

**BUL1101E**

## HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

PRELIMINARY DATA

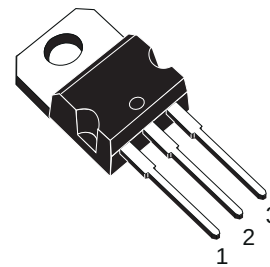
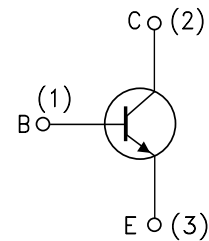
- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- LARGE RBSOA

**APPLICATIONS**

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING

**DESCRIPTION**

The device is manufactured using High Voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capability. It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA.

**TO-220****INTERNAL SCHEMATIC DIAGRAM****ABSOLUTE MAXIMUM RATINGS**

| Symbol    | Parameter                                  | Value         | Unit |
|-----------|--------------------------------------------|---------------|------|
| $V_{CES}$ | Collector-Emitter Voltage ( $V_{BE} = 0$ ) | 1100          | V    |
| $V_{CEO}$ | Collector-Emitter Voltage ( $I_B = 0$ )    | 450           | V    |
| $V_{EBO}$ | Emitter-Base Voltage ( $I_C = 0$ )         | $V_{(BR)EBO}$ | V    |
| $I_C$     | Collector Current                          | 3             | A    |
| $I_{CM}$  | Collector Peak Current ( $t_p < 5$ ms)     | 6             | A    |
| $I_B$     | Base Current                               | 1.5           | A    |
| $I_{BM}$  | Base Peak Current ( $t_p < 5$ ms)          | 3             | A    |
| $P_{tot}$ | Total Dissipation at $T_c = 25$ °C         | 70            | W    |
| $T_{stg}$ | Storage Temperature                        | -65 to 150    | °C   |
| $T_j$     | Max. Operating Junction Temperature        | 150           | °C   |

## BUL1101E

### THERMAL DATA

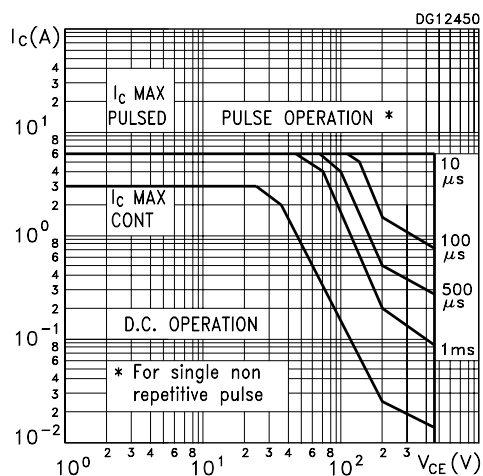
|                       |                                     |     |      |      |
|-----------------------|-------------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-Case    | Max | 1.78 | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-ambient | Max | 62.5 | °C/W |

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

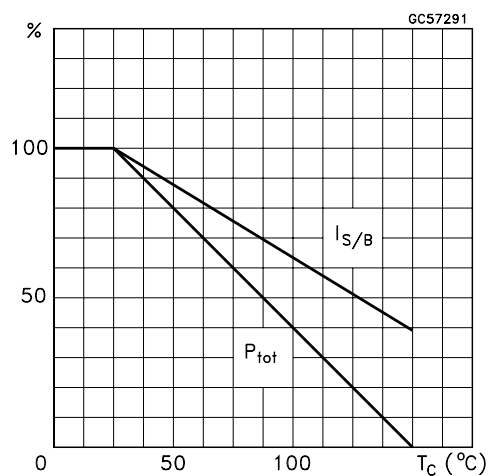
| Symbol                           | Parameter                                                 | Test Conditions                                                                                                                                                                  | Min.    | Typ.     | Max.     | Unit     |
|----------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|----------|----------|
| I <sub>CES</sub>                 | Collector Cut-off Current (V <sub>BE</sub> = 0)           | V <sub>CE</sub> = 1100 V                                                                                                                                                         |         |          | 100      | μA       |
| V <sub>(BR)EBO</sub>             | Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)       | I <sub>E</sub> = 1 mA                                                                                                                                                            | 12      |          | 24       | V        |
| V <sub>CEO(sus)</sub> *          | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 100 mA                                                                                                                                                          | 450     |          |          | V        |
| V <sub>CE(sat)</sub> *           | Collector-Emitter Saturation Voltage                      | I <sub>C</sub> = 1 A      I <sub>B</sub> = 200 mA                                                                                                                                |         | 0.25     | 1        | V        |
| V <sub>BE(sat)</sub> *           | Base-Emitter Saturation Voltage                           | I <sub>C</sub> = 1 A      I <sub>B</sub> = 200 mA                                                                                                                                |         |          | 1.5      | V        |
| h <sub>FE</sub> *                | DC Current Gain                                           | I <sub>C</sub> = 250 mA      V <sub>CE</sub> = 5 V<br>I <sub>C</sub> = 2 A      V <sub>CE</sub> = 5 V                                                                            | 20<br>6 | 38<br>10 | 60<br>15 |          |
| t <sub>s</sub><br>t <sub>f</sub> | RESISTIVE LOAD<br>Storage Time<br>Fall Time               | I <sub>C</sub> = 2.5 A      V <sub>CC</sub> = 125 V<br>V <sub>BB(off)</sub> = -5 V      t <sub>P</sub> = 300 μs<br>I <sub>B1</sub> = - I <sub>B2</sub> = 0.5 A<br>(see figure 1) |         | 400      | 2<br>700 | μs<br>ns |
| E <sub>ar</sub>                  | Repetitive Avalanche Energy                               | L = 2 mH      C = 1.8 nF<br>I <sub>BR</sub> ≤ 2.5A      (see figure 2)                                                                                                           | 6       |          |          | mJ       |

