

## NTE2319 Silicon NPN Transistor High Voltage, High Speed Power Switch

### **Description:**

The NTE2319 is a silicon NPN transistor in a TO3 type package designed for high voltage, high speed, power switching in inductive circuits where fall time is critical. It is particularly suited for line-operated switchmode applications.

### **Features:**

- Fast Turn-On Times @  $T_C = +100^\circ\text{C}$ :  
Inductive Fall Time: 50ns Typ  
Inductive Crossover Time: 90ns Typ  
Inductive Storage Time: 800ns Typ
- $100^\circ\text{C}$  Performance Specified for:  
Reverse-Biased SOA with Inductive Loads  
Switching Times with Inductive Loads  
Saturation Voltages  
Leakage Current

### **Applications:**

- Switching Regulators
- Inverters
- Solenoids
- Relay Drivers
- Motor Controls
- Deflection Circuits

### **Absolute Maximum Ratings:**

Collector-Emitter Voltage, $V_{CEO}$	450V
Collector-Emitter Voltage, $V_{CEV}$	850V
Emitter-Base Voltage, $V_{EB}$	6V
Collector Current, $I_C$	
Continuous	15A
Peak (Note 1)	20A
Base Current, $I_B$	
Continuous	10A
Peak (Note 1)	15A
Total Device Dissipation, $P_D$	
$T_C = +25^\circ\text{C}$	175W
$T_C = +100^\circ\text{C}$	100W
Derate Above $25^\circ\text{C}$	1W/ $^\circ\text{C}$
Operating Junction Temperature Range, $T_J$	$-65^\circ$ to $+200^\circ\text{C}$
Storage Temperature Range, $T_{stg}$	$-65^\circ$ to $+200^\circ\text{C}$
Thermal Resistance, Junction-to-Case, $R_{thJC}$	1 $^\circ\text{C/W}$
Lead Temperature (During Soldering, 1/8" from case, 5sec), $T_L$	$+275^\circ\text{C}$

Note 1. Pulse Test: Pulse Width  $\leq 5\mu\text{s}$ , Duty Cycle  $\geq 10\%$ .

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

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
OFF Characteristics							
Collector–Emitter Sustaining Voltage	V <sub>CEO(sus)</sub>	Table 2, I <sub>C</sub> = 100mA, I <sub>B</sub> = 0		450	–	–	V
Collector Cutoff Current	I <sub>CEV</sub>	V <sub>CEV</sub> = 850V, V <sub>BE(off)</sub> = 1.5V	T <sub>C</sub> = +25°C	–	–	0.25	mA
			T <sub>C</sub> = +100°C	–	–	1.5	mA
	I <sub>CER</sub>	V <sub>CE</sub> = 850V, R <sub>BE</sub> = 50Ω, T <sub>C</sub> = +100°C	–	–	2.5	mA	
Emitter Cutoff Current	I <sub>EBO</sub>	V <sub>EB</sub> = 6V, I <sub>C</sub> = 0		–	–	1.0	mA
ON Characteristics (Note 2)							
Collector–Emitter Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 5A, I <sub>B</sub> = 700mA		–	–	2.5	V
		I <sub>C</sub> = 10A, I <sub>B</sub> = 1.3A	T <sub>C</sub> = +25°C	–	–	3.0	V
			T <sub>C</sub> = +100°C	–	–	3.0	V
Base–Emitter Saturation Voltage	V <sub>BE(sat)</sub>	I <sub>C</sub> = 10A, I <sub>B</sub> = 1.3A	T <sub>C</sub> = +25°C	–	–	1.5	V
			T <sub>C</sub> = +100°C	–	–	1.5	V
DC Current Gain	h <sub>FE</sub>	I <sub>C</sub> = 15A, V <sub>CE</sub> = 5V		5	–	–	
Dynamic Characteristics							
Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> = 10V, I <sub>E</sub> = 0, f <sub>test</sub> = 1kHz		–	–	400	pF
Switching Characteristics							
Resistive Load (Table 1)							
Delay Time	t <sub>d</sub>	I <sub>C</sub> = 10A, V <sub>CC</sub> = 250V, I <sub>B1</sub> = 1.3A, PW = 30vs, Duty Cycle ≤ 2%	I <sub>B2</sub> = 2.6A, R <sub>B</sub> = 1.6Ω	–	20	–	ns
Rise Time	t <sub>r</sub>			–	200	–	ns
Storage Time	t <sub>s</sub>			–	1200	–	ns
Fall Time	t <sub>f</sub>			–	200	–	ns
Storage Time	t <sub>s</sub>		V <sub>BE(off)</sub> = 5V	–	650	–	ns
Fall Time	t <sub>f</sub>			–	80	–	ns
Inductive Load (Table 2)							
Storage Time	t <sub>sv</sub>	I <sub>C</sub> = 10A, I <sub>B1</sub> = 1.3A, V <sub>BE(off)</sub> = 5V, V <sub>CE(pk)</sub> = 400V	T <sub>C</sub> = +100°C	–	800	1800	ns
Fall Time	t <sub>fi</sub>			–	50	200	ns
Crossover Time	t <sub>c</sub>			–	90	250	ns
Storage Time	t <sub>sv</sub>		T <sub>C</sub> = +150°C	–	1050	–	ns
Fall Time	t <sub>fi</sub>			–	70	–	ns
Crossover Time	t <sub>c</sub>			–	120	–	ns

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

