# NTE2312
# Silicon NPN Transistor
# High Voltage, High Speed Switch

**Description:**

The NTE2312 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 switch–mode applications such as switching regulators, inverters, motor controls, solenoid/relay drivers, and deflection circuits.

**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 . . . . . . . . 8A
  Peak (Note 1) . . . . . . . . 16A
Base Current, $I_B$
  Continuous . . . . . . . . 4A
  Peak (Note 1) . . . . . . . . 8A
Emitter Current, $I_E$
  Continuous . . . . . . . . 12A
  Peak (Note 1) . . . . . . . . 24A
Total Power Dissipation ($T_A$ = +25°C), $P_D$ . . . . . . . . 2W
  Derate Above 25°C . . . . . . . . 16mW/°C
Total Power Dissipation ($T_C$ = +25°C), $P_D$ . . . . . . . . 80W
  Derate Above 25°C . . . . . . . . 640mW/°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, $R_{thJC}$ . . . . . . . . 1.56°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

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

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**Electrical Characteristics:** ($T_C$ = +25°C unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF Characteristics** (Note 2) | | | | | | |
| Collector–Emitter Sustaining Voltage | $V_{CEO(sus)}$ | $I_C$ = 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 | – | – | 5 | mA |
| Emitter Cutoff Current | $I_{EBO}$ | $V_{EB}$ = 9V, $I_c$ = 0 | – | – | 1 | mA |
| **ON Characteristics** (Note 2) | | | | | | |
| DC Current Gain | $h_{FE}$ | $I_C$ = 2A, $V_{CE}$ = 5V | 8 | – | 60 | |
| | | $I_C$ = 5A, $V_{CE}$ = 5V | 5 | – | 30 | |
| Collector–Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$ = 2A, $I_B$ = 0.4A | – | – | 1 | V |
| | | $I_C$ = 5A, $I_B$ = 1A | – | – | 2 | V |
| | | $I_C$ = 8A, $I_B$ = 2A | – | – | 3 | V |
| | | $I_C$ = 5A, $I_B$ = 1A, $T_C$ = +100°C | – | – | 3 | V |
| Base–Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C$ = 2A, $I_B$ = 0.4A | – | – | 1.2 | V |
| | | $I_C$ = 5A, $I_B$ = 1A | – | – | 1.6 | V |
| | | $I_C$ = 5A, $I_B$ = 1A, $T_C$ = +100°C | – | – | 1.5 | V |
| **Dynamic Characteristics** | | | | | | |
| Current–Gain Bandwidth Product | $f_T$ | $I_C$ = 500mA, $V_{CE}$ = 10V, f = 1MHz | 4 | – | – | MHz |
| Output Capacitance | $C_{ob}$ | $V_{CB}$ = –10V, $I_E$ = 0, f = 0.1MHz | – | 110 | – | pF |
| **Switching Characteristics** (Resistive Load) | | | | | | |
| Delay Time | $t_d$ | $V_{CC}$ = 125V, $I_C$ = 5A, $I_{B1}$ = $I_{B2}$ = 1A, $t_p$ = 25µs, Duty Cycle ≤ 1% | – | 0.05 | 0.1 | µs |
| Rise Time | $t_r$ | | – | 0.8 | 1.5 | µs |
| Storage Time | $t_s$ | | – | 1.0 | 3.0 | µs |
| Fall Time | $t_f$ | | – | 0.15 | 0.7 | µs |
| **Switching Characteristics** (Inductive Load), Clamped | | | | | | |
| Voltage Storage Time | $t_{sv}$ | $I_C$ = 5A, $V_{clamp}$ = 300V, $I_{B1}$ = 1A, $V_{BE(off)}$ = 5V, $T_C$ = +100°C | – | 0.86 | 2.3 | µs |
| Crossover Time | $t_c$ | | – | 0.14 | 0.7 | µs |

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

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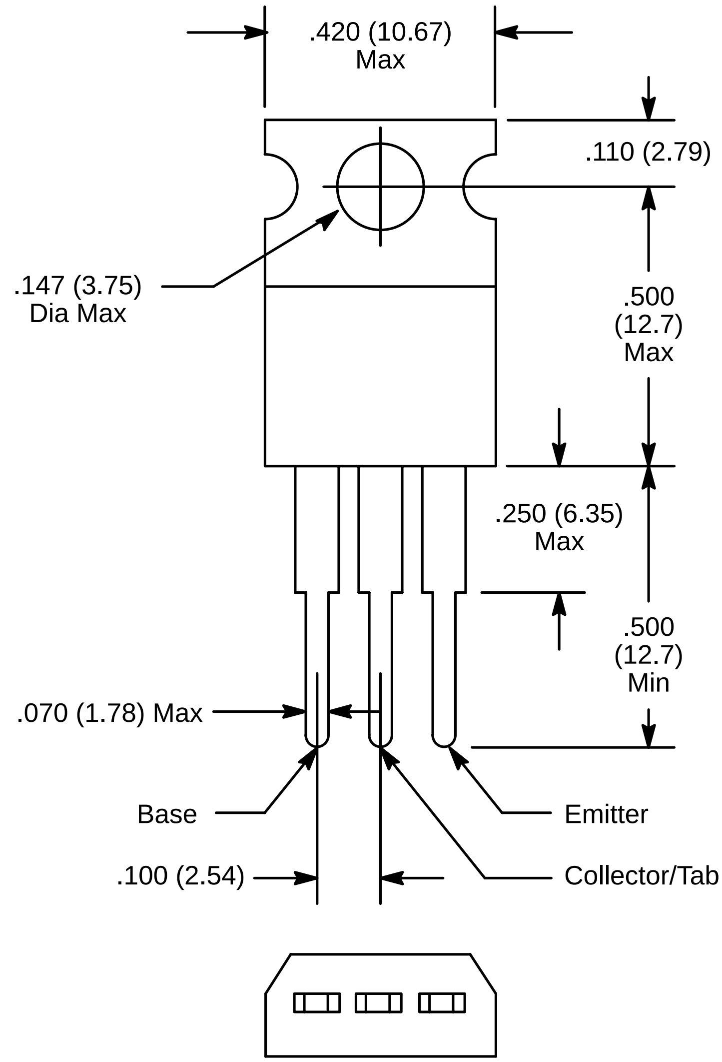


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