

**BUL510**

## HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- STMicroelectronics PREFERRED SALESTYPE
- NPN TRANSISTOR
- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERIZED AT 125°C

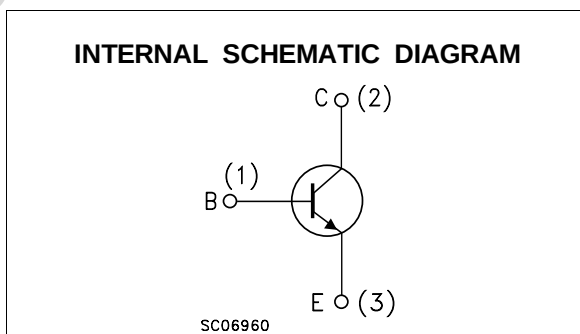
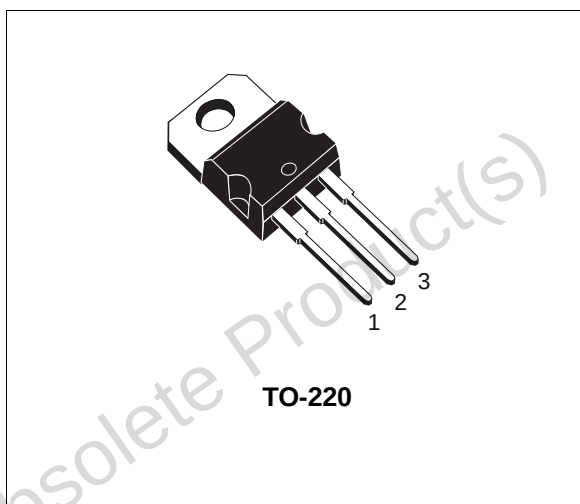
### APPLICATIONS

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- SWITCH MODE POWER SUPPLIES
- ELECTRONIC TRANSFORMER FOR HALOGEN LAMP

### DESCRIPTION

The BUL510 is manufactured using high voltage Multiepitaxial Mesa technology for cost-effective high performance. It uses a Hollow Emitter structure to enhance switching speeds.

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



### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter                                  | Value      | Unit |
|-----------|--------------------------------------------|------------|------|
| $V_{CES}$ | Collector-Emitter Voltage ( $V_{BE} = 0$ ) | 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                          | 10         | A    |
| $I_{CM}$  | Collector Peak Current ( $t_p < 5$ ms)     | 18         | A    |
| $I_B$     | Base Current                               | 3.5        | A    |
| $I_{BM}$  | Base Peak Current ( $t_p < 5$ ms)          | 7          | A    |
| $P_{tot}$ | Total Dissipation at $T_c = 25$ °C         | 100        | W    |
| $T_{stg}$ | Storage Temperature                        | -65 to 150 | °C   |
| $T_j$     | Max. Operating Junction Temperature        | 150        | °C   |

THERMAL DATA

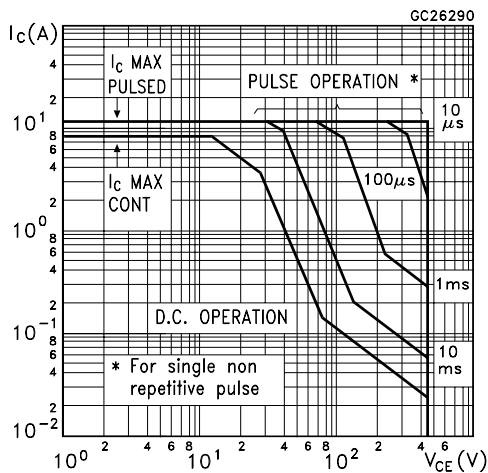
|                       |                                     |     |      |      |
|-----------------------|-------------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-Case    | Max | 1.25 | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-Ambient | Max | 62.5 | °C/W |

