



BUL89

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- HIGH VOLTAGE CAPABILITY
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- LOW BASE-DRIVE REQUIREMENTS
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERIZED AT 125°C

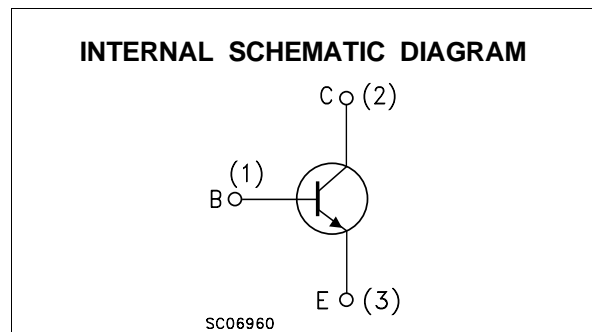
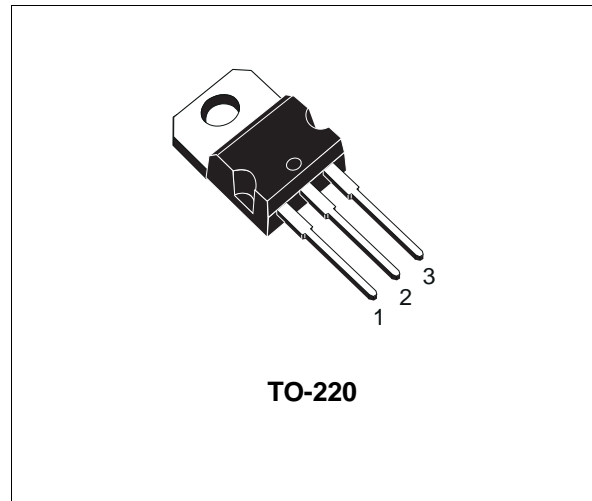
APPLICATIONS

- ELECTRONIC TRANSFORMER FOR HALOGEN LAMPS
- SWITCH MODE POWER SUPPLIES

DESCRIPTION

The BUL89 is manufactured using high voltage Multi-epitaxial 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 ($V_{BE} = 0$) | 850 | V |
| V_{CEO} | Collector-Emitter Voltage ($I_B = 0$) | 400 | V |
| V_{EBO} | Emitter-Base Voltage ($I_C = 0$) | 9 | V |
| I_C | Collector Current | 12 | A |
| I_{CM} | Collector Peak Current ($t_p < 5$ ms) | 25 | A |
| I_B | Base Current | 6 | A |
| I_{BM} | Base Peak Current ($t_p < 5$ ms) | 12 | A |
| P_{tot} | Total Dissipation at $T_c = 25$ °C | 110 | W |
| T_{stg} | Storage Temperature | -65 to 150 | °C |
| T_j | Max. Operating Junction Temperature | 150 | °C |

THERMAL DATA

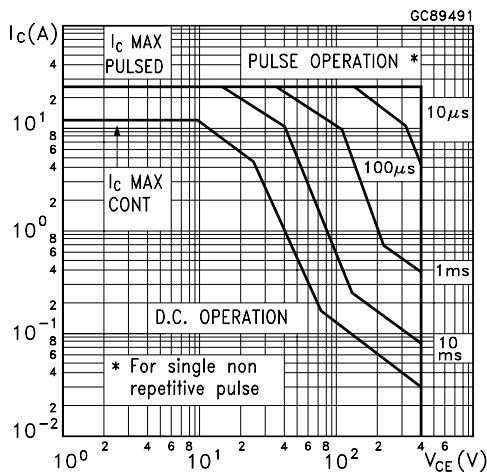
| | | | | |
|-----------------------|----------------------------------|-----|------|------|
| R _{thj-case} | Thermal Resistance Junction-Case | Max | 1.14 | °C/W |
|-----------------------|----------------------------------|-----|------|------|

