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FAIRCHILD SEMICONDUCTOR®

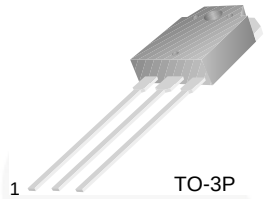
July 2013

# FJA13009

# High-Voltage Switch Mode Application

## Features

- High-Speed Switching
- Suitable for Switching Regulator and Motor Control




TO-3P

1.Base 2.Collector 3.Emitter

## Ordering Information

| Part Number | Marking | Package | Packing Method |
|---|---|---|---|
| FJA13009TU | J13009 | TO-3P | Rail |

## Absolute Maximum Ratings

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) | 130 | W |
| $T_J$ | Junction Temperature | 150 | °C |
| $T_{STG}$ | Storage Temperature | - 65 to +150 | °C |

## Electrical Characteristics[1]

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

| Symbol | Parameter | Test Condition | 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 | $V_{EB}$ = 7 V, $I_C$ = 0 | | | 1 | mA |
| $h_{FE}$ | DC Current Gain | $V_{CE}$ = 5 V, $I_C$ = 5 A | 8 | | 40 | |
| | | $V_{CE}$ = 5 V, $I_C$ = 8 A | 6 | | 30 | |
| $V_{CE}$(sat) | Collector-Emitter Saturation Voltage | $I_C$ = 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 | $I_C$ = 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<br>$I_{B1}$ = - $I_{B2}$ = 1.6 A<br>$R_L$ = 15.6 Ω | | | 1.1 | µs |
| $t_{STG}$ | Storage Time | | | | 3.0 | |
| $t_F$ | Fall Time | | | | 0.7 | |

