FAIRCHILD SEMICONDUCTOR®

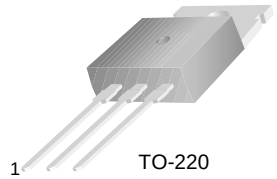
July 2013

# FJP13009

# High-Voltage Fast-Switching NPN Power Transistor

## Features

- High-Voltage Capability
- High Switching Speed
- Suitable for Electronic Ballast and Switched Mode Power Supply




TO-220

1.Base 2.Collector 3.Emitter

## Ordering Information

| Part Number(1) | Marking | Package | Packing Method |
|---|---|---|---|
| FJP13009TU | J13009 | TO-220 3L | Rail |
| FJP13009H2TU | J13009-2 | TO-220 3L | Rail |

**Note:**

1. The Affix “-H2” means the hFE classification.

   The Suffix “-TU” means the tube packing method.

## Absolute Maximum Ratings(2)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_C$ = 25°C unless otherwise noted.

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $V_{CBO}$ | Collector-Base Voltage | 700 | V |
| $V_{CEO}$ | Collector-Emitter Voltage | 400 | V |
| $V_{EBO}$ | Emitter-Base Voltage | 9 | V |
| $I_C$ | Collector Current (DC) | 12 | A |
| $I_{CP}$ | Collector Current (Pulse) | 24 | A |
| $I_B$ | Base Current | 6 | A |
| $P_D$ | Total Device Dissipation ($T_C$ = 25°C) | 100 | W |
| $T_J$ | Junction Temperature | 150 | °C |
| $T_{STG}$ | Storage Temperature Range | -65 to +150 | °C |

**Note:**

2. These ratings are based on a maximum junction temperature of 150°C.
   These are steady state limits. The factory should be consulted on application involving pulsed or low duty cycle operations.

## Electrical Characteristics

Values are at $T_C$ = 25°C unless otherwise noted.

| Symbol | Parameter | Conditions | Min. | Typ. | Max | Units |
|---|---|---|---|---|---|---|
| $V_{CEO}$(sus) | Collector-Emitter Sustaining Voltage | $I_C$ = 10 mA, $I_B$ = 0 | 400 | | | V |
| $I_{EBO}$ | Emitter Cut-Off Current | $V_{EB}$ = 9 V, $I_C$ = 0 | | | 1 | mA |
| $h_{FE}$ | DC Current Gain(3) | $V_{CE}$ = 5 V, $I_C$ = 5 A ($h_{FE1}$) | 8 | | 40 | |
| | | $V_{CE}$ = 5 V, $I_C$ = 8 A | 6 | | 30 | |
| $V_{CE}$(sat) | Collector-Emitter Saturation Voltage(3) | $I_C$ = 5 A, $I_B$ = 1 A | | | 1.0 | V |
| | | $I_C$ = 8 A, $I_B$ = 1.6 A | | | 1.5 | |
| | | $I_C$ = 12 A, $I_B$ = 3 A | | | 3.0 | |
| $V_{BE}$ (sat) | Base-Emitter Saturation Voltage(3) | $I_C$ = 5 A, $I_B$ = 1 A | | | 1.2 | V |
| | | $I_C$ = 8 A, $I_B$ = 1.6 A | | | 1.6 | |
| $C_{ob}$ | Output Capacitance | $V_{CB}$ = 10 V, f = 0.1 MHz | | 180 | | pF |
| $f_T$ | Current Gain Bandwidth Product | $V_{CE}$ = 10 V, $I_C$ = 0.5 A | 4 | | | MHz |
| $t_{ON}$ | Turn-On Time | $V_{CC}$ = 125 V, $I_C$ = 8 A, $I_{B1}$ = - $I_{B2}$ = 1.6 A, $R_L$ = 15.6 Ω | | | 1.1 | µs |
| $t_{STG}$ | Storage Time | | | | 3.0 | |
| $t_F$ | Fall Time | | | | 0.7 | |

