



# BUT70W

## HIGH POWER NPN TRANSISTOR

- STMicroelectronics PREFERRED SALESTYPE
- NPN TRANSISTOR
- HIGH CURRENT CAPABILITY
- FAST SWITCHING SPEED
- VERY LOW SATURATION VOLTAGE AND HIGH GAIN

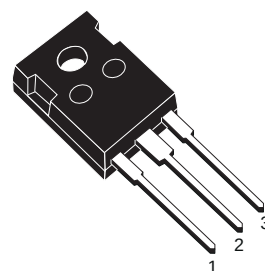
### APPLICATION

- SWITCHING REGULATORS
- MOTOR CONTROL
- HIGH FREQUENCY AND EFFICIENCY CONVERTERS

### DESCRIPTION

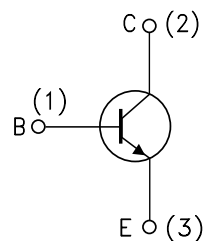
The BUT70W is a Multiepitaxial planar NPN transistor in TO-247 plastic package.

It's intended for use in high frequency and efficiency converters such as motor controllers and industrial equipment.



TO-247

### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

| Symbol       | Parameter                                                   | Value      | Unit        |
|--------------|-------------------------------------------------------------|------------|-------------|
| $V_{CEV}$    | Collector-emitter Voltage ( $V_{BE} = -1.5V$ )              | 200        | V           |
| $V_{CEO}$    | Collector-emitter Voltage ( $I_B = 0$ )                     | 125        | V           |
| $V_{EBO}$    | Emitter-Base Voltage ( $I_C = 0$ )                          | 7          | V           |
| $I_{E(RMS)}$ | Emitter Current                                             | 40         | A           |
| $I_{EM}$     | Emitter Peak Current                                        | 120        | A           |
| $I_B$        | Base Current                                                | 8          | A           |
| $I_{BM}$     | Base Peak Current                                           | 24         | A           |
| $P_{tot}$    | Total Power Dissipation at $T_{case} < 25\text{ }^{\circ}C$ | 200        | W           |
| $T_{stg}$    | Storage Temperature                                         | -65 to 150 | $^{\circ}C$ |
| $T_j$        | Max Operating Junction Temperature                          | 150        | $^{\circ}C$ |

## BUT70W

### THERMAL DATA

|                       |                                  |     |      |      |
|-----------------------|----------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case | Max | 0.63 | °C/W |
|-----------------------|----------------------------------|-----|------|------|

### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

| Symbol                 | Parameter                                                 | Test Conditions                                                                                                                                                                                                                          | Min. | Typ. | Max.                     | Unit             |
|------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|--------------------------|------------------|
| I <sub>CEr</sub>       | Collector Cut-off Current (R <sub>BE</sub> = 5Ω)          | V <sub>CE</sub> = 200 V<br>V <sub>CE</sub> = 200 V T <sub>C</sub> = 100°C                                                                                                                                                                |      |      | 1<br>5                   | mA<br>mA         |
| I <sub>CEV</sub>       | Collector Cut-off Current (V <sub>BE</sub> = -1.5V)       | V <sub>CE</sub> = 200 V<br>V <sub>CE</sub> = 200 V T <sub>C</sub> = 100°C                                                                                                                                                                |      |      | 1<br>4                   | mA<br>mA         |
| I <sub>EBO</sub>       | Emitter Cut-off Current (I <sub>C</sub> = 0)              | V <sub>EB</sub> = 5 V                                                                                                                                                                                                                    |      |      | 1                        | mA               |
| V <sub>CEO(sus)*</sub> | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 0.2 A L = 25 mH                                                                                                                                                                                                         | 125  |      |                          | V                |
| V <sub>(BR)EBO</sub>   | Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)       | I <sub>E</sub> = 50 mA                                                                                                                                                                                                                   | 7    |      |                          | V                |
| V <sub>CE(sat)*</sub>  | Collector-Emitter Saturation Voltage                      | I <sub>C</sub> = 70 A I <sub>B</sub> = 7 A<br>I <sub>C</sub> = 70 A I <sub>B</sub> = 7 A T <sub>C</sub> = 100°C<br>I <sub>C</sub> = 35 A I <sub>B</sub> = 1.75 A<br>I <sub>C</sub> = 35 A I <sub>B</sub> = 1.75 A T <sub>C</sub> = 100°C |      |      | 0.9<br>1.5<br>0.9<br>1.2 | V<br>V<br>V<br>V |
| V <sub>BE(sat)*</sub>  | Base-Emitter Saturation Voltage                           | I <sub>C</sub> = 70 A I <sub>B</sub> = 7 A<br>I <sub>C</sub> = 70 A I <sub>B</sub> = 7 A T <sub>C</sub> = 100°C<br>I <sub>C</sub> = 35 A I <sub>B</sub> = 1.75 A<br>I <sub>C</sub> = 35 A I <sub>B</sub> = 1.75 A T <sub>C</sub> = 100°C |      |      | 1.8<br>1.9<br>1.4<br>1.4 | V<br>V<br>V<br>V |
| di <sub>c</sub> /dt*   | Rated of Rise of on-state Collector Current               | V <sub>CC</sub> = 100 V R <sub>C</sub> = 0 I <sub>B1</sub> = 3.5 A<br>t <sub>p</sub> = 3 μs T <sub>C</sub> = 100°C                                                                                                                       | 140  |      |                          | A/μs             |

