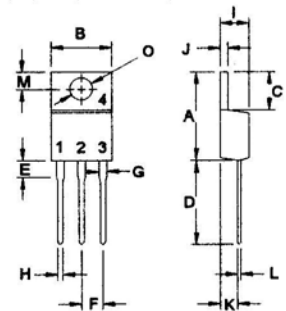
1.5 AMPERE
POWER
TRANSISTORS
300-400 VOLTS
40 WATTS

MAXIMUM RATINGS

Characteristic	Symbol	MJE13002	MJE13003	Unit
Collector-Emitter Voltage	V_{CEO}	300	400	V
Collector-Emitter Voltage	V_{CEV}	600	700	V
Emitter-Base Voltage	V_{EBO}	9.0		V
Collector Current - Continuous	I_C	1.5		A
- Peak	I_{CM}	3.0		
Base current	I_B	0.75		A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	40	0.32	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +150		$^\circ\text{C}$



TO-220



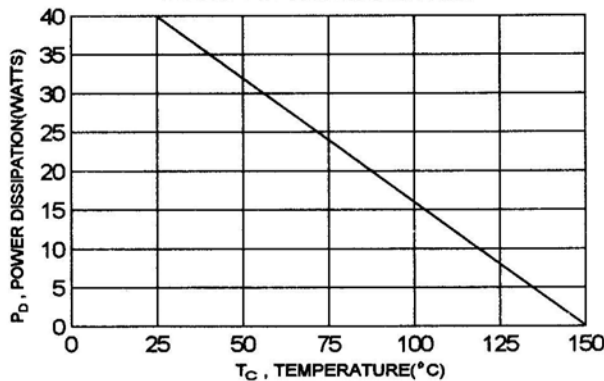
PIN 1.BASE
2.COLLECTOR
3.EMITTER
4.COLLECTOR(CASE)

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	3.12	$^\circ\text{C/W}$

DIM	MILLIMETERS	
	MIN	MAX
A	14.68	16.00
B	9.78	10.42
C	5.02	6.60
D	13.00	14.62
E	3.10	4.19
F	2.41	2.67
G	1.10	1.67
H	0.69	1.01
I	3.21	4.98
J	1.14	1.40
K	2.20	3.30
L	0.28	0.61
M	2.48	3.00
O	3.50	4.00

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 ($I_C = 10\text{ mA}$, $I_B = 0$) MJE13002 MJE13003	$V_{CEO(sus)}$	300 400		V
Collector Cutoff Current ($V_{CEV} = \text{Rated Value}$, $V_{BE(off)} = 1.5\text{ V}$) ($V_{CEV} = \text{Rated Value}$, $V_{BE(off)} = 1.5\text{ V}$, $T_C = 100^\circ\text{C}$)	I_{CEV}		1.0 5.0	mA
Emitter Cutoff Current ($V_{EB} = 9.0\text{ V}$, $I_C = 0$)	I_{EBO}		1.0	mA

ON CHARACTERISTICS (1)

DC Current Gain ($I_C = 0.5\text{ A}$, $V_{CE} = 2.0\text{ V}$) ($I_C = 1.0\text{ A}$, $V_{CE} = 2.0\text{ V}$)	hFE	8.0 5.0	40 25	
Collector-Emitter Saturation Voltage ($I_C = 0.5\text{ A}$, $I_B = 100\text{ mA}$) ($I_C = 1.0\text{ A}$, $I_B = 250\text{ mA}$) ($I_C = 1.5\text{ A}$, $I_B = 0.5\text{ A}$)	$V_{CE(sat)}$		0.5 1.0 3.0	V
Base-Emitter Saturation Voltage ($I_C = 0.5\text{ A}$, $I_B = 100\text{ mA}$) ($I_C = 1.0\text{ A}$, $I_B = 250\text{ mA}$)	$V_{BE(sat)}$		1.0 1.2	V

DYNAMIC CHARACTERISTICS

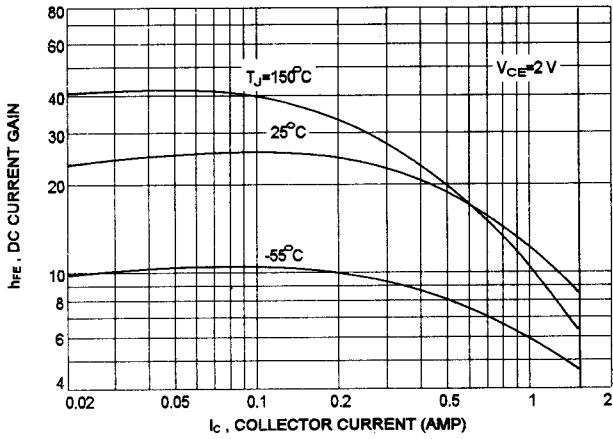
Current Gain - Bandwidth Product ($I_C = 100\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ MHz}$)	f_T	4.0		MHz
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SWITCHING CHARACTERISTICS

