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## MJE13006 Silicon NPN Transistor High Voltage, High Speed Switch TO-220 Type Package

**Description:**

The MJE13006 is a silicon NPN transistor in a TO-220 type package designed for high-voltage, high-speed power switching inductive circuits where fall time is critical. This device is particularly suited for 115V and 220V switch-mode applications such as switching regulators, inverters, motor controls, solenoid/relay drivers, and deflection circuits.

**Absolute Maximum Ratings:**

Collector-Emitter Voltage, $V_{CEO(sus)}$ .....	300V
Collector-Emitter Voltage, $V_{CEV}$ .....	600V
Emitter-Base Voltage, $V_{EBO}$ .....	9V
Collector Current, $I_C$	
Continuous .....	8A
Peak .....	16A
Continuous Base Current, $I_B$ .....	4A
Total Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....	80W
Derate Above $25^\circ C$ .....	640mW/ $^\circ C$
Operating Junction Temperature Range, $T_J$ .....	$-65^\circ$ to $+150^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+150^\circ C$
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	1.56 $^\circ C/W$

**Electrical Characteristics:** ( $T_C = +25^\circ C$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Collector-Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 10mA, I_B = 0$	300	-	-	V
Collector Cutoff Current	$I_{CEV}$	$V_{CEV} = 600V, V_{BE(off)} = 1.5V$	-	-	1	mA
		$V_{CEV} = 600V, V_{BE(off)} = 1.5V,$ $T_C = +100^\circ C$	-	-	5	mA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 9V, I_C = 0$	-	-	1	mA

**Electrical Characteristics (Cont'd):** ( $T_C = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>ON Characteristics (Note 1)</b>						
DC Current Gain	$h_{FE}$	$I_C = 2\text{A}, V_{CE} = 5\text{V}$	8	-	60	
		$I_C = 5\text{A}, V_{CE} = 5\text{V}$	5	-	30	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 2\text{A}, I_B = 0.4\text{A}$	-	-	1	V
		$I_C = 5\text{A}, I_B = 1\text{A}$	-	-	2	V
		$I_C = 8\text{A}, I_B = 2\text{A}$	-	-	3	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 2\text{A}, I_B = 0.4\text{A}$	-	-	1.2	V
		$I_C = 5\text{A}, I_B = 1\text{A}$	-	-	1.6	V
<b>Dynamic Characteristics</b>						
Current-Gain Bandwidth Product	$f_T$	$I_C = 500\text{mA}, V_{CE} = 10\text{V}, f = 1\text{MHz}$	4	-	-	MHz
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}, I_E = 0, f = 0.1\text{MHz}$	-	110	-	pF
<b>Switching Characteristics</b>						
Delay Time	$t_d$	$V_{CC} = 125\text{V}, I_C = 5\text{A},$ $I_{B1} = -I_{B2} = 1\text{A}, t_p = 25\mu\text{s},$ Duty Cycle $\leq 1\%$	-	-	0.1	$\mu\text{s}$
Rise Time	$t_r$		-	-	1.5	$\mu\text{s}$
Storage Time	$t_s$		-	-	3.0	$\mu\text{s}$
Fall Time	$t_f$		-	-	0.7	$\mu\text{s}$

Note 1. Pulse Test: Pulse Width =  $300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