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

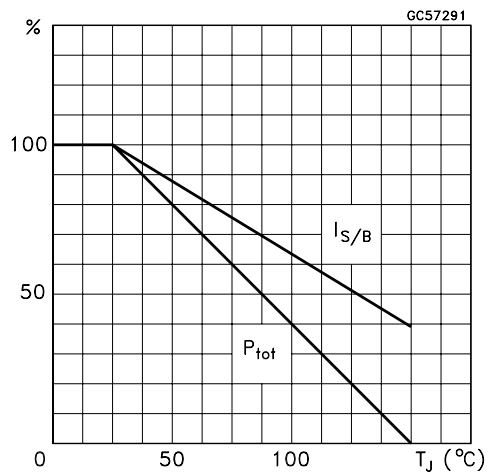
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|---|--|----------|-----------|---------------|-------------|
| I _{CES} | Collector Cut-off Current (V _{BE} = 0) | V _{CE} = 850 V V _{CE} = 850 V T _j = 125 °C | | | 100 500 | μA μA |
| I _{CEO} | Collector Cut-off Current (I _B = 0) | V _{CE} = 400 V | | | 100 | μA |
| V _{CEO(sus)*} | Collector-Emitter Sustaining Voltage (I _B = 0) | I _C = 10 mA L = 25 mH | 400 | | | V |
| V _{EBO} | Emitter-Base Voltage (I _C = 0) | I _E = 10 mA | 9 | | | V |
| V _{CE(sat)*} | Collector-Emitter Saturation Voltage | I _C = 5 A I _B = 1 A I _C = 8 A I _B = 1.6 A I _C = 12 A I _B = 2.4 A | | | 1 1.5 5 | V V V |
| V _{BE(sat)*} | Base-Emitter Saturation Voltage | I _C = 5 A I _B = 1 A I _C = 8 A I _B = 1.6 A | | | 1.3 1.6 | V V |
| h _{FE*} | DC Current Gain | I _C = 5 A V _{CE} = 5 V I _C = 10 mA V _{CE} = 5 V | 10 10 | | 40 | |
| t _s t _f | INDUCTIVE LOAD Storage Time Fall Time | I _C = 8 A I _{B1} = 1.6 A V _{BE(off)} = -5 V R _{BB} = 0 Ω V _{CL} = 350 V L = 200 μH (see figure 1) | | 1.5 55 | 2.3 110 | μs ns |
| t _s t _f | INDUCTIVE LOAD Storage Time Fall Time | I _C = 8 A I _{B1} = 1.6 A V _{BE(off)} = -5 V R _{BB} = 0 Ω V _{CL} = 350 V L = 200 μH T _j = 100 °C (see figure 1) | | 1.9 80 | | μs ns |

