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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/ $^\circ\text{C}$ |
| Operating Junction Temperature Range, T_J | -65° to $+200^\circ\text{C}$ |
| Storage Temperature Range, T_{stg} | -65° to $+200^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Case, R_{thJC} | 1 $^\circ\text{C}/\text{W}$ |
| 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 | $V_{CEO(sus)}$ | 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 | |
| ON Characteristics (Note 2) | | | | | | | |
| 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 |
| | | | $T_C = +100^\circ\text{C}$ | – | – | 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 | – | – | | |
| Dynamic Characteristics | | | | | | | |
| Output Capacitance | C_{ob} | $V_{CB} = 10\text{V}$, $I_E = 0$, $f_{test} = 1\text{kHz}$ | – | – | 400 | pF | |
| Switching Characteristics | | | | | | | |
| 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 $\leq 2\%$.

