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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
OFF Characteristics (Note 2)						
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
ON Characteristics (Note 2)						
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
Dynamic Characteristics						
Output Capacitance	C_{ob}	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{kHz}$	–	–	250	pF
Switching Characteristics (Resistive Load)						
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	μs
Rise Time	t_r		–	0.10	1.40	μs
Storage Time	t_s		–	0.40	0.50	μs
Fall Time	t_f		–	0.175	0.500	μs
Switching Characteristics (Inductive Load, Clamped)						
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	–	μs
Crossover Time	t_c		–	0.15	–	μs
Fall Time	t_{fi}		–	0.10	–	μs
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	μs
Crossover Time	t_c		–	0.28	0.50	μs
Fall Time	t_{fi}		–	0.15	0.30	μs

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

