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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 ($T_A = +25^\circ\text{C}$), P_D	2W
Derate Above 25°C	16mW/ $^\circ\text{C}$
Total Power Dissipation ($T_C = +25^\circ\text{C}$), P_D	80W
Derate Above 25°C	640mW/ $^\circ\text{C}$
Operating Junction Temperature Range, T_J	-65° to $+150^\circ\text{C}$
Storage Temperature Range, T_{stg}	-65° to $+150^\circ\text{C}$
Thermal Resistance, Junction-to-Case, R_{thJC}	1.56 $^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient, R_{thJA}	62.5 $^\circ\text{C/W}$
Lead Temperature (During Soldering, 1/8" from case, 5sec), T_L	$+275^\circ\text{C}$

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 = 10mA, I _B = 0	400	–	–	V
Collector Cutoff Current	I _{CEV}	V _{CEV} = 700V, V _{BE(off)} = 1.5V	–	–	1	mA
		V _{CEV} = 700V, V _{BE(off)} = 1.5V, T _C = +100°C	–	–	5	mA
Emitter Cutoff Current	I _{EBO}	V _{EB} = 9V, I _c = 0	–	–	1	mA
ON Characteristics (Note 2)						
DC Current Gain	h _{FE}	I _C = 2A, V _{CE} = 5V	8	–	60	
		I _C = 5A, V _{CE} = 5V	5	–	30	
Collector–Emitter Saturation Voltage	V _{CE(sat)}	I _C = 2A, I _B = 0.4A	–	–	1	V
		I _C = 5A, I _B = 1A	–	–	2	V
		I _C = 8A, I _B = 2A	–	–	3	V
		I _C = 5A, I _B = 1A, T _C = +100°C	–	–	3	V
Base–Emitter Saturation Voltage	V _{BE(sat)}	I _C = 2A, I _B = 0.4A	–	–	1.2	V
		I _C = 5A, I _B = 1A	–	–	1.6	V
		I _C = 5A, I _B = 1A, T _C = +100°C	–	–	1.5	V
Dynamic Characteristics						
Current–Gain Bandwidth Product	f _T	I _C = 500mA, V _{CE} = 10V, f = 1MHz	4	–	–	MHz
Output Capacitance	C _{ob}	V _{CB} = –10V, I _E = 0, f = 0.1MHz	–	110	–	pF
Switching Characteristics (Resistive Load)						
Delay Time	t _d	V _{CC} = 125V, I _C = 5A, I _{B1} = I _{B2} = 1A, t _p = 25μs, Duty Cycle ≤ 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 = 5A, V _{clamp} = 300V, I _{B1} = 1A, V _{BE(off)} = 5V, T _C = +100°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%.