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

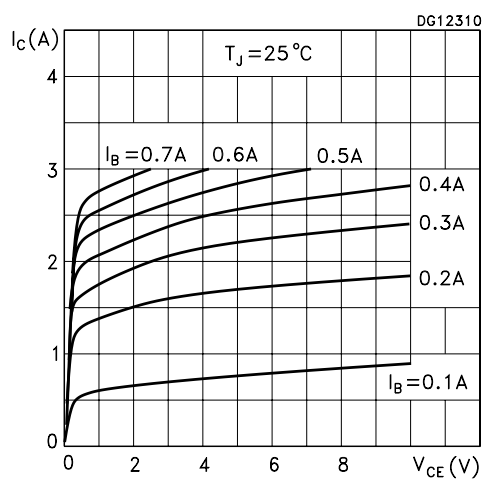
## Safe Operating Area



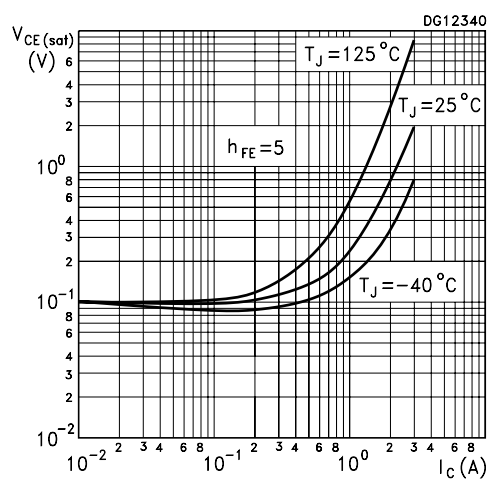
## Derating Curve



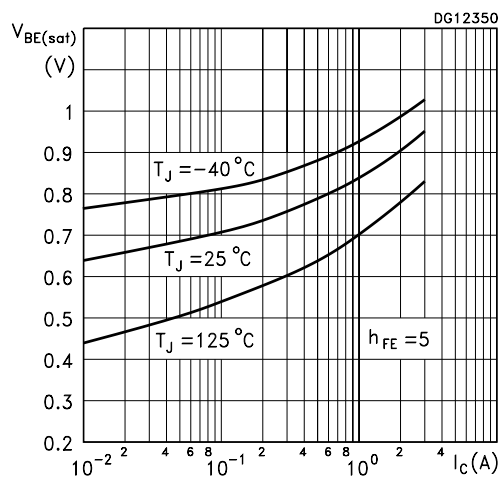
## Output Characteristics



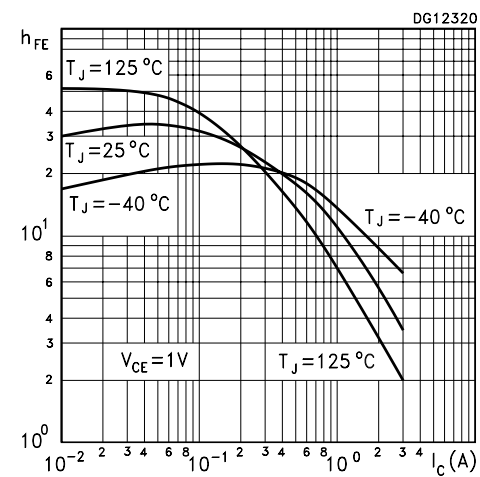