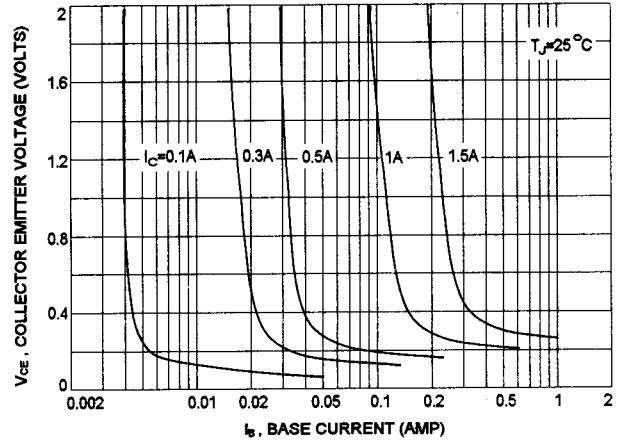
Delay Time	$V_{CC} = 125\text{ V}$, $I_C = 1.0\text{ A}$ $I_{B1} = -I_{B2} = 0.2\text{ A}$, $t_p = 25\text{ us}$, Duty Cycle $\leq 1\%$	t_d	0.1	us
Rise Time		t_r	1.0	us
Storage Time		t_s	4.0	us
Fall Time		t_f	0.7	us

