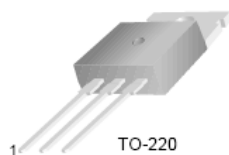


# TIP31/TIP31A/TIP31B/TIP31C

## 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<br>: TIP31<br>: TIP31A<br>: TIP31B<br>: TIP31C | $I_C = 30\text{mA}, I_B = 0$                                                                                                                      | 40<br>60<br>80<br>100 |                          | V<br>V<br>V<br>V                                                 |
| $I_{CEO}$      | Collector Cut-off Current<br>: TIP31/31A<br>: TIP31B/31C                              | $V_{CE} = 30\text{V}, I_B = 0$<br>$V_{CE} = 60\text{V}, I_B = 0$                                                                                  |                       | 0.3<br>0.3               | mA<br>mA                                                         |
| $I_{CES}$      | Collector Cut-off Current<br>: TIP31<br>: TIP31A<br>: TIP31B<br>: TIP31C              | $V_{CE} = 40\text{V}, V_{EB} = 0$<br>$V_{CE} = 60\text{V}, V_{EB} = 0$<br>$V_{CE} = 80\text{V}, V_{EB} = 0$<br>$V_{CE} = 100\text{V}, V_{EB} = 0$ |                       | 200<br>200<br>200<br>200 | $\mu\text{A}$<br>$\mu\text{A}$<br>$\mu\text{A}$<br>$\mu\text{A}$ |
| $I_{EBO}$      | Emitter Cut-off Current                                                               | $V_{EB} = 5\text{V}, I_C = 0$                                                                                                                     |                       | 1                        | mA                                                               |
| $h_{FE}$       | * DC Current Gain                                                                     | $V_{CE} = 4\text{V}, I_C = 1\text{A}$<br>$V_{CE} = 4\text{V}, I_C = 3\text{A}$                                                                    | 25<br>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