## Collector-Emitter Saturation Voltage



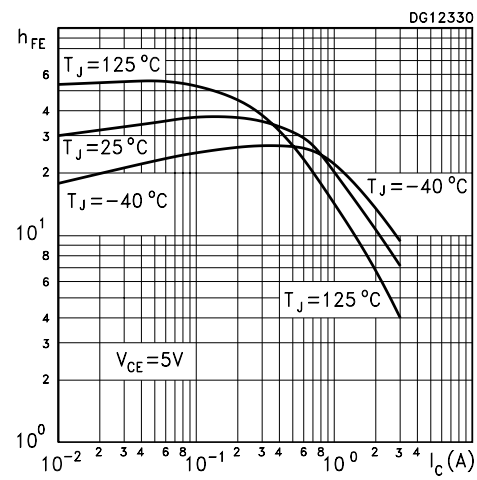
## Base-Emitter Saturation Voltage



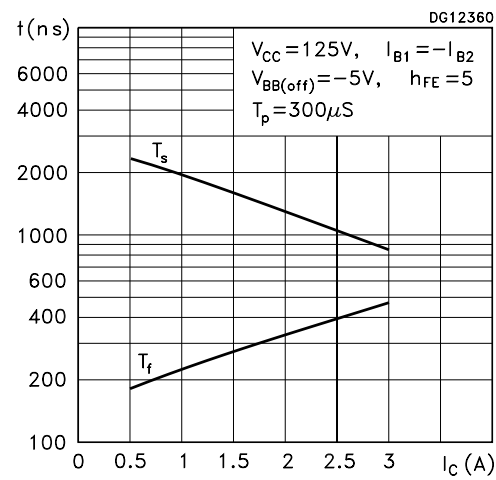
## DC Current Gain



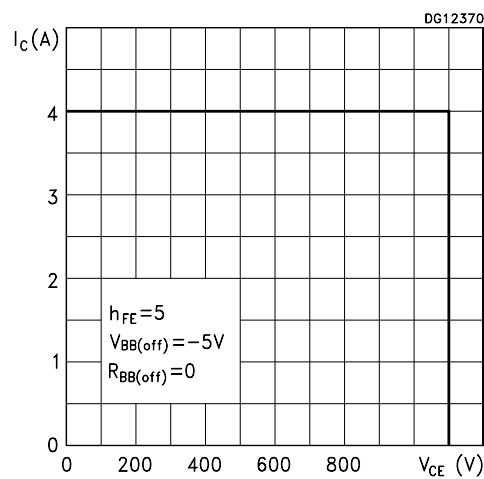
DC Current Gain

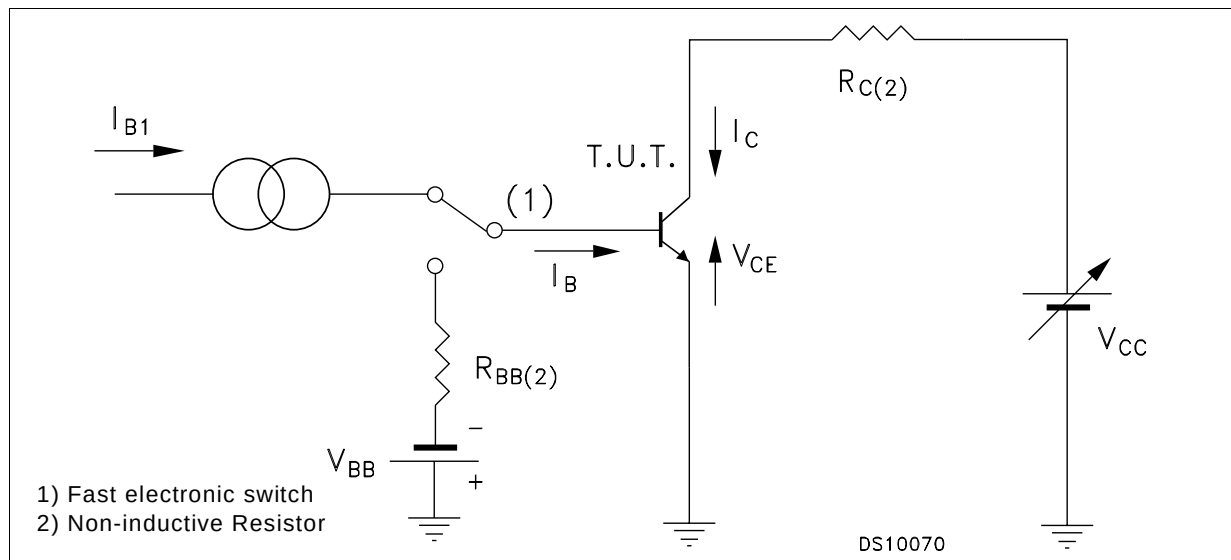
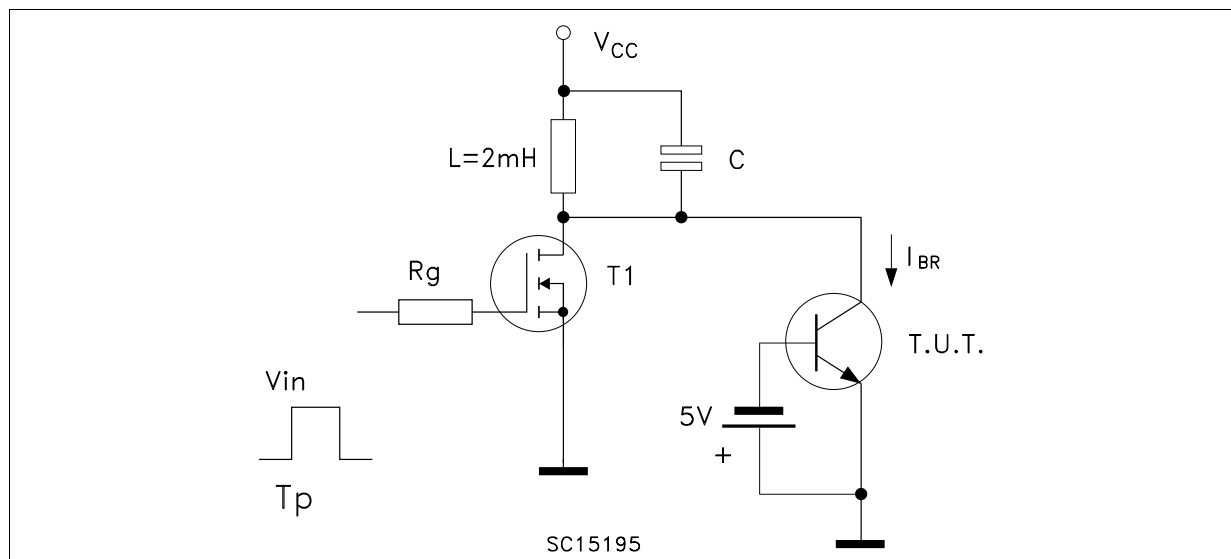