**Note:**

3. Pulse test: pulse width ≤ 300 µs, duty cycle ≤ 2%.

## $h_{FE}$ Classification

| Classification | H1 | H2 |
|---|---|---|
| $h_{FE1}$ | 8 ~ 17 | 15 ~ 28 |

## Typical Performance Characteristics

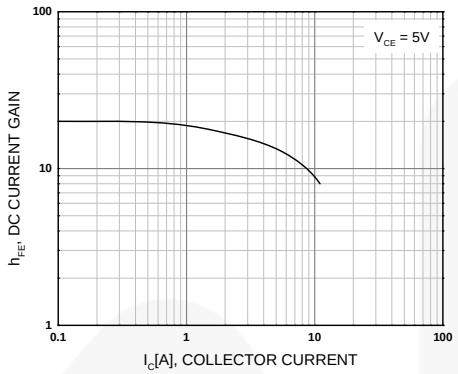



**Figure 1. DC Current Gain**

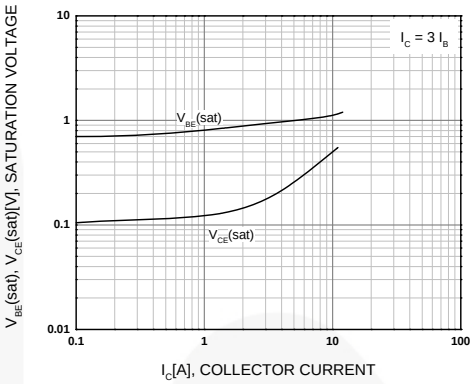



**Figure 2. Base-Emitter Saturation Voltage Collector-Emitter Saturation Voltage**

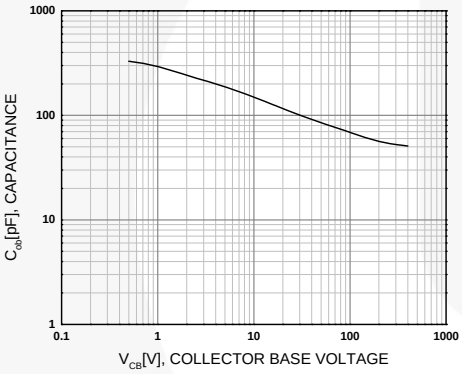



**Figure 3. Collector Output Capacitance**

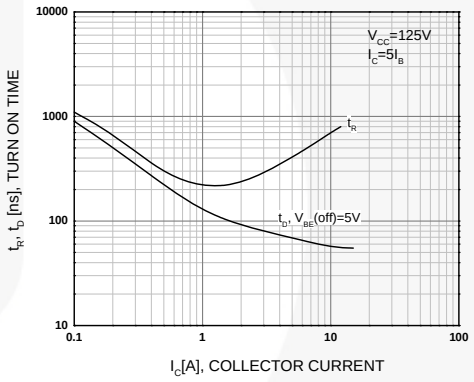



