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NTE51
Silicon NPN Transistor
High Voltage, High Speed Switch

Description:

The NTE51 is a silicon NPN transistor in a TO220 type package designed for high–voltage, high–speed power switching inductive circuits where fall time is critical. This device is particularly suited for 115V and 220V SWITCHMODE applications such as switching regulators, Inverters, motor controls, solenoid/relay drivers and deflection circuits.

Features:

- Reverse Bias SOA with Inductive Loads @ T_C = +100°C
- 700V Blocking Capability

Absolute Maximum Ratings:

Collector–Emitter Voltage, $V_{CEO(sus)}$ 400V
Collector–Emitter Voltage, V_{CEV} 700V
Emitter Base Voltage, V_{EBO} 9V
Collector Current, I_C
  Continuous 4A
  Peak (Note 1) 8A
Base Current, I_B
  Continuous 2A
  Peak (Note 1) 4A
Emitter Current, I_E
  Continuous 6A
  Peak (Note 1) 12A
Total Power Dissipation (T_A = +25°C), P_D 2W
  Derate above 25°C . . . . . 16mW/°C
Total Power Dissipation (T_C = +25°C), P_D 75W
  Derate above 25°C . . . . . 600mW/°C
Operating Junction Temperature Range, T_J . . . . . –65° to +150°C
Storage Temperature Range, T_{stg} . . . . . –65° to +150°C
Thermal Resistance, Junction–to–Case, R_{thJC} . . . . . 1.67°C/W
Thermal Resistance, Junction–to–Ambient, R_{thJA} . . . . . 62.5°C/W
Lead Temperature (During Soldering, 1/8” from case, 5sec), T_L . . . . . +275°C

Electrical Characteristics: (T_C = +25°C unless otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics (Note 1)						
Collector–Emitter Sustaining Voltage	$V_{CEO(sus)}$	I_c = 10mA, I_B = 0	400	–	–	V
Collector Cutoff Current	I_{CEV}	V_{CEV} = 700V, $V_{BE(off)}$ = 1.5V	–	–	1	mA
		V_{CEV} = 700V, $V_{BE(off)}$ = 1.5V, T_C = +100°C	–	–	1	mA
Emitter Cutoff Current	I_{EBO}	V_{EB} = 9V, I_c = 0	–	–	1	mA

Note 1. Pulse test: Pulse Width = 300μs, Duty Cycle = 2%.

Electrical Characteristics (Cont'd): (T_C = +25°C unless otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
ON Characteristics (Note 1)						
DC Current Gain	h_{FE}	V_{CE} = 5V, I_C = 1A	10	–	60	
		V_{CE} = 5V, I_C = 2A	8	–	40	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 1A, I_B = 0.2A	–	–	0.5	V
		I_C = 2A, I_B = 0.5A	–	–	0.6	V
		I_C = 2A, I_B = 0.5A, T_C = +100°C	–	–	1.0	V
		I_C = 4A, I_B = 1A	–	–	1.0	V
Dynamics Characteristics						
Current Gain–Bandwidth Product	f_T	V_{CE} = 10V, I_C = 500mA, f = 1MHz	4	–	–	MHz
Output Capacitance	C_{ob}	V_{CB} = 10V, I_E = 0, f = 0.1MHz	–	65	–	pF
Switching Characteristics (Resistive Load)						
Delay Time	t_d	V_{CC} = 125V, I_C = 2A, I_{B1} = I_{B2} = 0.4A, t_p = 25µs, Duty Cycle ≤ 1%	–	0.025	0.1	µs
Rise Time	t_r		–	0.3	0.7	µs
Storage Time	t_s		–	1.7	4.0	µs
Fall Time	t_f		–	0.4	0.9	µs
Switching Characteristics (Inductive Load, Clamped)						
Voltage Storage Time	t_{sv}	V_{clamp} = 300V, I_{B1} = 0.4A, $V_{BE(off)}$ = 5V	–	0.9	4.0	µs
Crossover Time	t_c		–	0.32	0.9	µs
Fall Time	t_{fi}		–	0.16	–	µs

Note 1. Pulse test: Pulse Width = 300µs, Duty Cycle = 2%.