(1) Pulse Test: Pulse Width = 300 us, Duty Cycle $\leq 2.0\%$

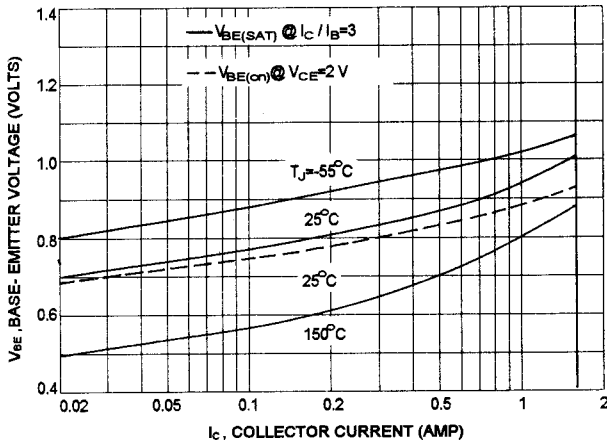
DC CURRENT GAIN



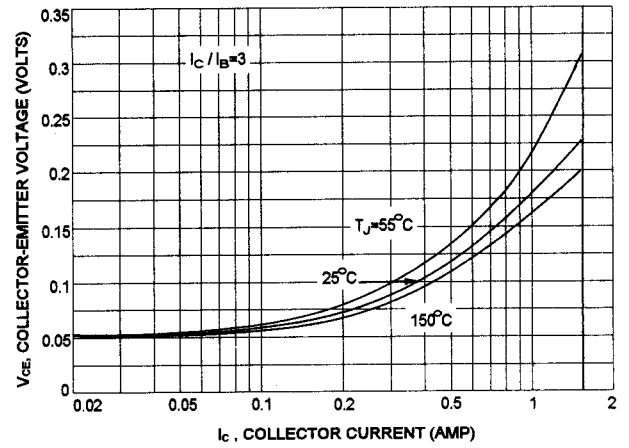
COLLECTOR SATURATION REGION



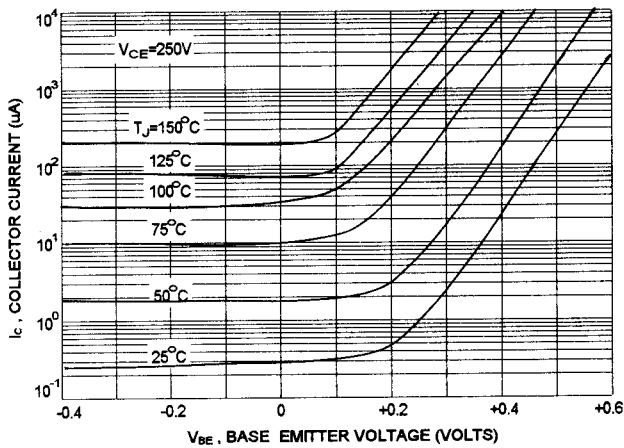
BASE-EMITTER VOLTAGE



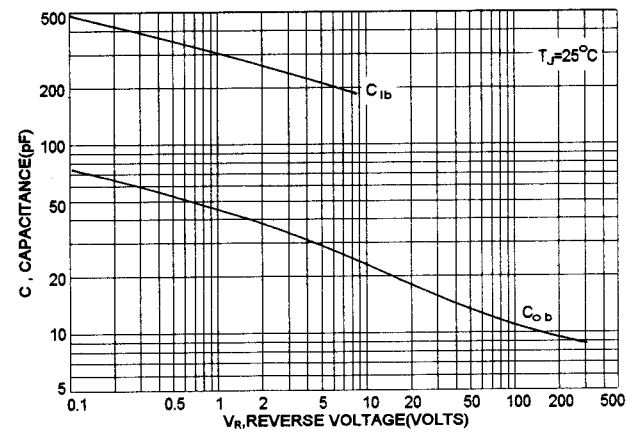
COLLECTOR-EMITTER SATURATION VOLTAGE



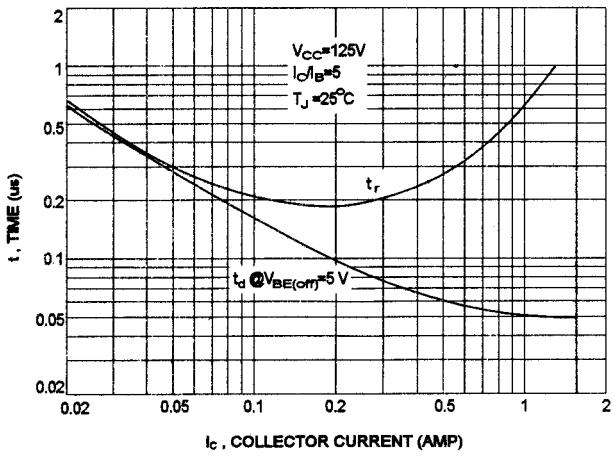
COLLECTOR CUT-OFF REGION



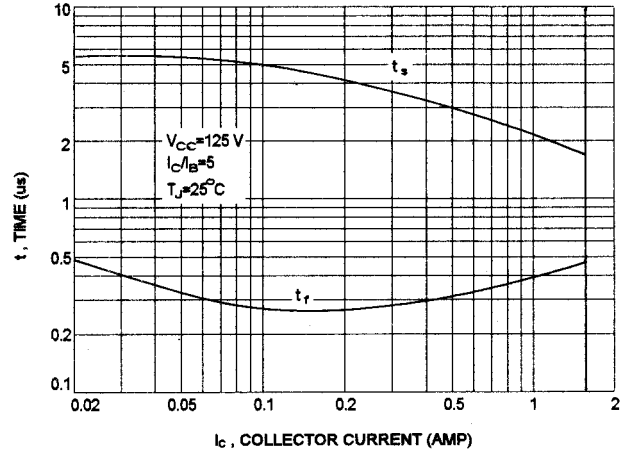
CAPACITANCE



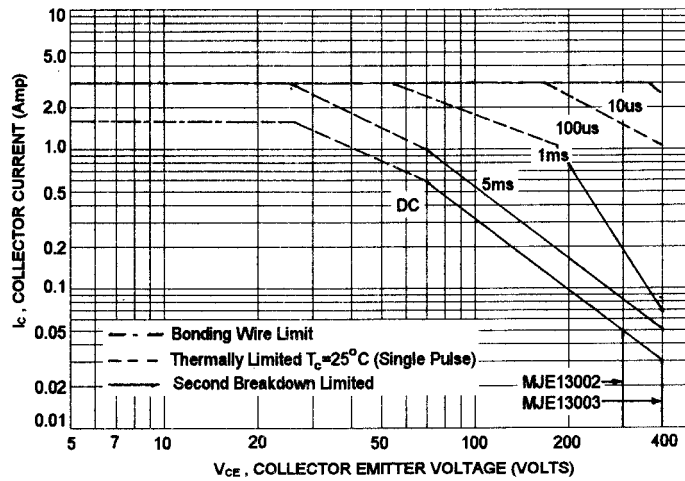
TURN-ON TIME



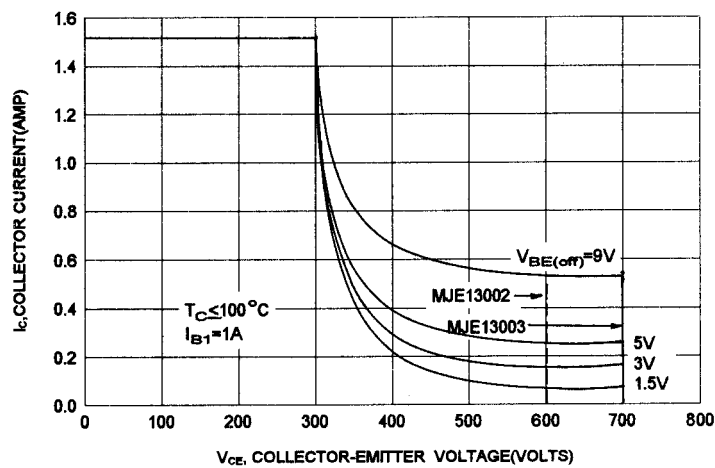
TURN-OFF TIME



ACTIVE REGION SAFE OPERATING AREA



REVERSE BIAS SWITCHING SAFE OPERATING AREA



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