

## Designer's™ Data Sheet

# NPN Silicon Power Transistor

### 1 kV SWITCHMODE Series

These transistors are designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical. They are particularly suited for line-operated switchmode applications.

Typical Applications:

Features:

- Switching Regulators
- Inverters
- Solenoids
- Relay Drivers
- Motor Controls
- Deflection Circuits
- Collector-Emitter Voltage —  $V_{CEV} = 1000$  Vdc
- Fast Turn-Off Times
  - 80 ns Inductive Fall Time — 100°C (Typ)
  - 120 ns Inductive Crossover Time — 100°C (Typ)
  - 800 ns Inductive Storage Time — 100°C (Typ)
- 100°C Performance Specified for:
  - Reverse-Biased SOA with Inductive Load
  - Switching Times with Inductive Loads
  - Saturation Voltages
  - Leakage Currents
- Extended FBSOA Rating Using Ultra-fast Rectifiers
- Extremely High RBSOA Capability

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	500	Vdc
Collector-Emitter Voltage	$V_{CEV}$	1000	Vdc
Emitter-Base Voltage	$V_{EB}$	6	Vdc
Collector Current — Continuous	$I_C$	8	Adc
— Peak(1)	$I_{CM}$	16	
Base Current — Continuous	$I_B$	6	Adc
— Peak(1)	$I_{BM}$	12	
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	$P_D$	125	Watts
@ $T_C = 100^\circ\text{C}$		50	
Derate above $T_C = 25^\circ\text{C}$		1	W/°C
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to 150	°C

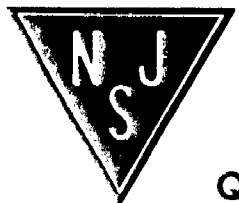
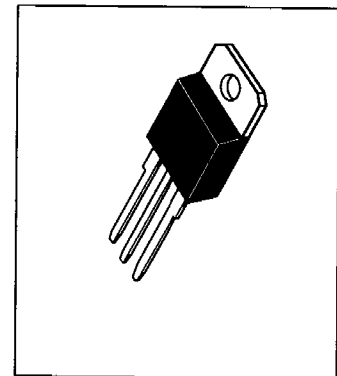
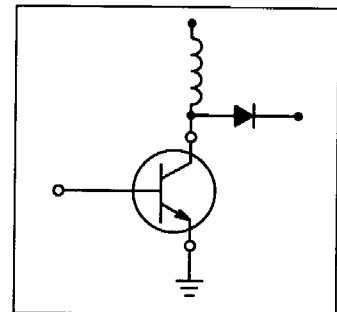
#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1	°C/W
Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	$T_L$	275	°C

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

**MJH16006A**

**POWER TRANSISTORS**  
**8 AMPERES**  
**500 VOLTS**  
**150 WATTS**



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# MJH16006A

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS(1)</b>					
Collector-Emitter Sustaining Voltage (Table 1) (I <sub>C</sub> = 100 mA, I <sub>B</sub> = 0)	V <sub>CEO(sus)</sub>	500	—	—	Vdc
Collector Cutoff Current (V <sub>CEV</sub> = 1000 Vdc, V <sub>BE(off)</sub> = 1.5 Vdc) (V <sub>CEV</sub> = 1000 Vdc, V <sub>BE(off)</sub> = 1.5 Vdc, T <sub>C</sub> = 100°C)	I <sub>CEV</sub>	—	0.003 0.020	0.15 1.0	mAdc
Collector Cutoff Current (V <sub>CE</sub> = 1000 Vdc, R <sub>BE</sub> = 50 Ω, T <sub>C</sub> = 100°C)	I <sub>CER</sub>	—	0.020	1.0	mAdc
Emitter Cutoff Current (V <sub>EB</sub> = 6 Vdc, I <sub>C</sub> = 0)	I <sub>EBO</sub>	—	0.005	0.15	mAdc

## SECOND BREAKDOWN

Second Breakdown Collector Current with Base Forward Biased	I <sub>S/b</sub>	See Figure 14a or 14b			
Clamped Inductive SOA with Base Reverse Biased	RBSOA	See Figure 15			

## ON CHARACTERISTICS(1)

Collector-Emitter Saturation Voltage (I <sub>C</sub> = 3 Adc, I <sub>B</sub> = 0.6 Adc) (I <sub>C</sub> = 5 Adc, I <sub>B</sub> = 1 Adc) (I <sub>C</sub> = 5 Adc, I <sub>B</sub> = 1 Adc, T <sub>C</sub> = 100°C)	V <sub>CE(sat)</sub>	—	0.35 0.50 0.60	0.7 1 1.5	Vdc
Base-Emitter Saturation Voltage (I <sub>C</sub> = 5 Adc, I <sub>B</sub> = 1 Adc) (I <sub>C</sub> = 5 Adc, I <sub>B</sub> = 1 Adc, T <sub>C</sub> = 100°C)	V <sub>BE(sat)</sub>	—	1 1	1.5 1.5	Vdc
DC Current Gain (I <sub>C</sub> = 8 Adc, V <sub>CE</sub> = 5 Vdc)	h <sub>FE</sub>	5	8	—	—

## DYNAMIC CHARACTERISTICS

Output Capacitance (V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, f <sub>test</sub> = 1 kHz)	C <sub>ob</sub>	—	—	350	pF
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## SWITCHING CHARACTERISTICS

Inductive Load (Table 1)							
Storage Time	(I <sub>C</sub> = 5 Adc, I <sub>B1</sub> = 0.66 Adc, V <sub>BE(off)</sub> = 5 Vdc, V <sub>CE(pk)</sub> = 400 Vdc)	(T <sub>J</sub> = 100°C)	t <sub>sv</sub>	—	800	2000	ns
Fall Time			t <sub>fi</sub>	—	80	200	
Crossover Time			t <sub>c</sub>	—	120	300	
Storage Time		(T <sub>J</sub> = 150°C)	t <sub>sv</sub>	—	1000	—	
Fall Time			t <sub>fi</sub>	—	90	—	
Crossover Time			t <sub>c</sub>	—	150	—	
Resistive Load (Table 2)							
Delay Time	(I <sub>C</sub> = 5 Adc, V <sub>CC</sub> = 250 Vdc, I <sub>B1</sub> = 0.66 Adc, PW = 30 μs, Duty Cycle ≤ 2%)	(I <sub>B2</sub> = 1.3 Adc, R <sub>B1</sub> = R <sub>B2</sub> = 4 Ω)	t <sub>d</sub>	—	25	100	ns
Rise Time			t <sub>r</sub>	—	400	700	
Storage Time			t <sub>s</sub>	—	1400	3000	
Fall Time		t <sub>f</sub>	—	175	400		
Storage Time		(V <sub>BE(off)</sub> = 5 Vdc)	t <sub>s</sub>	—	475	—	
Fall Time			t <sub>f</sub>	—	100	—	

(1) Pulse Test: PW = 300 μs, Duty Cycle ≤ 2%.