



# BUT11A

## HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

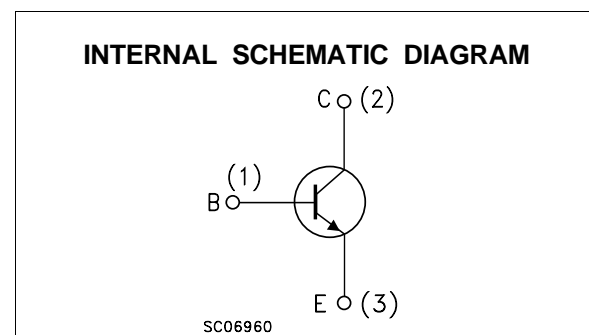
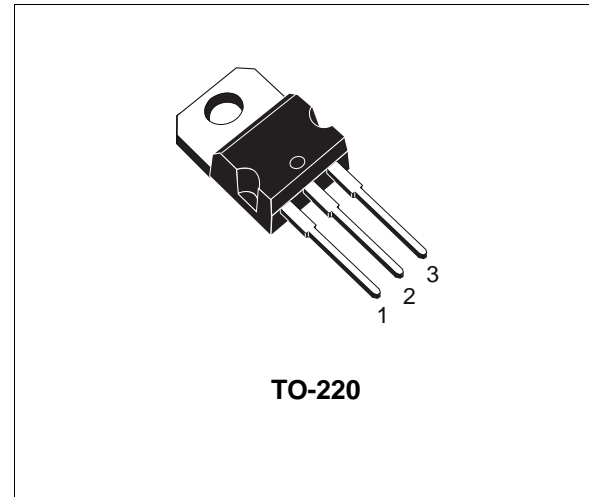
- STMicroelectronics PREFERRED SALESTYPE
- NPN TRANSISTOR
- HIGH VOLTAGE CAPABILITY
- FAST SWITCHING SPEED

### APPLICATIONS:

- FLYBACK AND FORWARD SINGLE TRANSISTOR LOW POWER CONVERTERS

### DESCRIPTION

The BUT11A is a silicon Multiepitaxial Mesa NPN transistor in Jedec TO-220 plastic package, particularly intended for switching application.



### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter                                   | Value      | Unit |
|-----------|---|------------|------|
| $V_{CES}$ | Collector-Emitter Voltage ( $V_{BE} = 0$ V) | 1000       | V    |
| $V_{CEO}$ | Collector-Emitter Voltage ( $I_B = 0$ )     | 450        | V    |
| $V_{EBO}$ | Emitter-Base Voltage ( $I_C = 0$ )          | 9          | V    |
| $I_C$     | Collector Current                           | 5          | A    |
| $I_{CM}$  | Collector Peak Current ( $t_p < 5$ ms)      | 10         | A    |
| $I_B$     | Base Current                                | 2          | A    |
| $I_{BM}$  | Base Peak Current ( $t_p < 5$ ms)           | 4          | A    |
| $P_{tot}$ | Total Power Dissipation at $T_c \leq 25$ °C | 83         | W    |
| $T_{stg}$ | Storage Temperature                         | -65 to 150 | °C   |
| $T_j$     | Max. Operating Junction Temperature         | 150        | °C   |

**THERMAL DATA**

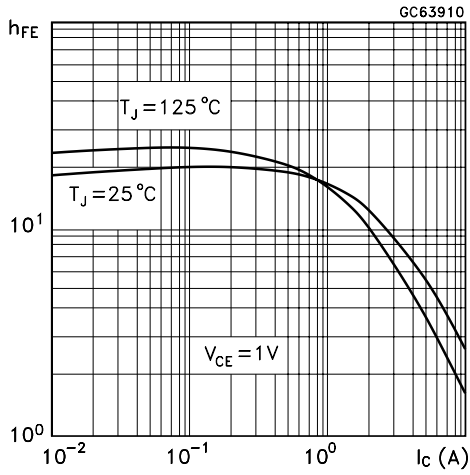
|                |                                  |     |     |               |
|----------------|----------------------------------|-----|-----|---------------|
| $R_{thj-case}$ | Thermal Resistance Junction-case | Max | 1.5 | $^{\circ}C/W$ |
|----------------|----------------------------------|-----|-----|---------------|

