



**ELECTRONICS, INC.**  
 44 FARRAND STREET  
 BLOOMFIELD, NJ 07003  
 (973) 748-5089

## NTE52 Silicon NPN Transistor High Voltage, High Speed Switch

**Description:**

The NTE52 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. This device is particularly suited for line-operated switch-mode applications.

**Applications:**

- Switching Regulators
- Motor Controls
- Inverters
- Solenoid and Relay Drivers

**Features:**

- Fast Turn-Off Times:
  - 100ns Inductive Fall Time @ +25°C (Typ)
  - 150ns Inductive Crossover Time @ +25°C (Typ)
  - 400ns Inductive Storage Time @ +25°C (Typ)
- Operating Temperature Range: -65° to +200°C

**Absolute Maximum Ratings:**

Collector-Emitter Voltage, $V_{CEO(sus)}$ .....	450V
Collector-Emitter Voltage, $V_{CEV}$ .....	750V
Emitter-Base Voltage, $V_{EB}$ .....	6V
Collector Current, $I_C$	
Continuous .....	5A
Peak (Note 1) .....	8A
Base Current, $I_B$	
Continuous .....	2A
Peak (Note 1) .....	4A
Total Device Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....	125W
Derate Above 25°C .....	0.714W/°C
Total Device Dissipation ( $T_C = +100^\circ C$ ), $P_D$ .....	71.5W
Operating Junction Temperature Range, $T_J$ .....	-65° to +200°C
Storage Temperature Range, $T_{stg}$ .....	-65° to +200°C
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	1.4°C/W
Maximum Lead temperature (During Soldering, 1/8" from case, 5sec), $T_L$ .....	+275°C

Note 1. Pulse test: Pulse Width = 5ms, Duty Cycle ≤ 10%.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF Characteristics (Note 2)</b>						
Collector–Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 100\text{mA}, I_B = 0$	450	–	–	V
Collector Cutoff Current	$I_{CEV}$	$V_{CEV} = 750\text{V}, V_{BE(off)} = 1.5\text{V}$	–	–	0.5	mA
		$V_{CEV} = 750\text{V}, V_{BE(off)} = 1.5\text{V}, T_C = +100^\circ\text{C}$	–	–	2.5	mA
	$I_{CER}$	$V_{CEV} = 750\text{V}, R_{BE} = 50\Omega, T_C = +100^\circ\text{C}$	–	–	3.0	mA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 6\text{V}, I_C = 0$	–	–	1.0	mA
<b>ON Characteristics (Note 2)</b>						
DC Current Gain	$h_{FE}$	$V_{CE} = 5\text{V}, I_C = 3\text{A}$	8	–	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 3\text{A}, I_B = 0.6\text{A}$	–	–	1.0	V
		$I_C = 3\text{A}, I_B = 0.6\text{A}, T_C = +100^\circ\text{C}$	–	–	2.0	V
		$I_C = 5\text{A}, I_B = 1\text{A}$	–	–	3.0	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 3\text{A}, I_B = 0.6\text{A}$	–	–	1.5	V
		$I_C = 3\text{A}, I_B = 0.6\text{A}, T_C = +100^\circ\text{C}$	–	–	1.5	V
<b>Dynamic Characteristics</b>						
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{kHz}$	–	–	250	pF
<b>Switching Characteristics (Resistive Load)</b>						
Delay Time	$t_d$	$V_{CC} = 250\text{V}, I_C = 3\text{A}, I_{B1} = 0.4\text{A}, V_{BE(off)} = 5\text{V}, t_p = 300\mu\text{s}, \text{Duty Cycle} \leq 2\%$	–	0.03	0.05	$\mu\text{s}$
Rise Time	$t_r$		–	0.10	1.40	$\mu\text{s}$
Storage Time	$t_s$		–	0.40	0.50	$\mu\text{s}$
Fall Time	$t_f$		–	0.175	0.500	$\mu\text{s}$
<b>Switching Characteristics (Inductive Load, Clamped)</b>						
Storage Time	$t_{sv}$	$I_C = 3\text{A peak}, V_{clamp} = 250\text{V}, I_{B1} = 0.4\text{A}, V_{BE(off)} = 5\text{V}$	–	0.40	–	$\mu\text{s}$
Crossover Time	$t_c$		–	0.15	–	$\mu\text{s}$
Fall Time	$t_{fi}$		–	0.10	–	$\mu\text{s}$
Storage Time	$t_{sv}$	$I_C = 3\text{A peak}, V_{clamp} = 250\text{V}, I_{B1} = 0.4\text{A}, V_{BE(off)} = 5\text{V}, T_J = +100^\circ\text{C}$	–	0.70	2.0	$\mu\text{s}$
Crossover Time	$t_c$		–	0.28	0.50	$\mu\text{s}$
Fall Time	$t_{fi}$		–	0.15	0.30	$\mu\text{s}$

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

