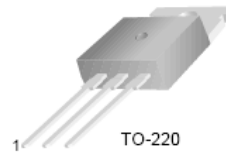


TIP31/TIP31A/TIP31B/TIP31C

NPN Epitaxial Silicon Transistor

Features

- Complementary to TIP32/TIP32A/TIP32B/TIP32C



TO-220
1. Base 2. Collector 3. Emitter

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Value | Units |
|-----------|--|------------|------------------|
| V_{CBO} | Collector-Base Voltage : TIP31 | 40 | V |
| | : TIP31A | 60 | V |
| | : TIP31B | 80 | V |
| | : TIP31C | 100 | V |
| V_{CEO} | Collector-Emitter Voltage : TIP31 | 40 | V |
| | : TIP31A | 60 | V |
| | : TIP31B | 80 | V |
| | : TIP31C | 100 | V |
| V_{EBO} | Emitter-Base Voltage | 5 | V |
| I_C | Collector Current (DC) | 3 | A |
| I_{CP} | Collector Current (Pulse) | 5 | A |
| I_B | Base Current | 1 | A |
| P_C | Collector Dissipation ($T_C=25^\circ\text{C}$) | 40 | W |
| | Collector Dissipation ($T_a=25^\circ\text{C}$) | 2 | W |
| T_J | Junction Temperature | 150 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature | - 65 ~ 150 | $^\circ\text{C}$ |

Electrical Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Condition | Min. | Max. | Units |
|----------------|---|---|-----------------------|--------------------------|--|
| $V_{CEO(sus)}$ | * Collector-Emitter Sustaining Voltage : TIP31 : TIP31A : TIP31B : TIP31C | $I_C = 30\text{mA}, I_B = 0$ | 40 60 80 100 | | V V V V |
| I_{CEO} | Collector Cut-off Current : TIP31/31A : TIP31B/31C | $V_{CE} = 30\text{V}, I_B = 0$ $V_{CE} = 60\text{V}, I_B = 0$ | | 0.3 0.3 | mA mA |
| I_{CES} | Collector Cut-off Current : TIP31 : TIP31A : TIP31B : TIP31C | $V_{CE} = 40\text{V}, V_{EB} = 0$ $V_{CE} = 60\text{V}, V_{EB} = 0$ $V_{CE} = 80\text{V}, V_{EB} = 0$ $V_{CE} = 100\text{V}, V_{EB} = 0$ | | 200 200 200 200 | μA μA μA μA |
| I_{EBO} | Emitter Cut-off Current | $V_{EB} = 5\text{V}, I_C = 0$ | | 1 | mA |
| h_{FE} | * DC Current Gain | $V_{CE} = 4\text{V}, I_C = 1\text{A}$ $V_{CE} = 4\text{V}, I_C = 3\text{A}$ | 25 10 | 50 | |
| $V_{CE(sat)}$ | * Collector-Emitter Saturation Voltage | $I_C = 3\text{A}, I_B = 375\text{mA}$ | | 1.2 | V |
| $V_{BE(sat)}$ | * Base-Emitter Saturation Voltage | $V_{CE} = 4\text{V}, I_C = 3\text{A}$ | | 1.8 | V |
| f_T | Current Gain Bandwidth Product | $V_{CE} = 10\text{V}, I_C = 500\text{mA}, f = 1\text{MHz}$ | 3.0 | | MHz |

