

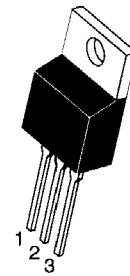
MJE13009

SWITCHMODE Series NPN Silicon Power Transistors

Features

- $V_{CEO(sus)}$ 400 V and 300 V
- Reverse Bias SOA with Inductive Loads @ $T_C = 100^\circ\text{C}$
- Inductive Switching Matrix 3 to 12 Amp, 25 and 100°C t_c @ 8 A, 100°C is 120 ns (Typ)
- 700 V Blocking Capability
- SOA and Switching Applications Information
- These Devices are Pb-Free and are RoHS Compliant*

**12 AMPERE
NPN SILICON
POWER TRANSISTOR
400 VOLTS – 100 WATTS**



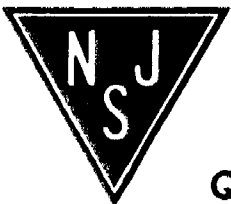
TO-220AB

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO(sus)}$	400	Vdc
Collector-Emitter Voltage	V_{CEV}	700	Vdc
Emitter-Base Voltage	V_{EBO}	9	Vdc
Collector Current – Continuous – Peak (Note 1)	I_C I_{CM}	12 24	Adc
Base Current – Continuous – Peak (Note 1)	I_B I_{BM}	6 12	Adc
Emitter Current – Continuous – Peak (Note 1)	I_E I_{EM}	18 36	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	2 0.016	W W/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	100 0.8	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.25	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 5 Seconds	T_L	275	$^\circ\text{C}$



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Quality Semi-Conductors

MJE13009

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS (Note 2)

Collector-Emitter Sustaining Voltage (I _C = 10 mA, I _B = 0)	V _{CEO(sus)}	400	-	-	Vdc
Collector Cutoff Current (V _{CEV} = Rated Value, V _{BE(off)} = 1.5 Vdc) (V _{CEV} = Rated Value, V _{BE(off)} = 1.5 Vdc, T _C = 100°C)	I _{CEV}	-	-	1 5	mAdc
Emitter Cutoff Current (V _{EB} = 9 Vdc, I _C = 0)	I _{EBO}	-	-	1	mAdc

SECOND BREAKDOWN

Second Breakdown Collector Current with base forward biased Clamped Inductive SOA with Base Reverse Biased	I _{S/b} -	See Figure 1 See Figure 2			
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ON CHARACTERISTICS (Note 2)

DC Current Gain (I _C = 5 Adc, V _{CE} = 5 Vdc) (I _C = 8 Adc, V _{CE} = 5 Vdc)	h _{FE}	8 6	-	40 30	
Collector-Emitter Saturation Voltage (I _C = 5 Adc, I _B = 1 Adc) (I _C = 8 Adc, I _B = 1.6 Adc) (I _C = 12 Adc, I _B = 3 Adc) (I _C = 8 Adc, I _B = 1.6 Adc, T _C = 100°C)	V _{CE(sat)}	-	-	1 1.5 3 2	Vdc
Base-Emitter Saturation Voltage (I _C = 5 Adc, I _B = 1 Adc) (I _C = 8 Adc, I _B = 1.6 Adc) (I _C = 8 Adc, I _B = 1.6 Adc, T _C = 100°C)	V _{BE(sat)}	-	-	1.2 1.6 1.5	Vdc

DYNAMIC CHARACTERISTICS

Current-Gain - Bandwidth Product (I _C = 500 mAdc, V _{CE} = 10 Vdc, f = 1 MHz)	f _T	4	-	-	MHz
Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f = 0.1 MHz)	C _{ob}	-	180	-	pF

SWITCHING CHARACTERISTICS

Resistive Load (Table 1)						
Delay Time	(V _{CC} = 125 Vdc, I _C = 8 A, I _{B1} = I _{B2} = 1.6 A, t _p = 25 μs, Duty Cycle ≤ 1%)	t _d	-	0.06	0.1	μs
Rise Time		t _r	-	0.45	1	μs
Storage Time		t _s	-	1.3	3	μs
Fall Time		t _f	-	0.2	0.7	μs
Inductive Load, Clamped (Table 1, Figure 13)						
Voltage Storage Time	(I _C = 8 A, V _{clamp} = 300 Vdc, I _{B1} = 1.6 A, V _{BE(off)} = 5 Vdc, T _C = 100°C)	t _{sv}	-	0.92	2.3	μs
Crossover Time		t _c	-	0.12	0.7	μs

2. Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2%.