

## 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°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°C .....	1W/°C
Operating Junction Temperature Range, $T_J$ .....	-65° to +200°C
Storage Temperature Range, $T_{stg}$ .....	-65° to +200°C
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	1°C/W
Lead Temperature (During Soldering, 1/8" from case, 5sec), $T_L$ .....	+275°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	
<b>OFF Characteristics</b>							
Collector–Emitter Sustaining Voltage	$V_{CEO(sus)}$	Table 2, $I_C = 100\text{mA}$ , $I_B = 0$	450	–	–	V	
Collector Cutoff Current	$I_{CEV}$	$V_{CEV} = 850\text{V}$ , $V_{BE(off)} = 1.5\text{V}$	$T_C = +25^\circ\text{C}$	–	–	0.25	mA
			$T_C = +100^\circ\text{C}$	–	–	1.5	mA
	$I_{CER}$	$V_{CE} = 850\text{V}$ , $R_{BE} = 50\Omega$ , $T_C = +100^\circ\text{C}$	–	–	2.5	mA	
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 6\text{V}$ , $I_C = 0$	–	–	1.0	mA	
<b>ON Characteristics (Note 2)</b>							
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 5\text{A}$ , $I_B = 700\text{mA}$	$T_C = +25^\circ\text{C}$	–	–	2.5	V
			$T_C = +100^\circ\text{C}$	–	–	3.0	V
		$I_C = 10\text{A}$ , $I_B = 1.3\text{A}$	$T_C = +25^\circ\text{C}$	–	–	3.0	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 10\text{A}$ , $I_B = 1.3\text{A}$	$T_C = +25^\circ\text{C}$	–	–	1.5	V
			$T_C = +100^\circ\text{C}$	–	–	1.5	V
DC Current Gain	$h_{FE}$	$I_C = 15\text{A}$ , $V_{CE} = 5\text{V}$	5	–	–		
<b>Dynamic Characteristics</b>							
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}$ , $I_E = 0$ , $f_{test} = 1\text{kHz}$	–	–	400	pF	
<b>Switching Characteristics</b>							
Resistive Load (Table 1)							
Delay Time	$t_d$	$I_C = 10\text{A}$ , $V_{CC} = 250\text{V}$ , $I_{B1} = 1.3\text{A}$ , $PW = 30\mu\text{s}$ , Duty Cycle $\leq 2\%$	$I_{B2} = 2.6\text{A}$ , $R_B = 1.6\Omega$	–	20	–	ns
Rise Time	$t_r$			–	200	–	ns
Storage Time	$t_s$			–	1200	–	ns
Fall Time	$t_f$			–	200	–	ns
Storage Time	$t_s$			$V_{BE(off)} = 5\text{V}$	–	650	–
Fall Time	$t_f$		–		80	–	ns
Inductive Load (Table 2)							
Storage Time	$t_{sv}$	$I_C = 10\text{A}$ , $I_{B1} = 1.3\text{A}$ , $V_{BE(off)} = 5\text{V}$ , $V_{CE(pk)} = 400\text{V}$	$T_C = +100^\circ\text{C}$	–	800	1800	ns
Fall Time	$t_{fi}$			–	50	200	ns
Crossover Time	$t_c$			–	90	250	ns
Storage Time	$t_{sv}$		$T_C = +150^\circ\text{C}$	–	1050	–	ns
Fall Time	$t_{fi}$			–	70	–	ns
Crossover Time	$t_c$			–	120	–	ns

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