* Pulse Test: $PW \leq 300\text{ms}$, Duty Cycle $\leq 2\%$

Typical Characteristics

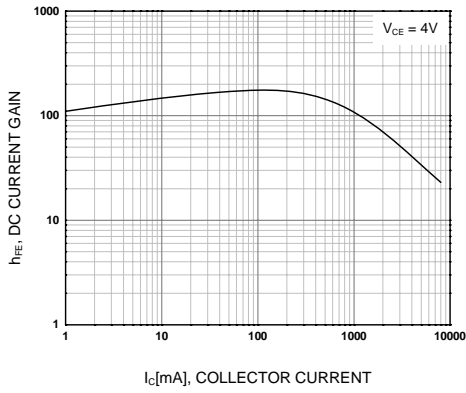


Figure 1. DC current Gain

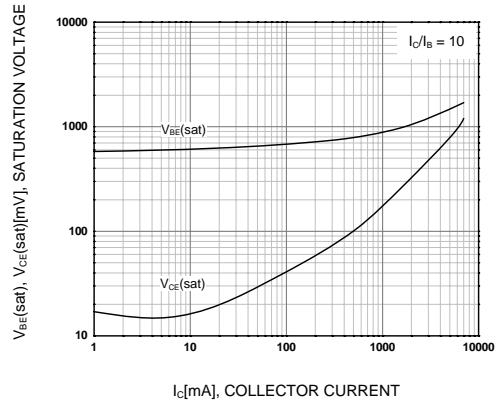


Figure 2. Base-Emitter Saturation Voltage
Collector-Emitter Saturation Voltage

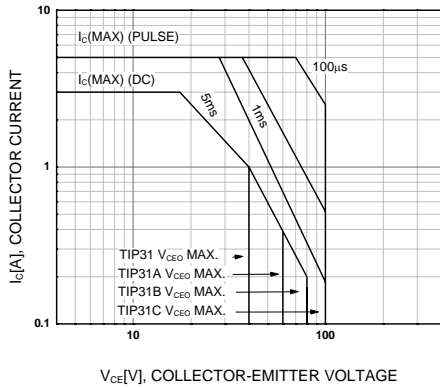


Figure 3. Safe Operating Area

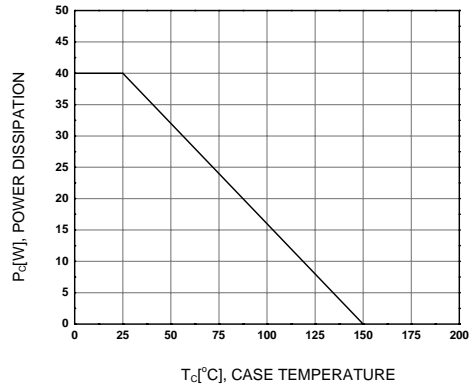
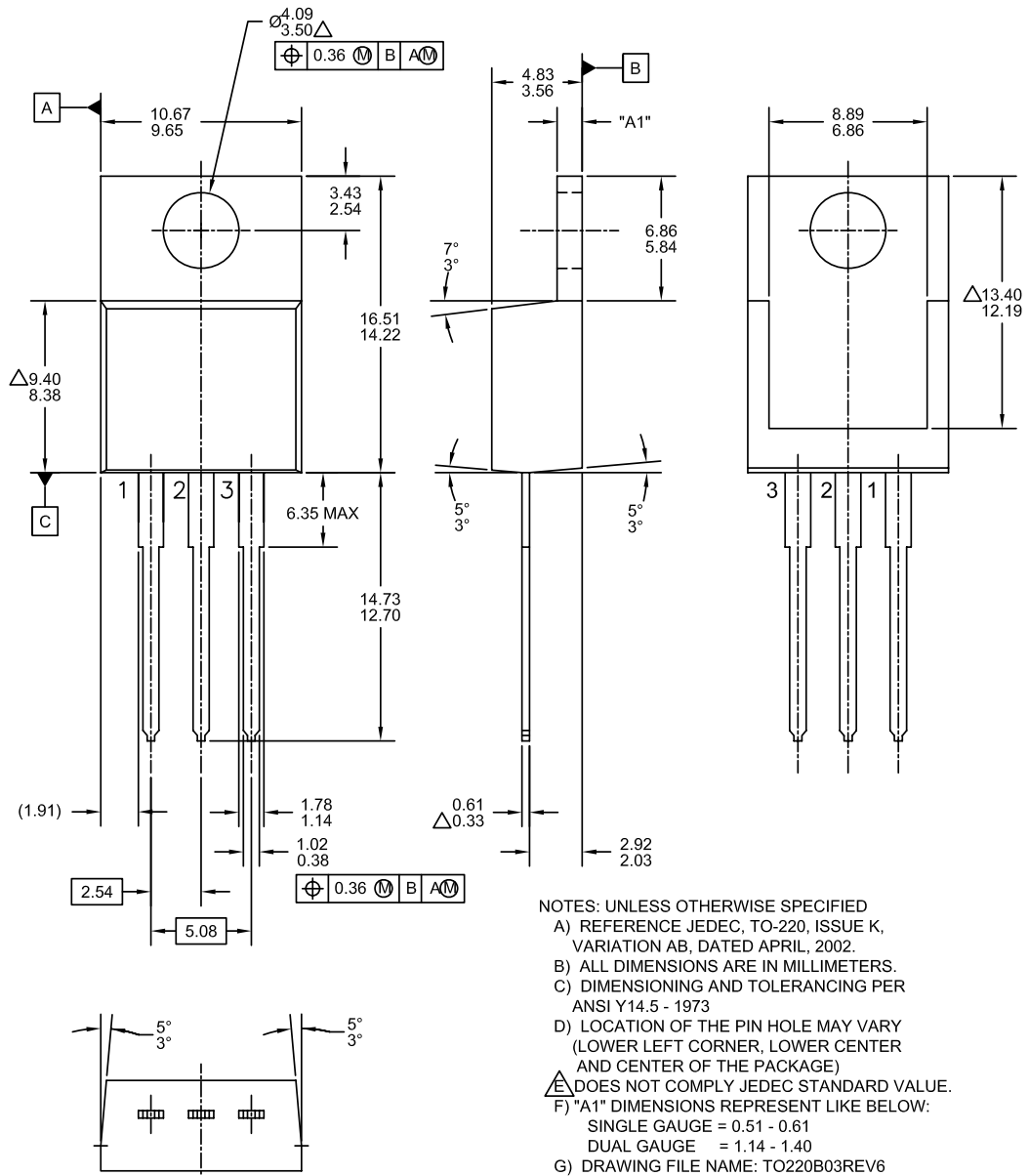


Figure 4. Power Derating

Mechanical Dimensions

TO220





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