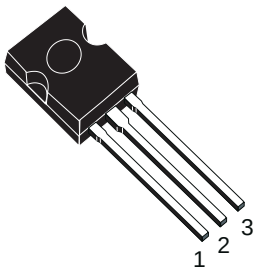
# BULK128D-B

## HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- STMicroelectronics PREFERRED SALESTYPE
- INTEGRATED ANTIPARALLEL COLLECTOR-EMITTER DIODE
- NPN TRANSISTOR
- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED




**SOT-82**

**APPLICATIONS:**

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- FLYBACK AND FORWARD SINGLE TRANSISTOR LOW POWER CONVERTERS

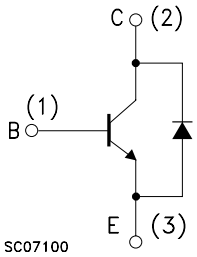
**DESCRIPTION**

The device is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and medium voltage capability.

It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA.

The device is designed for use in lighting applications and low cost switch-mode power supplies.

**INTERNAL SCHEMATIC DIAGRAM**




**ABSOLUTE MAXIMUM RATINGS**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Voltage ($V_{BE}$ = 0) | 700 | V |
| $V_{CEO}$ | Collector-Emitter Voltage ($I_B$ = 0) | 400 | V |
| $V_{EBO}$ | Emitter-Base Voltage ($I_C$ = 0, $I_B$ = 2 A, $t_p$ < 10µs, $T_j$ < 150°C) | $BV_{EBO}$ | V |
| $I_C$ | Collector Current | 4 | A |
| $I_{CM}$ | Collector Peak Current ($t_p$ < 5 ms) | 8 | A |
| $I_B$ | Base Current | 2 | A |
| $I_{BM}$ | Base Peak Current ($t_p$ < 5 ms) | 4 | A |
| $P_{tot}$ | Total Dissipation at $T_c$ = 25 °C | 55 | W |
| $T_{stg}$ | Storage Temperature | -65 to 150 | °C |
| $T_j$ | Max. Operating Junction Temperature | 150 | °C |

## THERMAL DATA

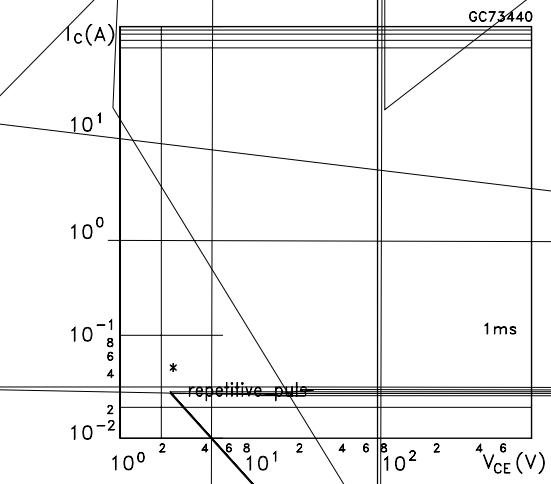
| | | | |
|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal Resistance Junction-Case Max | 2.27 | °C/W |
| $R_{thj\text{-}amb}$ | Thermal Resistance Junction-Ambient Max | 80 | °C/W |