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

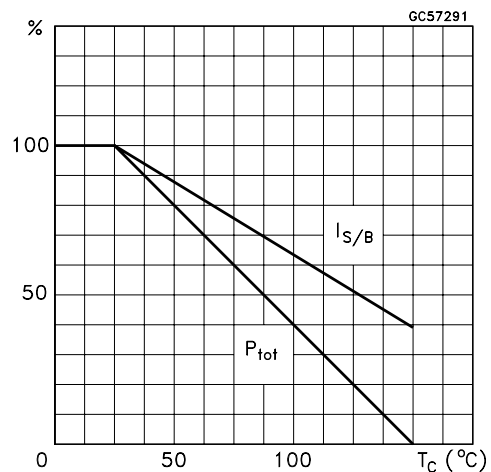
| Symbol                           | Parameter                                                 | Test Conditions                                                                                                                            | Min.     | Typ.      | Max.            | Unit        |
|----------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|-----------------|-------------|
| I <sub>CES</sub>                 | Collector Cut-off Current (V <sub>BE</sub> = 0)           | V <sub>CE</sub> = 1000 V<br>V <sub>CE</sub> = 1000 V T <sub>c</sub> = 125 °C                                                               |          |           | 100<br>500      | μA<br>μA    |
| I <sub>CEO</sub>                 | Collector Cut-off Current (I <sub>B</sub> = 0)            | V <sub>CE</sub> = 450 V                                                                                                                    |          |           | 250             | μA          |
| V <sub>CEO(sus)*</sub>           | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0) | I <sub>C</sub> = 100 mA L = 25 mH                                                                                                          | 450      |           |                 | V           |
| V <sub>EBO</sub>                 | Emitter-Base Voltage (I <sub>C</sub> = 0)                 | I <sub>E</sub> = 10 mA                                                                                                                     | 9        |           |                 | V           |
| V <sub>CE(sat)*</sub>            | Collector-Emitter Saturation Voltage                      | I <sub>C</sub> = 3 A I <sub>B</sub> = 0.6 A<br>I <sub>C</sub> = 4 A I <sub>B</sub> = 0.8 A<br>I <sub>C</sub> = 5 A I <sub>B</sub> = 1.25 A |          |           | 0.8<br>1<br>1.5 | V<br>V<br>V |
| V <sub>BE(sat)*</sub>            | Base-Emitter Saturation Voltage                           | I <sub>C</sub> = 3 A I <sub>B</sub> = 0.6 A<br>I <sub>C</sub> = 5 A I <sub>B</sub> = 1.25 A                                                |          |           | 1.2<br>1.5      | V<br>V      |
| h <sub>FE*</sub>                 | DC Current Gain                                           | I <sub>C</sub> = 1 A V <sub>CE</sub> = 5 V<br>I <sub>C</sub> = 10 mA V <sub>CE</sub> = 5 V                                                 | 15<br>10 |           | 45              |             |
| t <sub>s</sub><br>t <sub>f</sub> | INDUCTIVE LOAD<br>Storage Time<br>Fall Time               | I <sub>C</sub> = 4 A V <sub>CL</sub> = 300 V<br>I <sub>B1</sub> = 0.8 A I <sub>B2</sub> = -1.6 A<br>L = 200 μH                             |          | 2.2<br>80 | 3.4<br>150      | μs<br>ns    |
| t <sub>s</sub><br>t <sub>f</sub> | INDUCTIVE LOAD<br>Storage Time<br>Fall Time               | I <sub>C</sub> = 4 A V <sub>CL</sub> = 300 V<br>I <sub>B1</sub> = 0.8 A I <sub>B2</sub> = -1.6 A<br>L = 200 μH T <sub>c</sub> = 125 °C     |          | 3<br>120  |                 | μs<br>ns    |

