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MJE13007 Silicon NPN Transistor High Voltage, High Speed Switch TO-220 Type Package

Description:

The MJE13007 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, $V_{CEO(sus)}$	400V
Collector-Emitter Voltage, V_{CEV}	700V
Emitter-Base Voltage, V_{EBO}	9V
Collector Current, I_C	
Continuous	8A
Peak (Note 1)	16A
Base Current, I_B	
Continuous	4A
Peak (Note 1)	8A
Emitter Current, I_E	
Continuous	12A
Peak (Note 1)	24A
Total Power Dissipation ($T_A = +25^\circ C$), P_D	2W
Derate Above $25^\circ C$	16mW/ $^\circ C$
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° to $+150^\circ C$
Storage Temperature Range, T_{stg}	-65° to $+150^\circ C$
Thermal Resistance, Junction-to-Case, R_{thJC}	1.56 $^\circ C/W$
Thermal Resistance, Junction-to-Ambient, R_{thJA}	62.5 $^\circ C/W$
Lead Temperature (During Soldering, 1/8" from case, 5sec), T_L	$+275^\circ C$

Note 1. Pulse Test: Pulse Width = 5ms, Duty Cycle \leq 10%.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics (Note 2)						
Collector–Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 10\text{mA}, I_B = 0$	400	–	–	V
Collector Cutoff Current	I_{CEV}	$V_{CEV} = 700\text{V}, V_{BE(off)} = 1.5\text{V}$	–	–	1	mA
		$V_{CEV} = 700\text{V}, V_{BE(off)} = 1.5\text{V}, T_C = +100^\circ\text{C}$	–	–	5	mA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 9\text{V}, I_C = 0$	–	–	1	mA
ON Characteristics (Note 2)						
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
		$I_C = 5\text{A}, I_B = 1\text{A}, T_C = +100^\circ\text{C}$	–	–	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
		$I_C = 5\text{A}, I_B = 1\text{A}, T_C = +100^\circ\text{C}$	–	–	1.5	V
Dynamic Characteristics						
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
Switching Characteristics (Resistive Load)						
Delay Time	t_d	$V_{CC} = 125\text{V}, I_C = 5\text{A}, I_{B1} = I_{B2} = 1\text{A}, t_p = 25\mu\text{s}, \text{Duty Cycle} \leq 1\%$	–	0.05	0.1	μs
Rise Time	t_r		–	0.8	1.5	μs
Storage Time	t_s		–	1.0	3.0	μs
Fall Time	t_f		–	0.15	0.7	μs
Switching Characteristics (Inductive Load), Clamped						
Voltage Storage Time	t_{sv}	$I_C = 5\text{A}, V_{clamp} = 300\text{V}, I_{B1} = 1\text{A}, V_{BE(off)} = 5\text{V}, T_C = +100^\circ\text{C}$	–	0.86	2.3	μs
Crossover Time	t_c		–	0.14	0.7	μs

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

