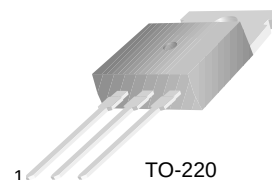


# BUT11/11A

## High Voltage Power Switching Applications



1. Base 2. Collector 3. Emitter

## NPN Silicon Transistor

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

| Symbol    | Parameter                                        | Value       | Units            |
|-----------|--------------------------------------------------|-------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage<br>: BUT11<br>: BUT11A    | 850<br>1000 | V                |
| $V_{CEO}$ | Collector-Emitter Voltage<br>: BUT11<br>: BUT11A | 400<br>450  | V                |
| $V_{EBO}$ | Emitter-Base Voltage                             | 9           | V                |
| $I_C$     | Collector Current (DC)                           | 5           | A                |
| $I_{CP}$  | *Collector Current (Pulse)                       | 10          | A                |
| $I_B$     | Base Current (DC)                                | 2           | A                |
| $I_{BP}$  | *Base Current (Pulse)                            | 4           | A                |
| $P_C$     | Collector Dissipation ( $T_C=25^\circ\text{C}$ ) | 100         | 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.       | Typ. | Max.       | Units         |
|----------------|---------------------------------------------------------------|--------------------------------------------------------------------------------|------------|------|------------|---------------|
| $V_{CEO(SUS)}$ | * Collector-Emitter Sustaining Voltage<br>: BUT11<br>: BUT11A | $I_C = 100\text{mA}, I_B = 0$                                                  | 400<br>450 |      |            | V<br>V        |
| $I_{CES}$      | Collector Cut-off Current<br>: BUT11<br>: BUT11A              | $V_{CE} = 850\text{V}, V_{BE} = 0$                                             |            |      | 1<br>1     | mA<br>mA      |
| $I_{EBO}$      | Emitter Cut-off Current                                       | $V_{BE} = 9\text{V}, I_C = 0$                                                  |            |      | 10         | mA            |
| $V_{CE(sat)}$  | Collector-Emitter Saturation Voltage<br>: BUT11<br>: BUT11A   | $I_C = 3\text{A}, I_B = 0.6\text{A}$<br>$I_C = 2.5\text{A}, I_B = 0.5\text{A}$ |            |      | 1.5<br>1.5 | V<br>V        |
| $V_{BE(sat)}$  | Base-Emitter Saturation Voltage<br>: BUT11<br>: BUT11A        | $I_C = 3\text{A}, I_B = 0.6\text{A}$<br>$I_C = 2.5\text{A}, I_B = 0.5\text{A}$ |            |      | 1.3<br>1.3 | V<br>V        |
| $t_{ON}$       | Turn On Time                                                  | $V_{CC} = 250\text{V}, I_C = 2.5\text{A}$                                      |            |      | 1          | $\mu\text{s}$ |
| $t_{STG}$      | Storage Time                                                  | $I_{B1} = -I_{B2} = 0.5\text{A}$<br>$R_L = 100\Omega$                          |            |      | 4          | $\mu\text{s}$ |
| $t_F$          | Fall Time                                                     |                                                                                |            |      | 0.8        | $\mu\text{s}$ |

\* Pulsed: pulsed duration = 300 $\mu\text{s}$ , duty cycle = 1.5%

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

| Symbol          | Parameter                            | Typ | Max  | Units              |
|-----------------|--------------------------------------|-----|------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case |     | 1.25 | $^\circ\text{C/W}$ |