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

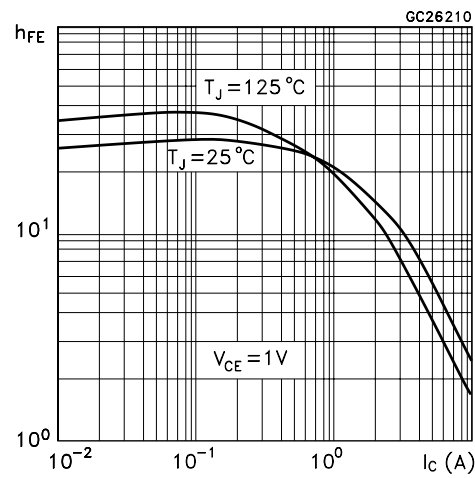
Safe Operating Areas



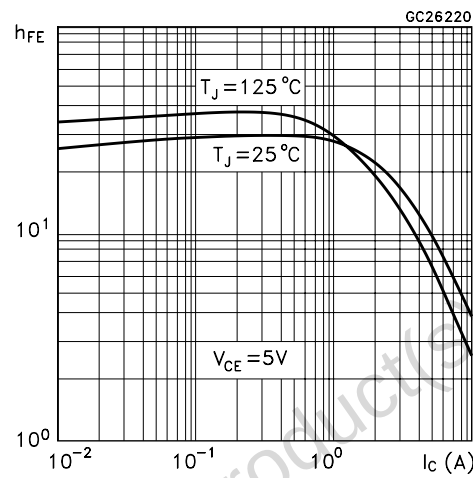
Derating Curve



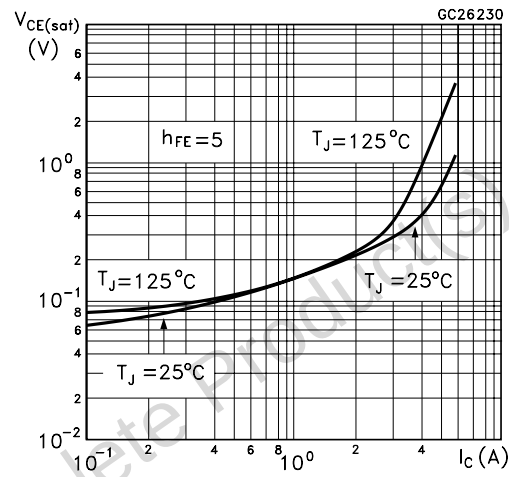
DC Current Gain



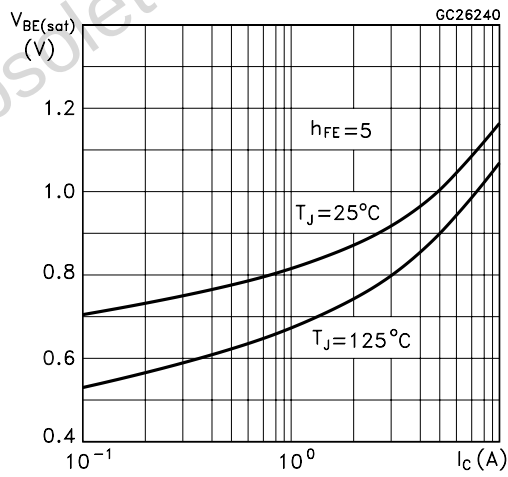
DC Current Gain



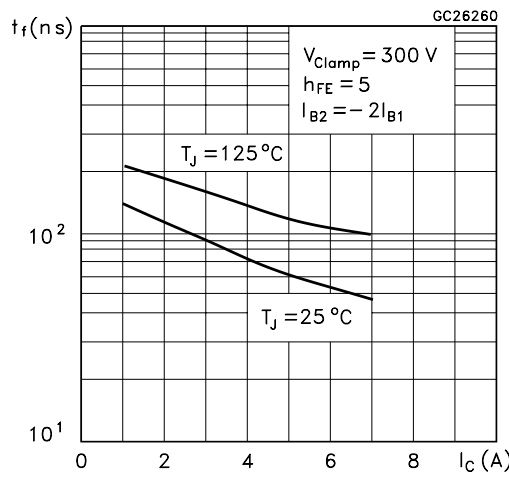
Collector Emitter Saturation Voltage



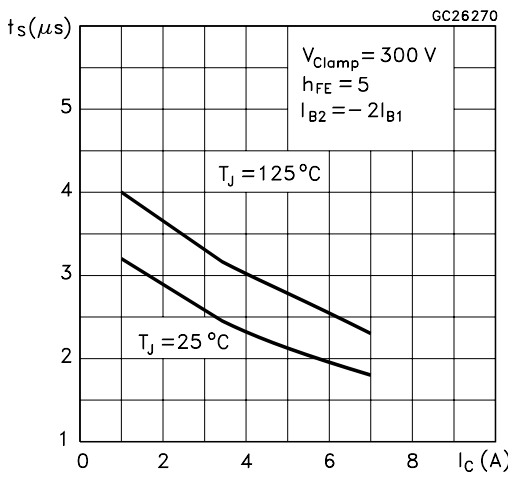
Base Emitter Saturation Voltage