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

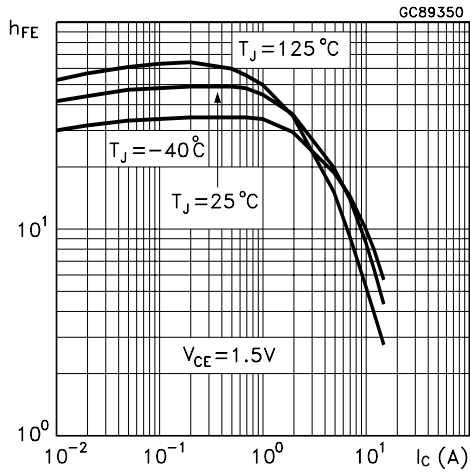
Safe Operating Area



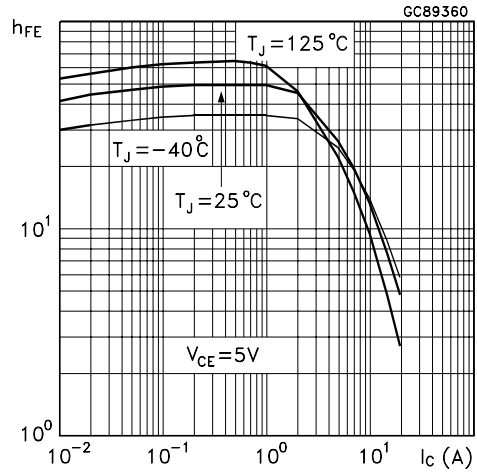
Derating Curve



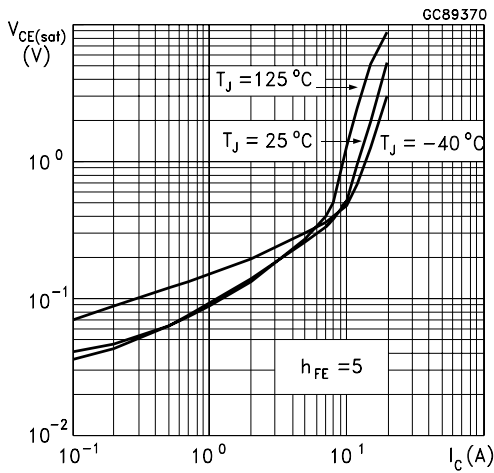
DC Current Gain



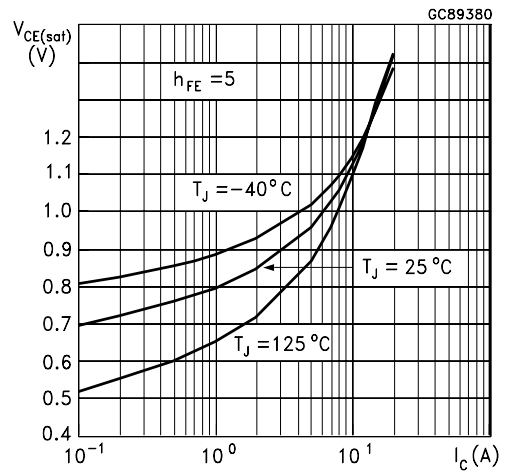
DC Current Gain



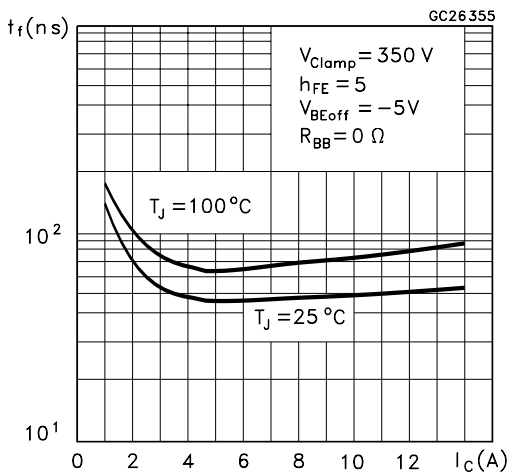
Collector Emitter Saturation Voltage



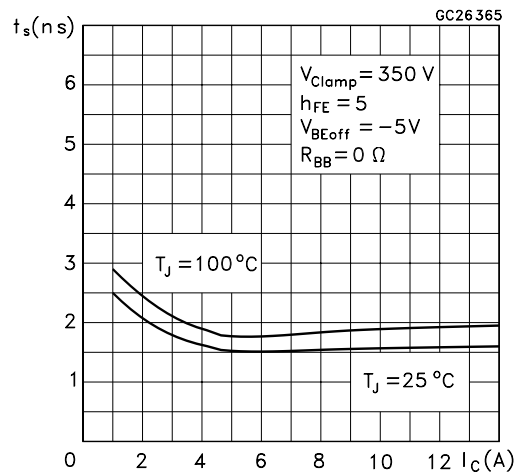