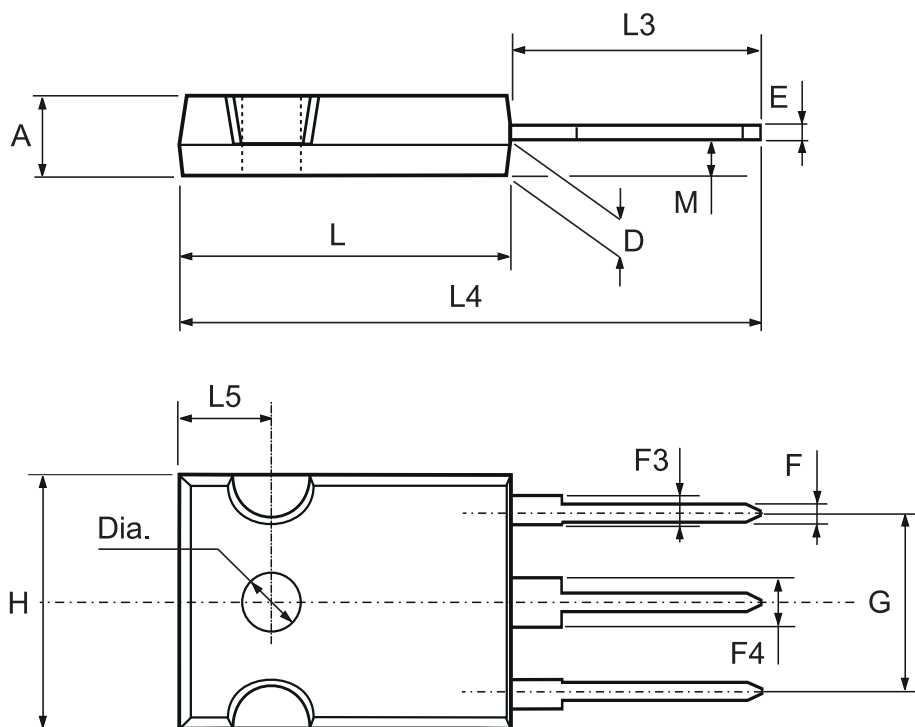
\* Pulsed: Pulse duration = 300 μs, duty cycle < 2 %

### INDUCTIVE LOAD

| Symbol         | Parameter       | Test Conditions                                                                                       | Min. | Typ. | Max. | Unit |
|----------------|-----------------|-------------------------------------------------------------------------------------------------------|------|------|------|------|
| t <sub>s</sub> | Storage Time    | I <sub>C</sub> = 35 A V <sub>CC</sub> = 90 V                                                          |      |      | 1.8  | μs   |
| t <sub>f</sub> | Fall Time       | V <sub>BB</sub> = -5 V R <sub>B2</sub> = 1.4 Ω                                                        |      |      | 0.2  | μs   |
| t <sub>c</sub> | Cross Over Time | I <sub>B1</sub> = 1.75 A L <sub>C</sub> = 0.15 mH<br>V <sub>CLAMP</sub> = 125V T <sub>C</sub> = 100°C |      |      | 0.35 | μs   |

## TO-247 MECHANICAL DATA

| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    | 4.7  |      | 5.3  | 0.185 |       | 0.209 |
| D    | 2.2  |      | 2.6  | 0.087 |       | 0.102 |
| E    | 0.4  |      | 0.8  | 0.016 |       | 0.031 |
| F    | 1    |      | 1.4  | 0.039 |       | 0.055 |
| F3   | 2    |      | 2.4  | 0.079 |       | 0.094 |
| F4   | 3    |      | 3.4  | 0.118 |       | 0.134 |
| G    |      | 10.9 |      |       | 0.429 |       |
| H    | 15.3 |      | 15.9 | 0.602 |       | 0.626 |
| L    | 19.7 |      | 20.3 | 0.776 |       | 0.779 |
| L3   | 14.2 |      | 14.8 | 0.559 |       | 0.582 |
| L4   |      | 34.6 |      |       | 1.362 |       |
| L5   |      | 5.5  |      |       | 0.217 |       |
| M    | 2    |      | 3    | 0.079 |       | 0.118 |



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