**Note:**

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

## Typical Performance Characteristics

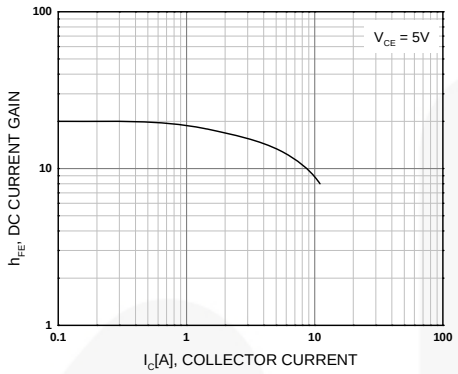



**Figure 1. DC Current Gain**

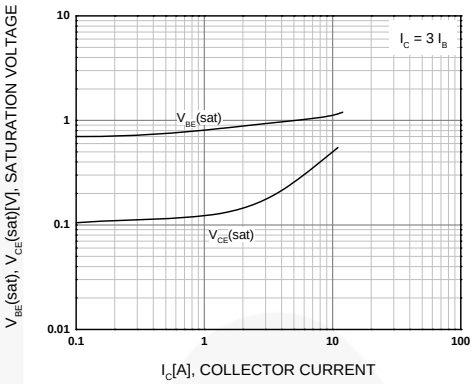



**Figure 2. Base-Emitter Saturation Voltage Collector-Emitter Saturation Voltage**

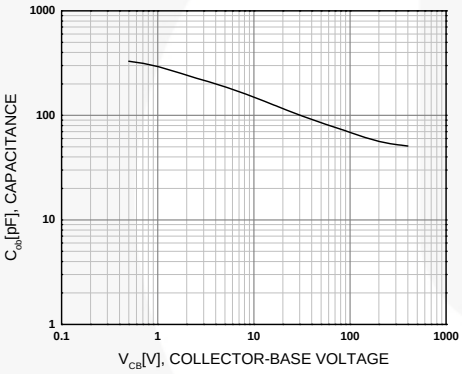



**Figure 3. Collector Output Capacitance**

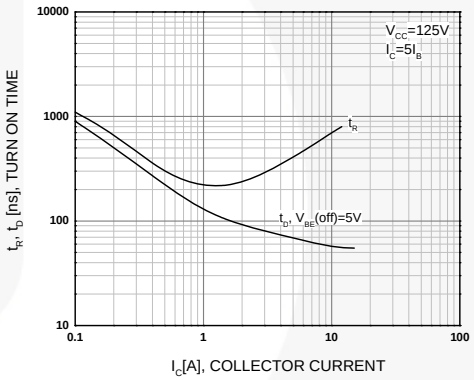



**Figure 4. Turn-On Time**

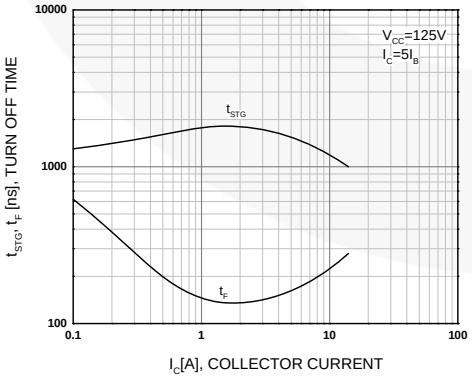



**Figure 5. Turn-Off Time**

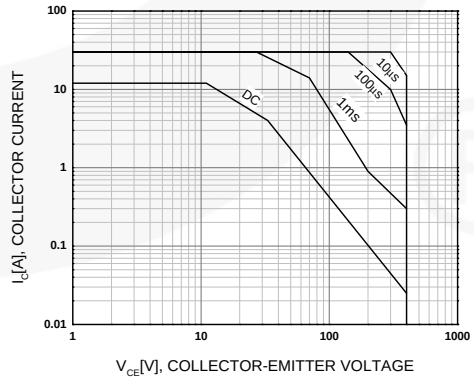



**Figure 6. Forward Bias Safe Operating Area**

## Typical Performance Characteristics (continued)

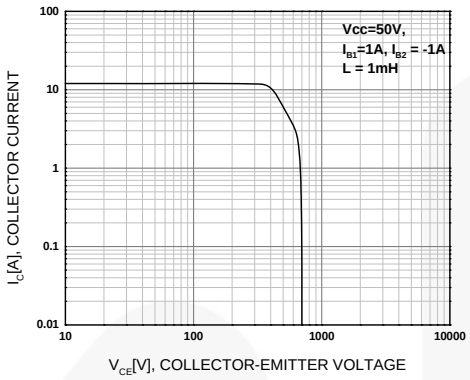



**Figure 7. Reverse Bias Safe Operating Area**

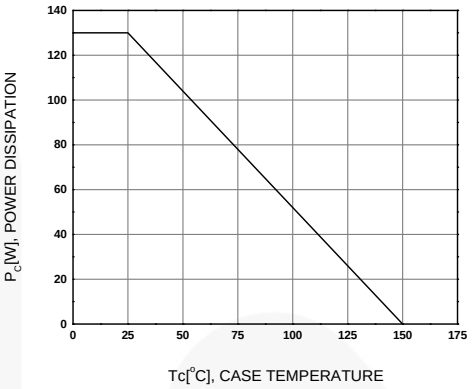



**Figure 8. Power Derating**

## Physical Dimensions

TO-3P

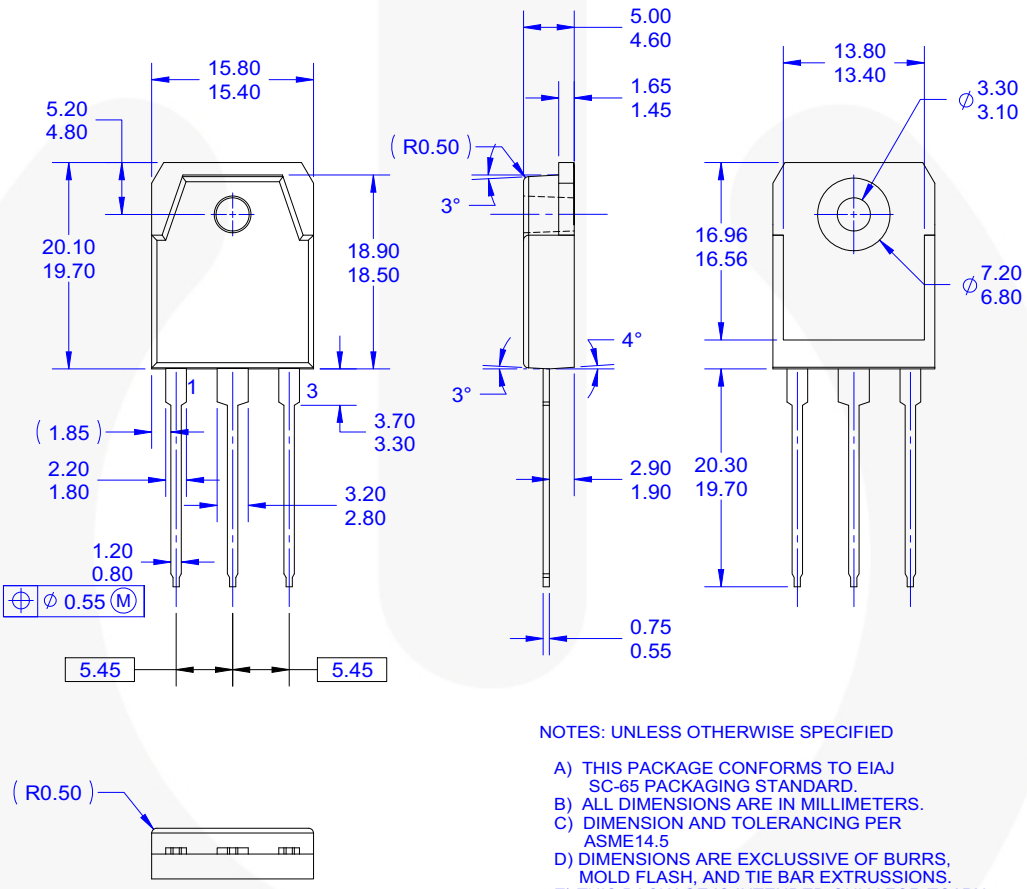



**Figure 9. 3-LEAD, T03, PLASTIC, EIAJ SC-65 (ACTIVE)**

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