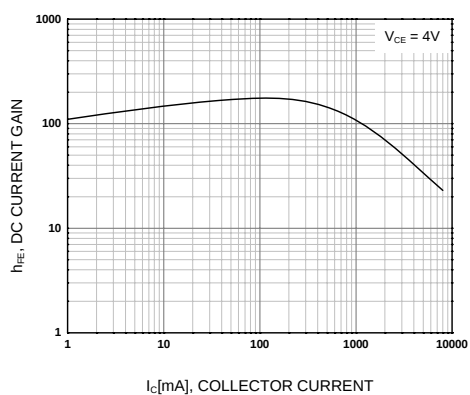


Figure 1. DC current Gain

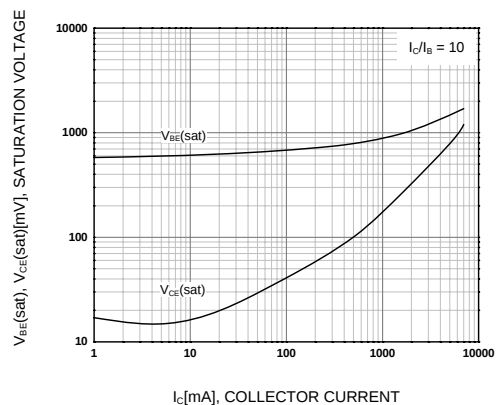


Figure 2. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

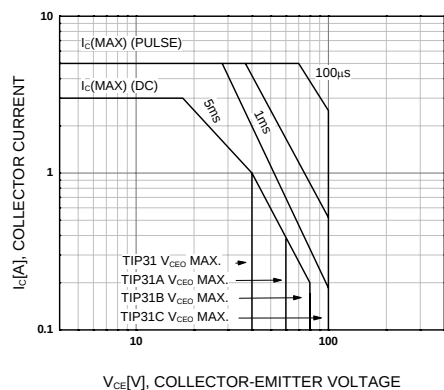


Figure 3. Safe Operating Area

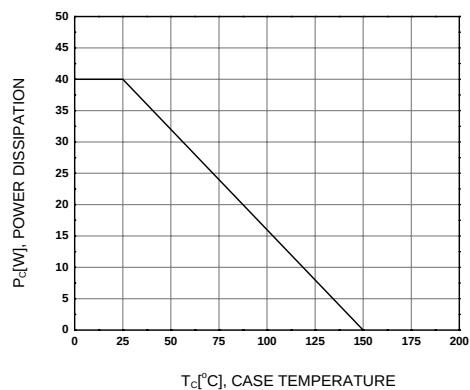
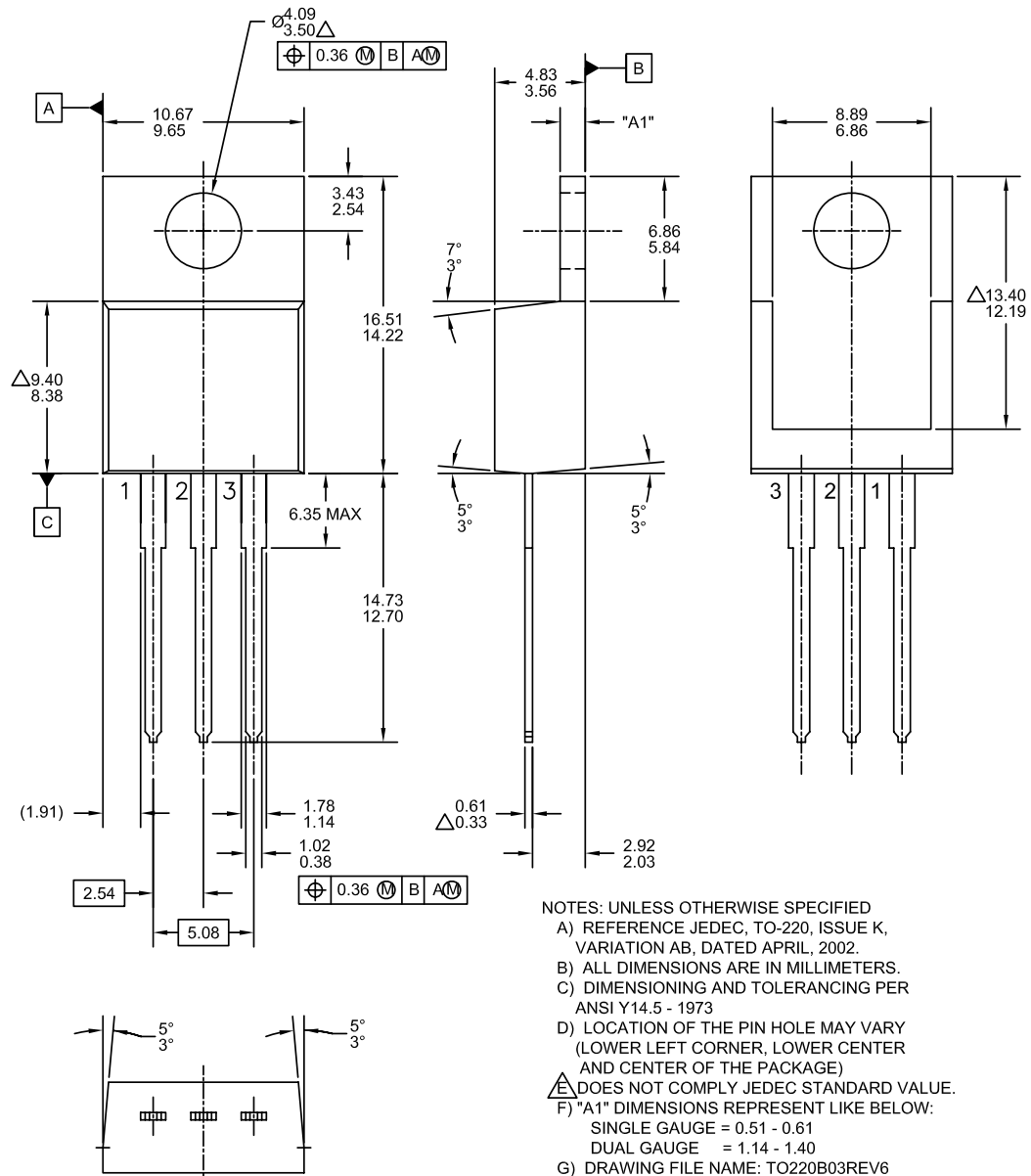


Figure 4. Power Derating

# Mechanical Dimensions

## TO220





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