Resistive Load Switching Times



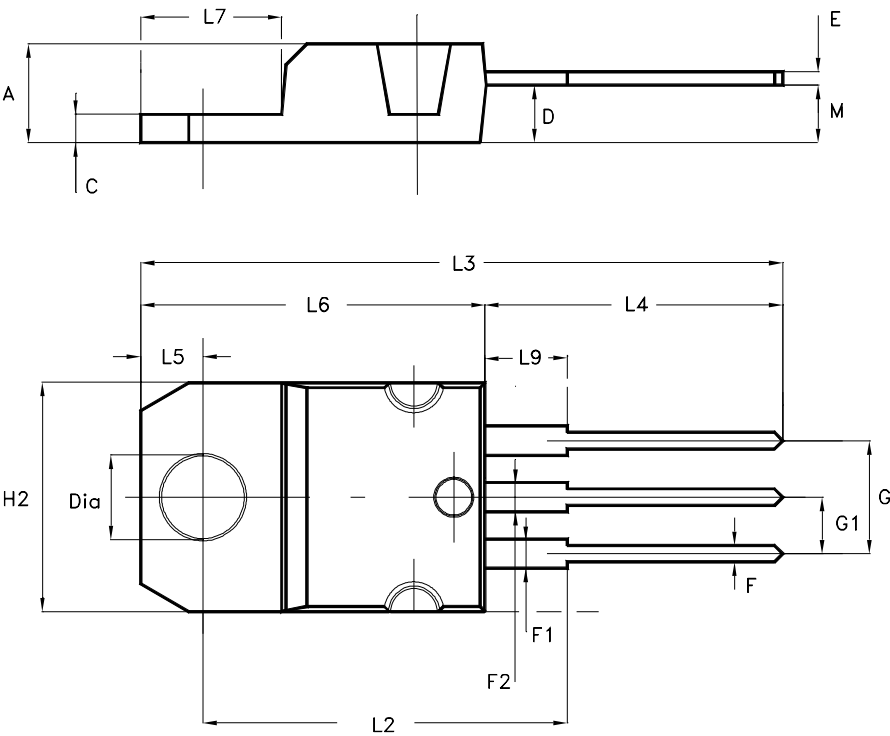
Reverse Biased Safe Operating Area



**Figure 1: Resistive Load Switching Test Circuit****Figure 2: Energy Rating Test Circuit**

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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