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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 controls, Solenoid / Relay drivers and Deflection circuits.

FEATURES:

*Collector-Emitter Sustaining Voltage-

$$V_{CE(SUS)} = 400 \text{ V and } 300 \text{ V}$$

* Collector-Emitter Saturation Voltage -

$$V_{CE(SAT)} = 1.0 \text{ V (Max.) @ } I_C = 4.0 \text{ A, } I_B = 1.0 \text{ A}$$

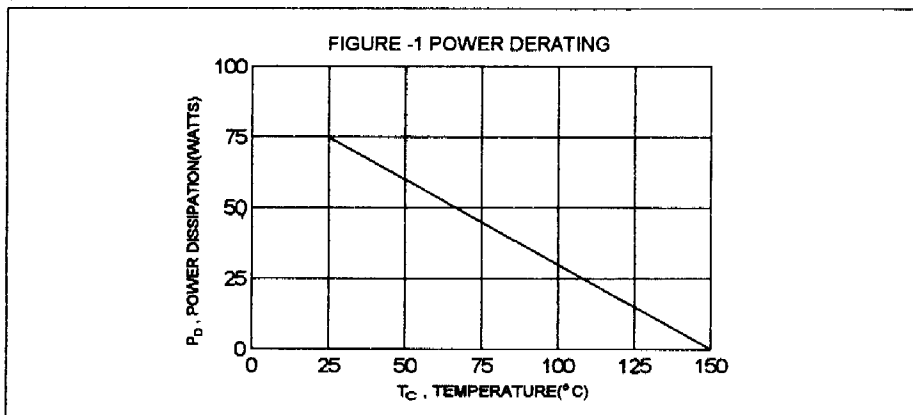
* Switching Time - $t_f = 0.9 \text{ us (Max.) @ } I_C = 2.0 \text{ A}$

MAXIMUM RATINGS

Characteristic	Symbol	MJE13004	MJE13005	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	4.0		A
- Peak	I_{CM}	8.0		
Base current	I_B	2.0		A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	P_D	75		W
Derate above 25°C		0.6		W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +150		$^\circ\text{C}$

THERMAL CHARACTERISTICS

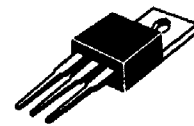
Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.67	$^\circ\text{C/W}$



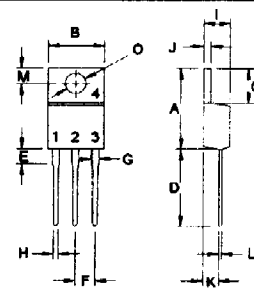
NPN

MJE13004
MJE13005

4 AMPERE
POWER
TRANSISTORS
300-400 VOLTS
75 WATTS



TO-220



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



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Quality Semi-Conductors

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 ($I_C = 10\text{ mA}$, $I_B = 0$) MJE13004 MJE13005	$V_{CE(sus)}$	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 ($I_C = 1.0\text{ A}$, $V_{CE} = 5.0\text{ V}$) ($I_C = 2.0\text{ A}$, $V_{CE} = 5.0\text{ V}$)	hFE	10 8.0	60 40	
Collector-Emitter Saturation Voltage ($I_C = 1.0\text{ A}$, $I_B = 200\text{ mA}$) ($I_C = 2.0\text{ A}$, $I_B = 500\text{ mA}$) ($I_C = 4.0\text{ A}$, $I_B = 1.0\text{ A}$)	$V_{CE(sat)}$		0.5 0.6 1.0	V
Base-Emitter Saturation Voltage ($I_C = 1.0\text{ A}$, $I_B = 200\text{ mA}$) ($I_C = 2.0\text{ A}$, $I_B = 500\text{ mA}$)	$V_{BE(sat)}$		1.2 1.6	V

DYNAMIC CHARACTERISTICS

Current Gain - Bandwidth Product ($I_C = 500\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1.0\text{ MHz}$)	f_T	4.0		MHz
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SWITCHING CHARACTERISTICS

Delay Time	$V_{CC} = 125\text{ V}$, $I_C = 2.0\text{ A}$ $I_{B1} = -I_{B2} = 0.4\text{ A}$, $t_p = 25\text{ us}$, Duty Cycle $\leq 1.0\%$	t_d	0.1	us
Rise Time		t_r	0.7	us
Storage Time		t_s	4.0	us
Fall Time		t_f	0.9	us

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

TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151