## ELECTRICAL CHARACTERISTICS ($T_{case}$ = 25 °C unless otherwise specified)

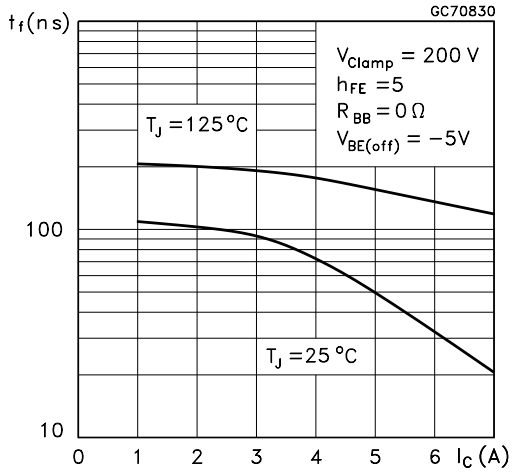
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CES}$ | Collector Cut-off Current ($V_{BE}$ = -1.5 V) | $V_{CE}$ = 700 V<br>$V_{CE}$ = 700 V $T_C$ = 125 °C | | | 100<br>500 | µA<br>µA |
| $I_{CEO}$ | Collector-Emitter Leakage Current ($I_B$ = 0) | $V_{CE}$ = 400 V | | | 250 | µA |
| $BV_{EBO}$ | Emitter-Base Breakdown Voltage ($I_C$ = 0) | $I_E$ = 10 mA | 9 | | 18 | V |
| $V_{CEO(sus)}$* | Collector-Emitter Sustaining Voltage ($I_B$ = 0) | $I_C$ = 100 mA L = 25 mH | 400 | | | V |
| $V_{CE(sat)}$* | Collector-Emitter Saturation Voltage | $I_C$ = 0.5 A $I_B$ = 0.1 A<br>$I_C$ = 1 A $I_B$ = 0.2 A<br>$I_C$ = 2.5 A $I_B$ = 0.5 A | | | 0.7<br>1<br>1.5 | V<br>V<br>V |
| $V_{BE(sat)}$* | Base-Emitter Saturation Voltage | $I_C$ = 0.5 A $I_B$ = 0.1 A<br>$I_C$ = 1 A $I_B$ = 0.2 A<br>$I_C$ = 2.5 A $I_B$ = 0.5 A | | | 1.1<br>1.2<br>1.3 | V<br>V<br>V |
| $h_{FE}$* | DC Current Gain | $I_C$ = 10 mA $V_{CE}$ = 5 V<br>$I_C$ = 2 A $V_{CE}$ = 5 V | 10<br>8 | | <br>40 | |
| $V_f$ | Forward Voltage Drop | $I_f$ = 2 A | | | 2.5 | V |
| <br>$t_s$<br>$t_f$ | RESISTIVE LOAD<br>Storage Time<br>Fall Time | $V_{CC}$ = 250 V $I_C$ = 2 A<br>$I_{B1}$ = 0.4 A $I_{B2}$ = -0.4 A<br>$T_p$ = 30 µs (see fig. 2) | <br>2 | <br><br>0.2 | <br>2.9 | <br>µs<br>µs |
| <br>$t_s$<br>$t_f$ | INDUCTIVE LOAD<br>Storage Time<br>Fall Time | $V_{CC}$ = 200 V $I_C$ = 2 A<br>$I_{B1}$ = 0.4 A $V_{BE(off)}$ = -5 V<br>$R_{BB}$ = 0 Ω L = 200 µH<br>(see fig. 1) | | <br>0.6<br>0.1 | | <br>µs<br>µs |

* Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

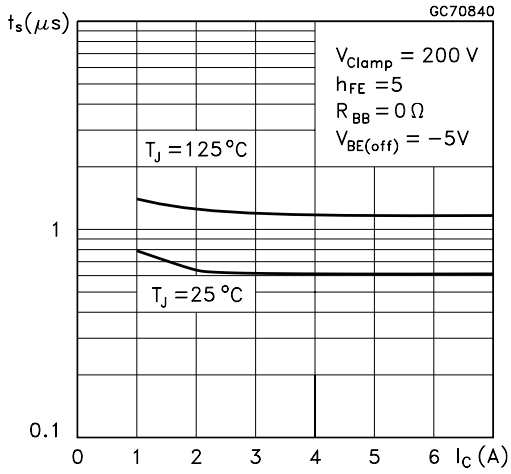
## Safe Operating Areas



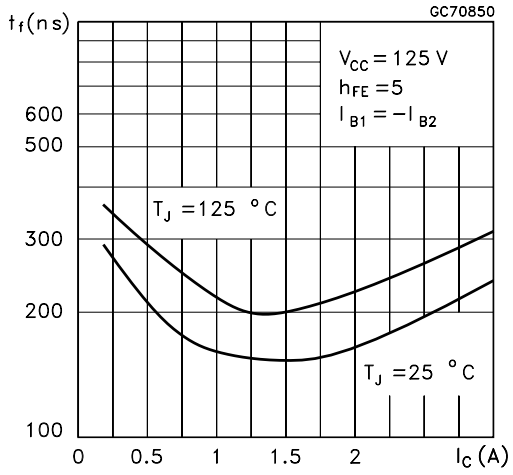
Inductive Fall Time



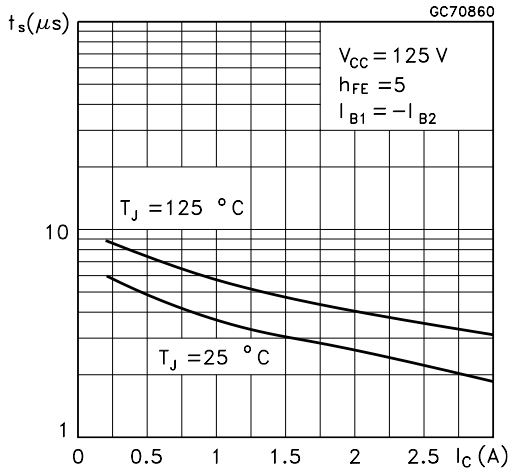

Inductive Storage Time




Resistive Load Fall Time




Resistive Load Storage Time




Reverse Biased SOA

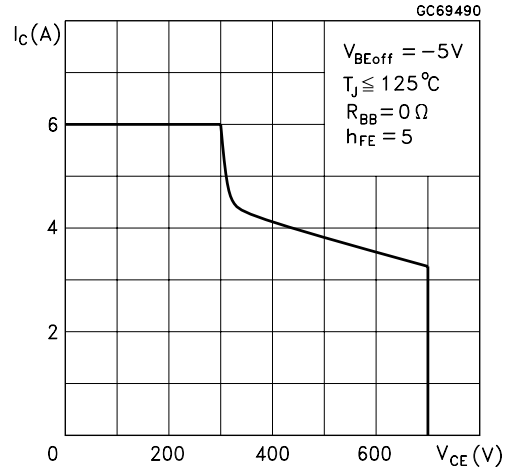


**Figure 1:** Inductive Load Switching Test Circuit.

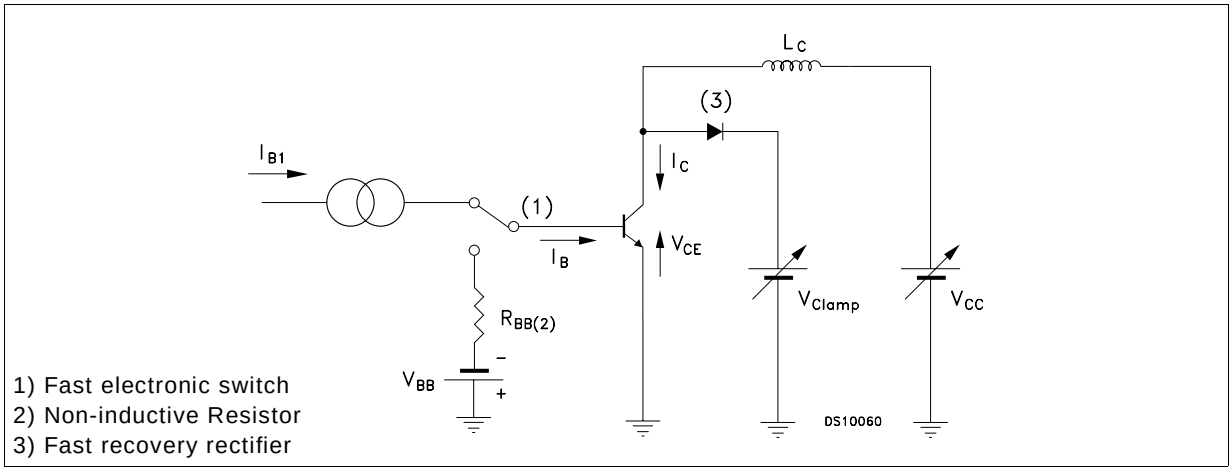
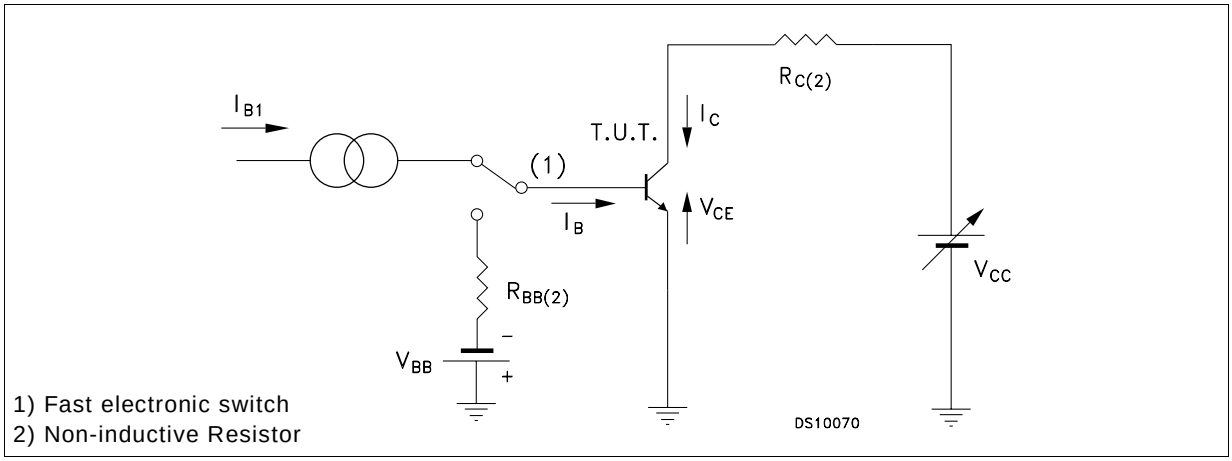
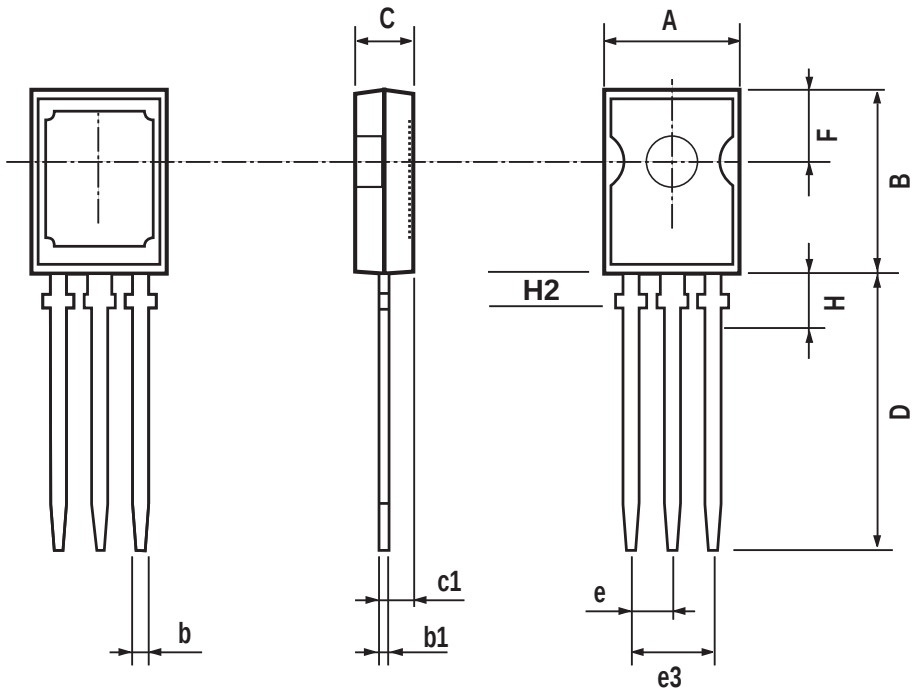



**Figure 2:** Resistive Load Switching Test Circuit.



## SOT-82 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 7.4 | | 7.8 | 0.291 | | 0.307 |
| B | 10.5 | | 10.8 | 0.413 | | 0.444 |
| b | 0.7 | | 0.9 | 0.028 | | 0.035 |
| b1 | 0.49 | | 0.75 | 0.019 | | 0.030 |
| C | 2.4 | | 2.7 | 0.04 | | 0.106 |
| c1 | 1.0 | | 1.3 | 0.039 | | 0.05 |
| D | 15.4 | | 16 | 0.606 | | 0.629 |
| e | | 2.2 | | | 0.087 | |
| e3 | 4.15 | | 4.65 | 0.163 | | 0.183 |
| F | | 3.8 | | | 0.150 | |
| H | | | 2.54 | | 0.100 | |
| H2 | | 2.15 | | | 0.084 | |

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