Base Emitter Saturation Voltage



Inductive Load Fall Time



Inductive Load Storage Time



Reverse Biased SOA

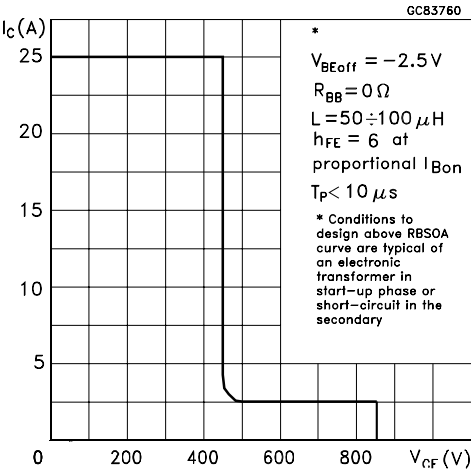
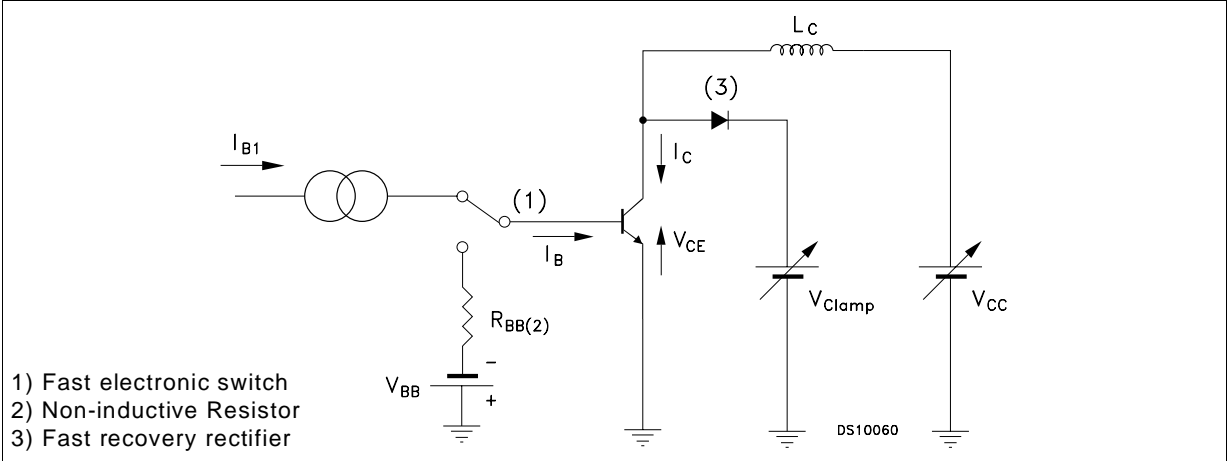
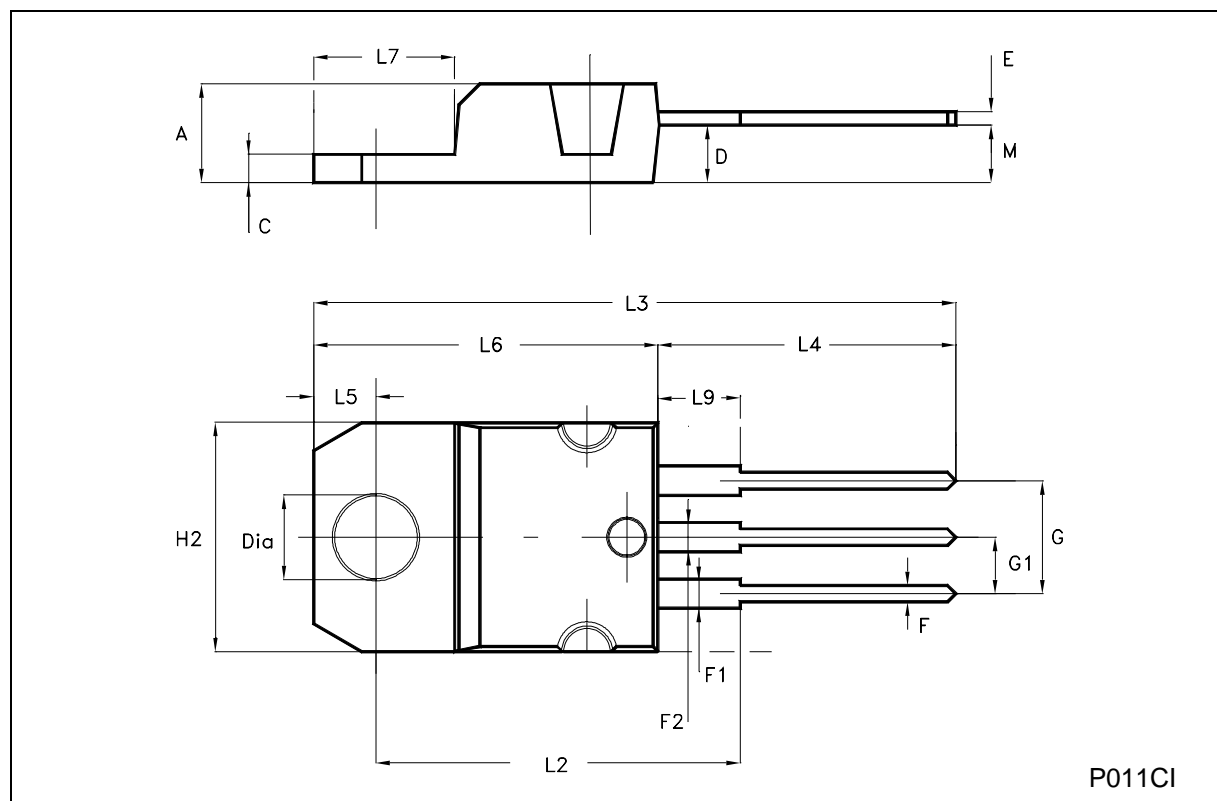


Figure 1: Inductive Load Switching Test Circuit



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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