**ELECTRICAL CHARACTERISTICS** ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

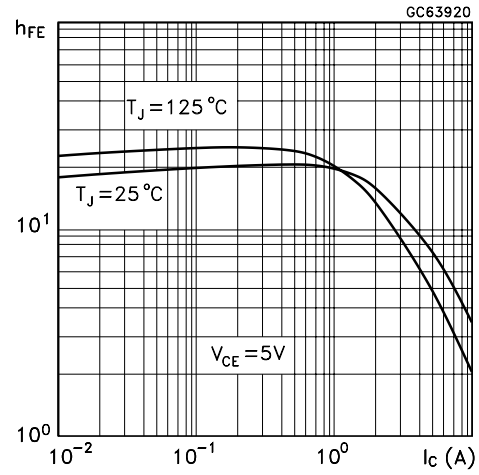
| Symbol                     | Parameter   | Test Conditions   | Min.     | Typ. | Max.          | Unit                          |
|----------------------------|---|---|----------|------|---------------|-------------------------------|
| $I_{CES}$                  | Collector Cut-off Current ( $V_{BE} = 0$ )                  | $V_{CE} = \text{rated } V_{CES}$<br>at $T_c = 125^{\circ}C$ |          |      | 1<br>2        | mA<br>mA                      |
| $I_{EBO}$                  | Emitter Cut-off Current ( $I_C = 0$ )                       | $I_C = 0$ $V_{BE} = 9 V$                                    |          |      | 10            | mA                            |
| $V_{CEO(sus)*}$            | Collector-emitter Sustaining Voltage ( $I_B = 0$ )          | $I_{B(off)} = 0$ $I_C = 100 mA$                             | 450      |      |               | V                             |
| $V_{CE(sat)*}$             | Collector-emitter Saturation Voltage                        | $I_C = 2.5 A$ $I_B = 0.5 A$                                 |          |      | 1.5           | V                             |
| $V_{BE(sat)*}$             | Base-emitter Saturation Voltage                             | $I_C = 2.5 A$ $I_B = 0.5 A$                                 |          |      | 1.3           | V                             |
| $h_{FE}$                   | DC Current Gain   | $I_C = 5 mA$ $V_{CE} = 5 V$<br>$I_C = 0.5 A$ $V_{CE} = 5 V$ | 10<br>10 |      | 35<br>35      |                               |
| $t_{on}$<br>$t_s$<br>$t_f$ | RESISTIVE LOAD<br>Turn on Time<br>Storage Time<br>Fall Time | $I_C = 2.5 A$ $V_{CC} = 250 V$<br>$I_B = -I_{B2} = 0.5 A$   |          |      | 1<br>4<br>0.8 | $\mu s$<br>$\mu s$<br>$\mu s$ |

\* Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %.

