

SWITCHMODE SERIES NPN SILICON POWER TRANSISTORS

... designed for use in high-voltage, high-speed, power switching in inductive circuit, where fall time and RBSOA are critical. They are particularly well-suited for line-operated switchmode applications such as switching regulator's, inverters, Motor Controls, and Deflection circuits

FEATURES:

- *Collector-Emitter Sustaining Voltage-
 $BV_{CEO} = 450V$
- * Collector-Emitter Saturation Voltage -
 $V_{CE(sat)} = 2.5 V \text{ (Max.) @ } I_C = 3.0 A, I_B = 0.4A/0.3A$
- * Switching Time - $t_f = 0.4 \mu s \text{ (Max.) @ } I_C = 3.0 A$
- * SOA and Switching Application Information:

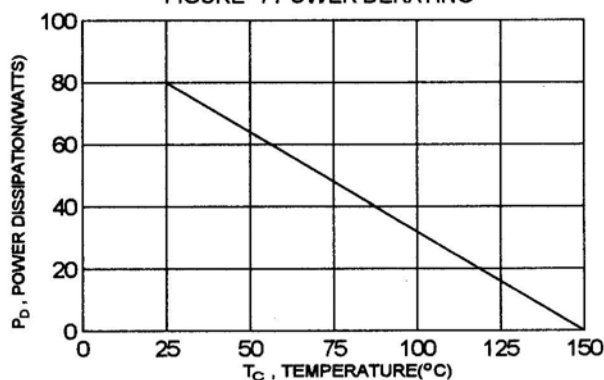
MAXIMUM RATINGS

Characteristic	Symbol	MJE16002, MJE16004	Unit
Collector-Emitter Voltage	V_{CEO}	450	V
Collector-Emitter Voltage	V_{CEV}	850	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current - Continuous - Peak	I_C I_{CM}	5 10	A
Base current	I_B	4	A
Total Power Dissipation @ $T_C = 25^\circ C$ Derate above $25^\circ C$	P_D	80 640	W mW/ $^\circ C$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +150	$^\circ C$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.56	$^\circ C/W$

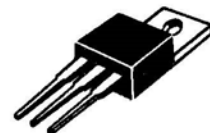
FIGURE -1 POWER DERATING



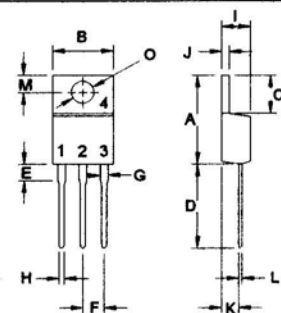
NPN

MJE16002
MJE16004

5 AMPERE
POWER
TRANSISTORS
450 VOLTS
80 WATTS



TO-220



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

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

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 ($I_C = 100\text{ mA}$, $I_B = 0$)	$V_{CEO(sus)}$	450		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_C		0.25 1.5	mA
Emitter Cutoff Current ($V_{EB} = 6.0\text{ V}$, $I_C = 0$)	I_{EBO}		1.0	mA

ON CHARACTERISTICS (1)

DC Current Gain ($I_C = 5.0\text{ A}$, $V_{CE} = 5.0\text{ V}$)	MJE16002 MJE16004	h_{FE}	5.0 7.0	
Collector-Emitter Saturation Voltage ($I_C = 1.5\text{ A}$, $I_B = 200\text{ mA}$) ($I_C = 1.5\text{ A}$, $I_B = 150\text{ mA}$) ($I_C = 3.0\text{ A}$, $I_B = 400\text{ mA}$) ($I_C = 3.0\text{ A}$, $I_B = 300\text{ mA}$)	MJE16002 MJE16004 MJE16002 MJE16004	$V_{CE(sat)}$		1.0 1.0 2.5 2.5 V
Base-Emitter Saturation Voltage ($I_C = 3.0\text{ A}$, $I_B = 400\text{ mA}$) ($I_C = 3.0\text{ A}$, $I_B = 300\text{ mA}$)	MJE16002 MJE16004	$V_{BE(sat)}$		1.5 1.5 V

DYNAMIC CHARACTERISTICS

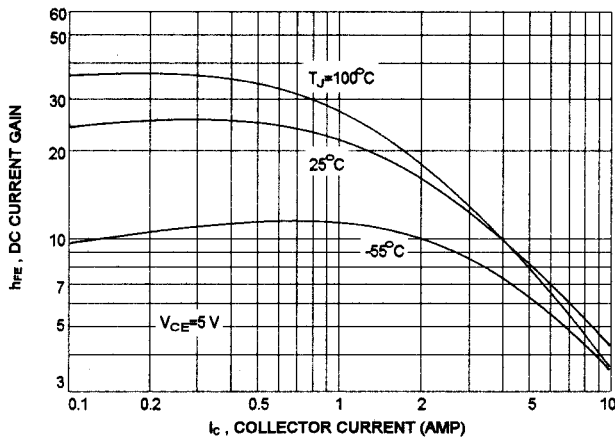
Output Capacitance ($V_{CB} = 10\text{ V}$, $I_E = 0$, $f = 1.0\text{ kHz}$)	C_{ob}		200	pF
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SWITCHING CHARACTERISTICS