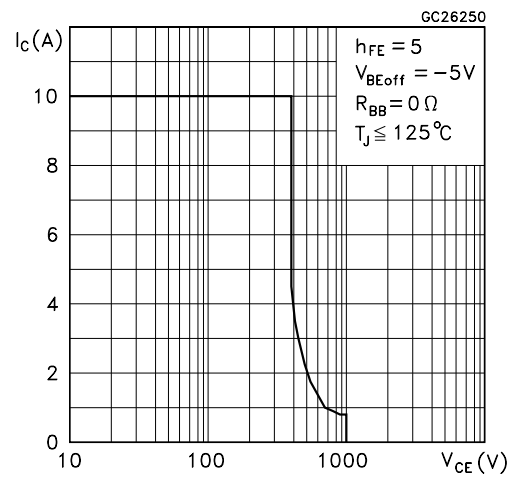
Inductive Fall Time



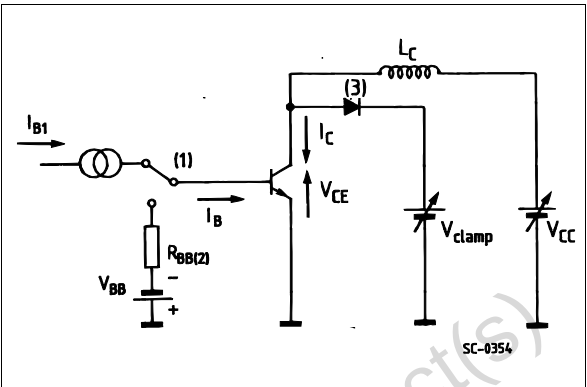
Inductive Storage Time



Reverse Biased SOA



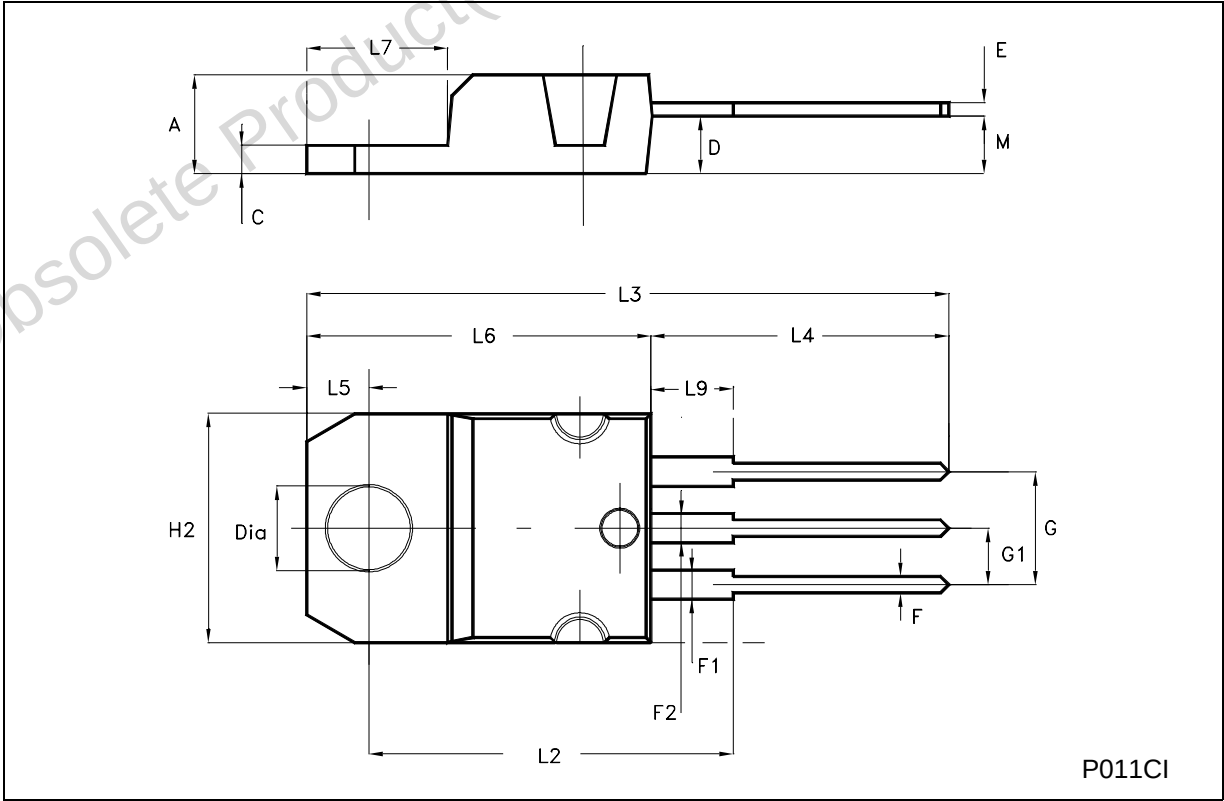
RBSOA and Inductive Load Switching Test Circuits



- (1) Fast electronic switch
- (2) Non-inductive Resistor
- (3) Fast recovery rectifier

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 |



Obsolete Product(s) - Obsolete Product(s)

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