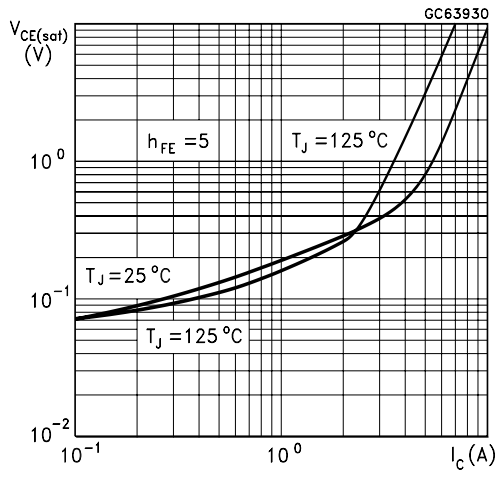
DC Current Gain



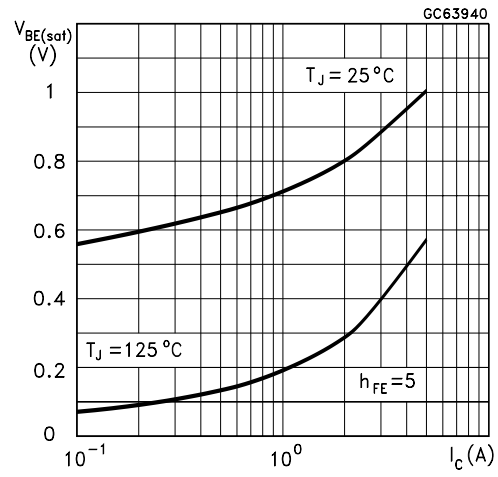
DC Current Gain



Collector-Emitter Saturation Voltage

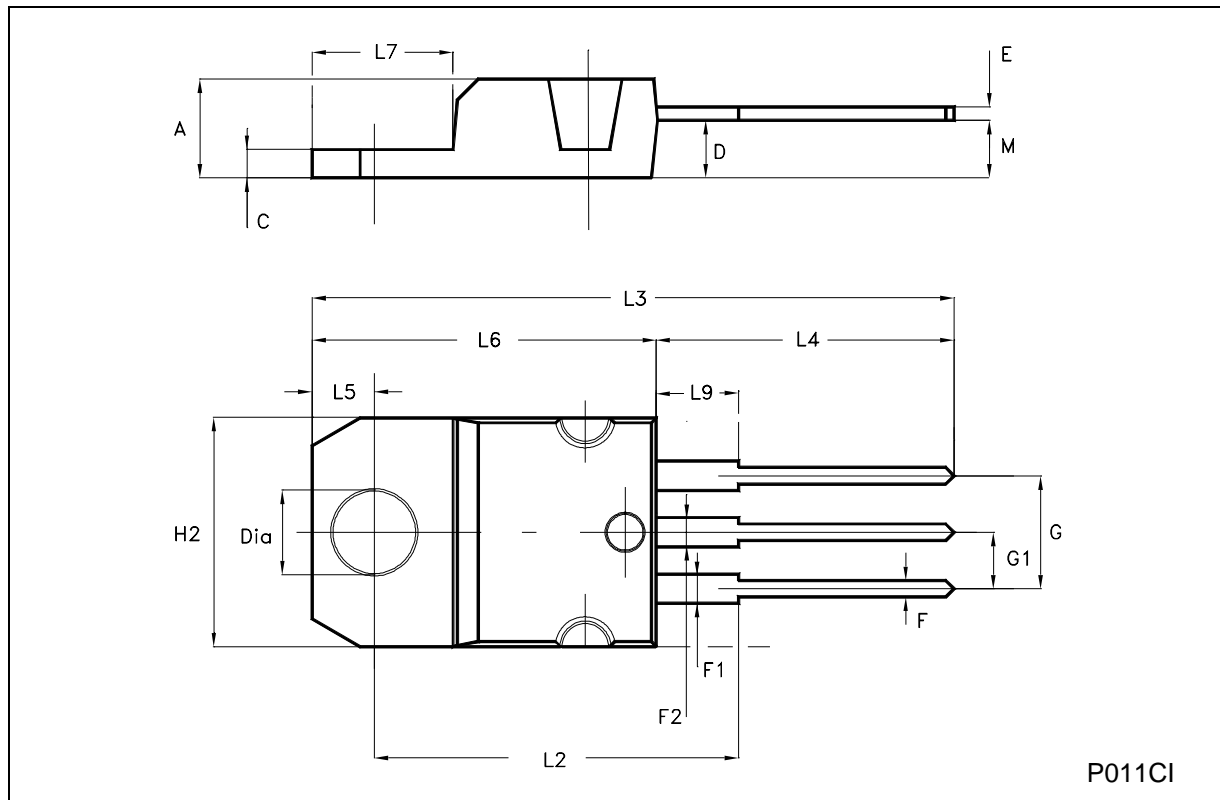


Base-Emitter Saturation Voltage



**TO-220 MECHANICAL DATA**

| DIM. | mm    |       |       | inch  |       |       |
|------|-------|-------|-------|-------|-------|-------|
|      | MIN.  | TYP.  | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.40  |       | 4.60  | 0.173 |       | 0.181 |
| C    | 1.23  |       | 1.32  | 0.048 |       | 0.052 |
| D    | 2.40  |       | 2.72  | 0.094 |       | 0.107 |
| E    | 0.49  |       | 0.70  | 0.019 |       | 0.027 |
| F    | 0.61  |       | 0.88  | 0.024 |       | 0.034 |
| F1   | 1.14  |       | 1.70  | 0.044 |       | 0.067 |
| F2   | 1.14  |       | 1.70  | 0.044 |       | 0.067 |
| G    | 4.95  |       | 5.15  | 0.194 |       | 0.202 |
| G1   | 2.40  |       | 2.70  | 0.094 |       | 0.106 |
| H2   | 10.00 |       | 10.40 | 0.394 |       | 0.409 |
| L2   |       | 16.40 |       |       | 0.645 |       |
| L4   | 13.00 |       | 14.00 | 0.511 |       | 0.551 |
| L5   | 2.65  |       | 2.95  | 0.104 |       | 0.116 |
| L6   | 15.25 |       | 15.75 | 0.600 |       | 0.620 |
| L7   | 6.20  |       | 6.60  | 0.244 |       | 0.260 |
| L9   | 3.50  |       | 3.93  | 0.137 |       | 0.154 |
| M    |       | 2.60  |       |       | 0.102 |       |
| DIA. | 3.75  |       | 3.85  | 0.147 |       | 0.151 |



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