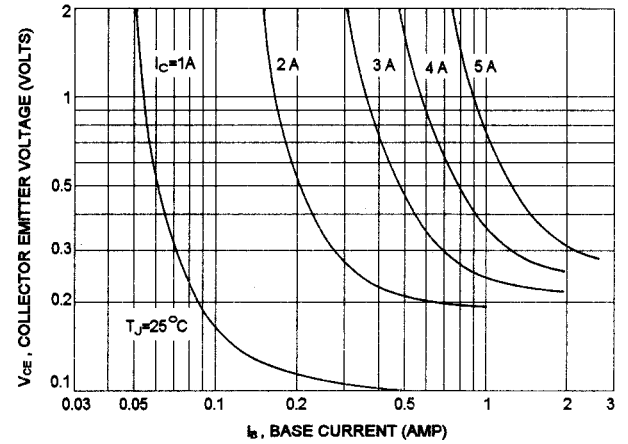
Delay Time	$V_{CC} = 250\text{ V}$, $I_C = 3.0\text{ A}$ $2I_{B1} = -I_{B2} = 0.8\text{ A}$ $t_p = 30\text{ us}$, Duty Cycle $\leq 2.0\%$	t_d		0.1	us
Rise Time		t_r		0.4	us
Storage Time		t_s		3.0	us
Fall Time		t_f		0.4	us