**Figure 4. Turn-On Time**

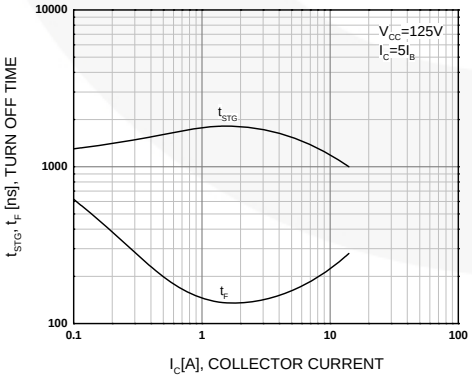



**Figure 5. Turn-Off Time**

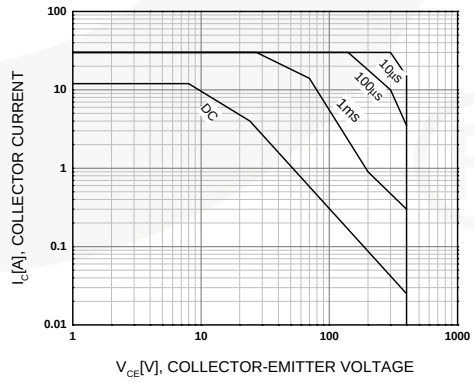



**Figure 6. Forward Bias Safe Operating Area**

## Typical Performance Characteristics (continued)

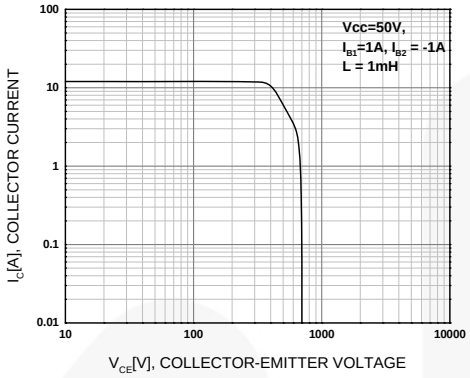



**Figure 7. Reverse Bias Safe Operating Area**

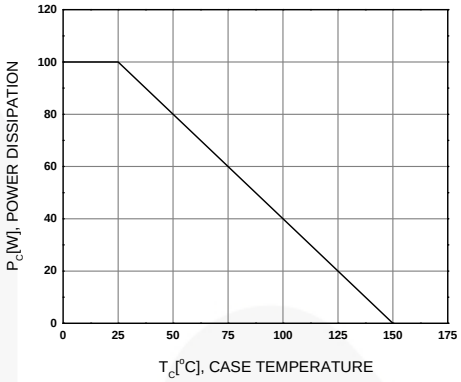



**Figure 8. Power Derating**

## Physical Dimensions

TO-220 3L

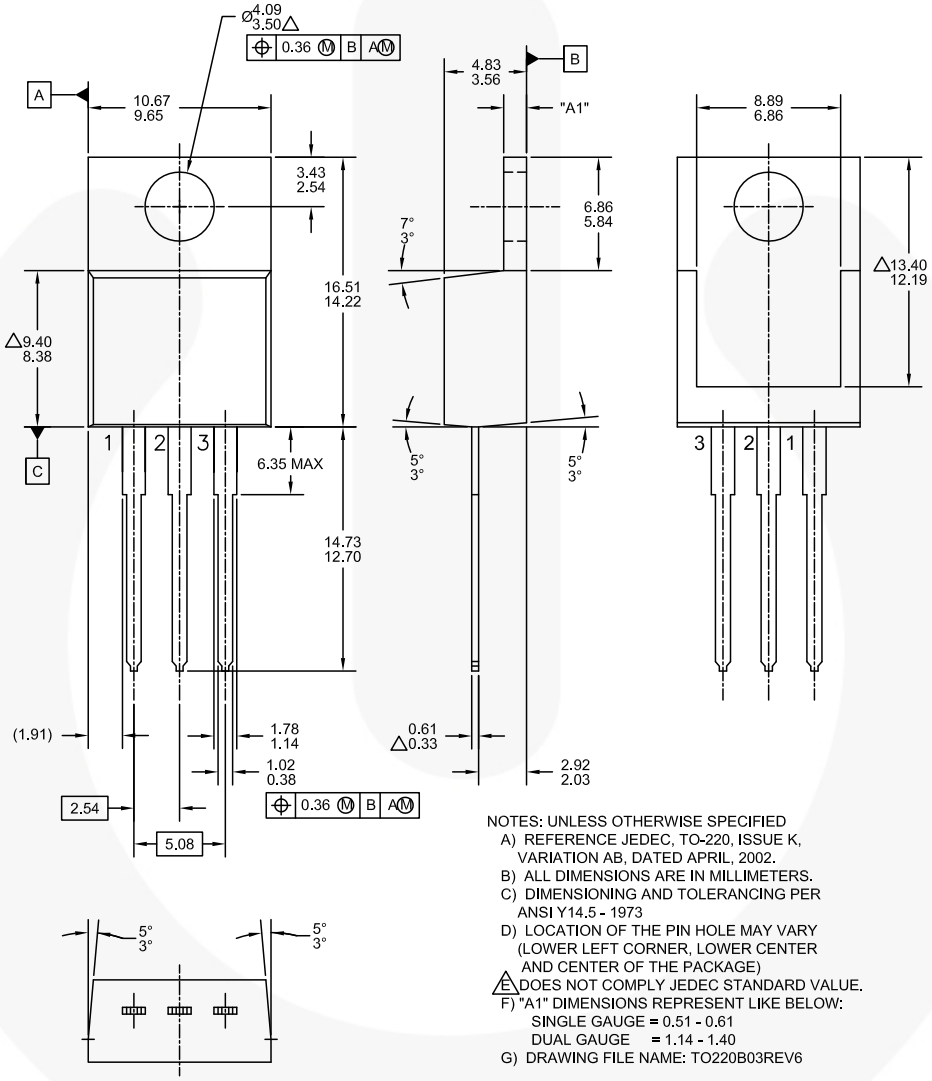



**Figure 9. TO220, MOLDED, 3-LEAD, JEDEC VARIATION (ACTIVE)**

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