# Typical Characteristics

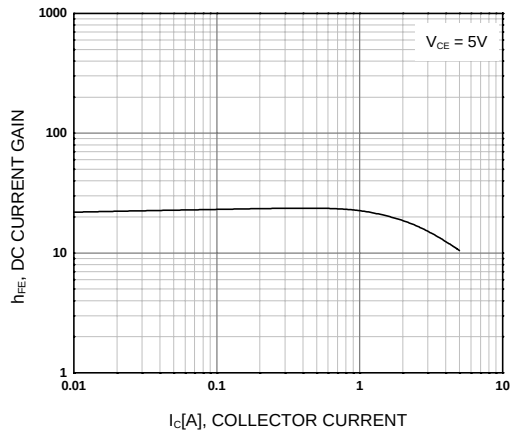


Figure 1. DC current Gain

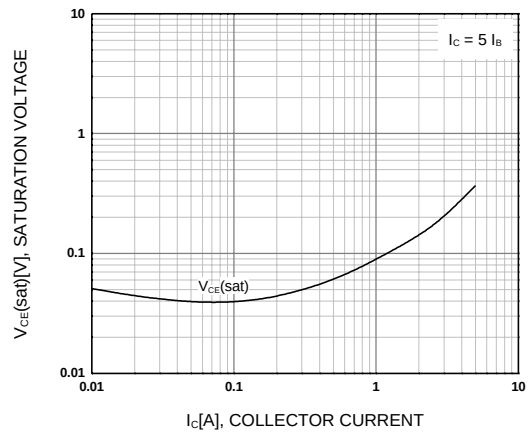


Figure 2. Collector-Emitter Saturation Voltage

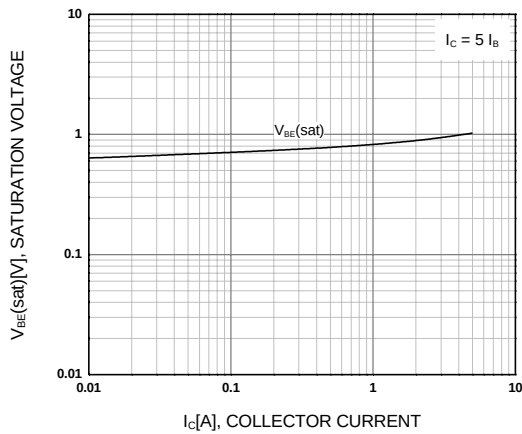


Figure 3. Base-Emitter Saturation Voltage

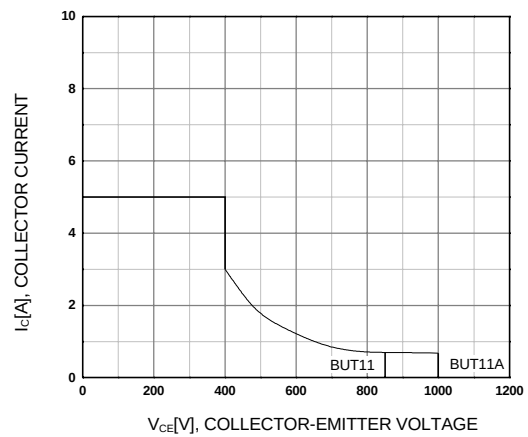


Figure 4. Reverse Biased Safe Operating Area

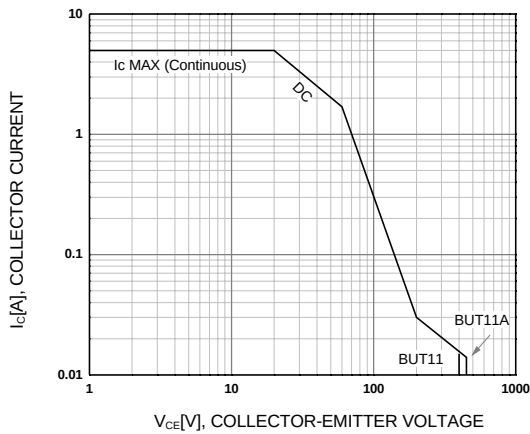


Figure 5. Safe Operating Area

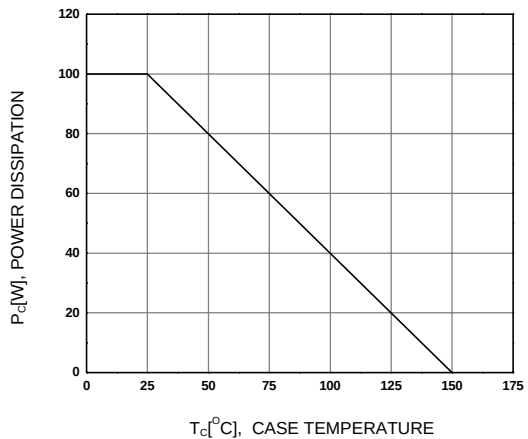
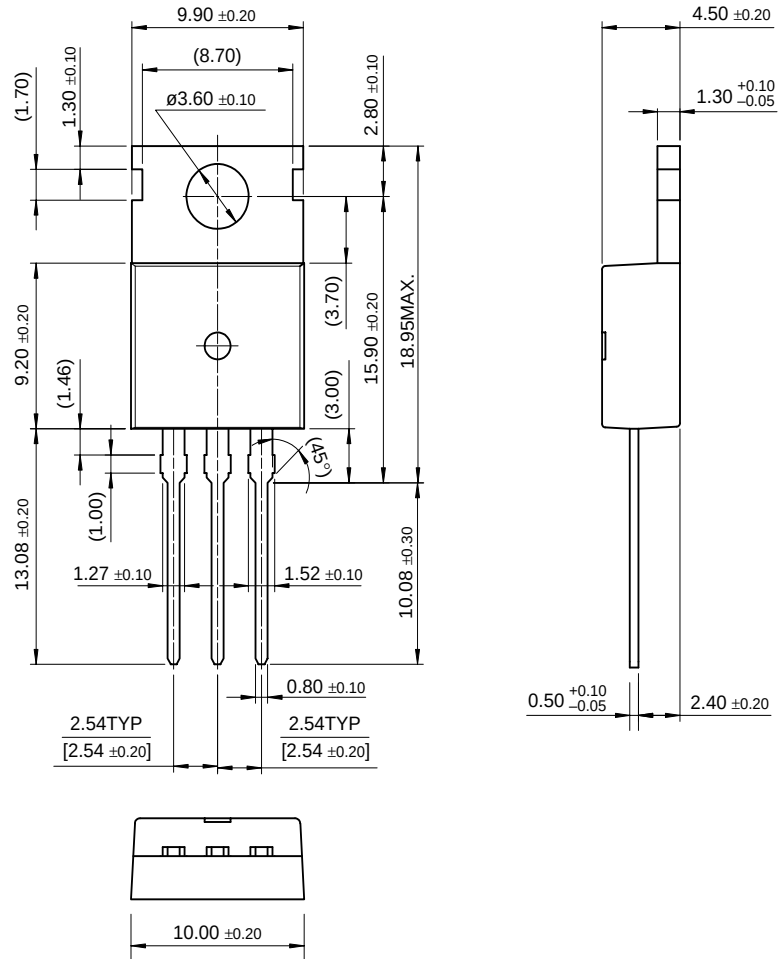


Figure 6. Power Derating

# Package Dimensions

## TO-220



Dimensions in Millimeters

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