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

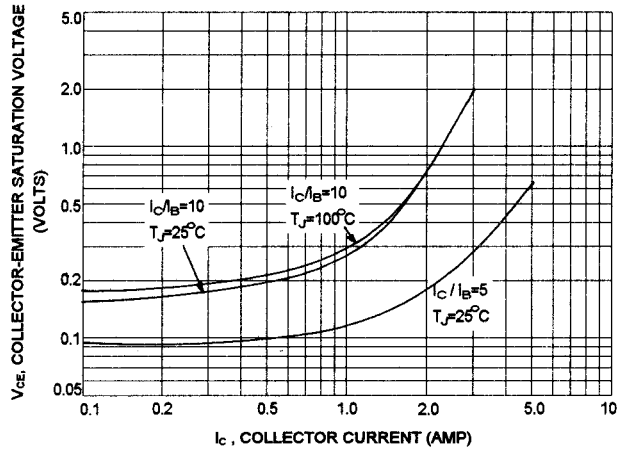
DC CURRENT GAIN



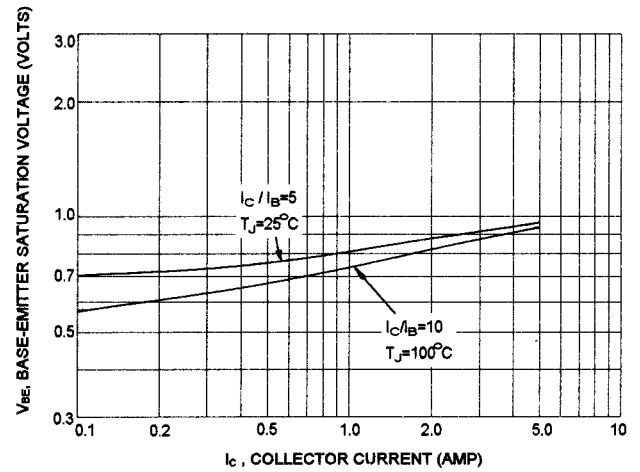
COLLECTOR SATURATION REGION



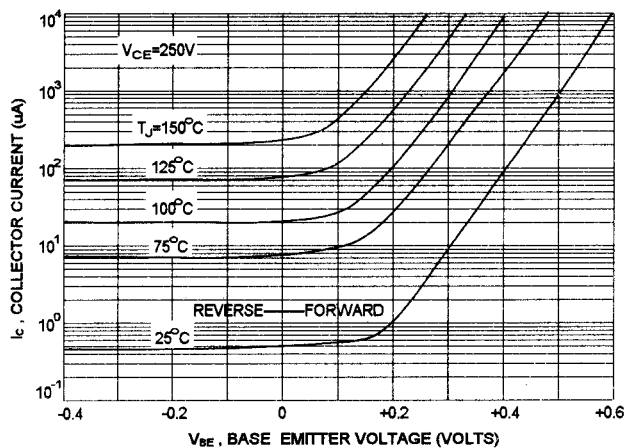
COLLECTOR-EMITTER SATURATION VOLTAGE



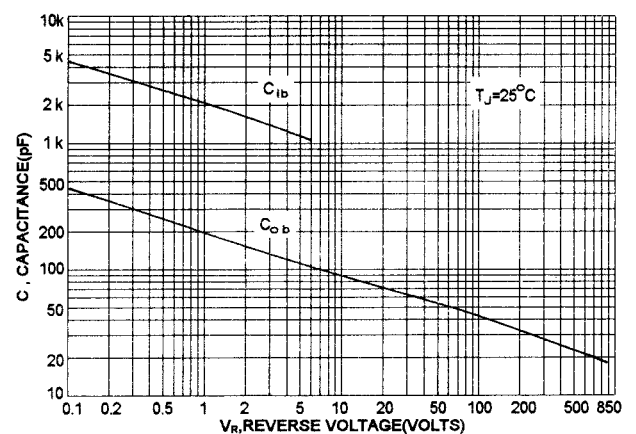
BASE-EMITTER SATURATION VOLTAGE



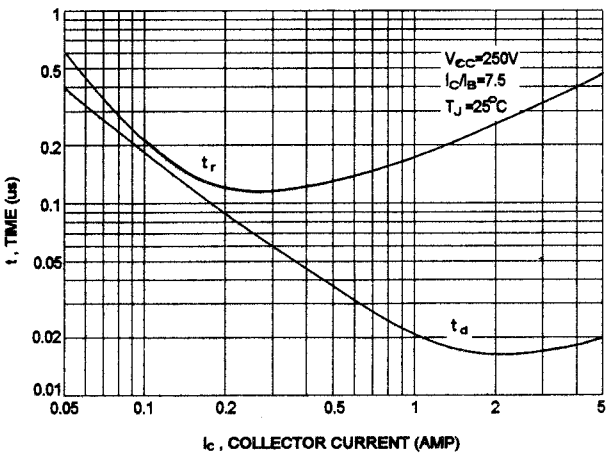
COLLECTOR CUT-OFF REGION



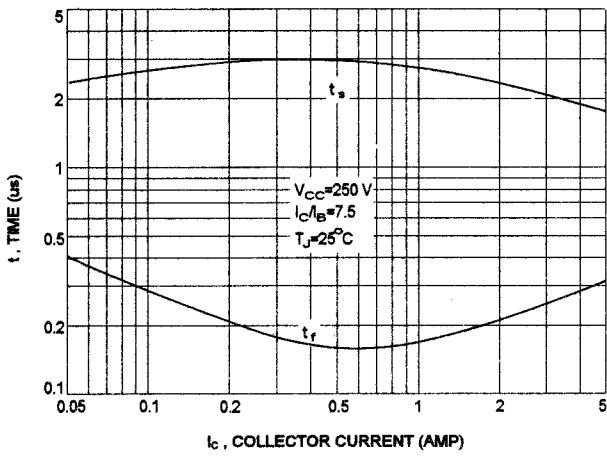
CAPACITANCE



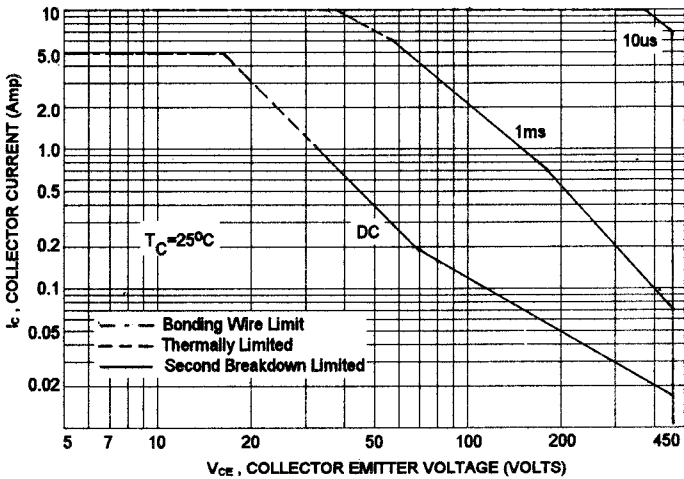
TURN-ON TIME



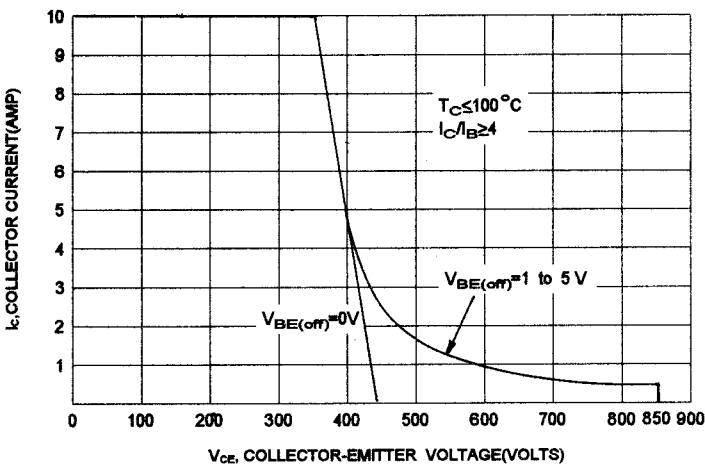
TURN-OFF TIME



ACTIVE REGION SAFE OPERATING AREA



REVERSE BIAS SWITCHING SAFE OPERATING AREA



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