



BUL38D

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- STMicroelectronics PREFERRED SALESTYPE
- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- LOW BASE-DRIVE REQUIREMENTS
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERISED AT 125°C
- HIGH RUGGEDNESS
- INTEGRATED ANTIPARALLEL COLLECTOR-EMITTER DIODE

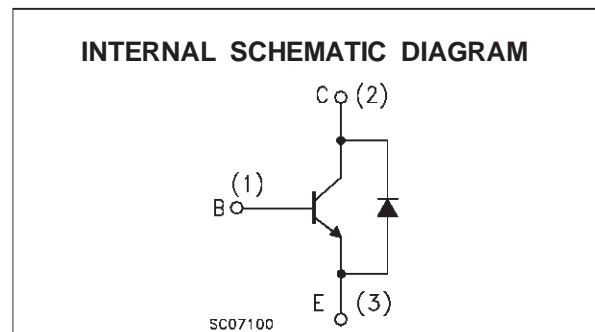
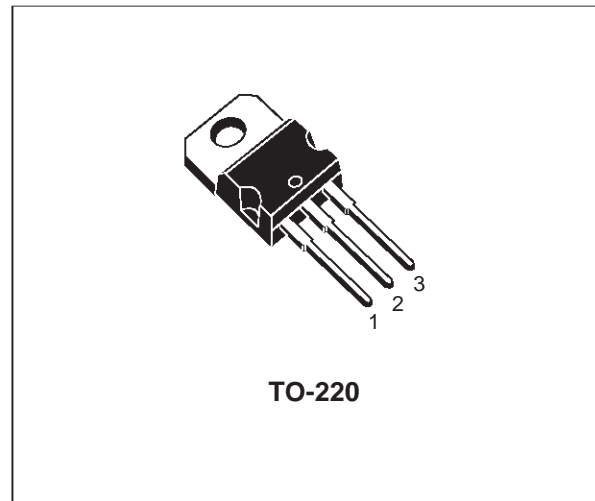
APPLICATIONS

- ELECTRONIC TRANSFORMERS FOR HALOGEN LAMPS
- SWITCH MODE POWER SUPPLIES

DESCRIPTION

The BUL38D is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and high voltage withstand capability.

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 ($V_{BE} = 0$) | 800 | 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 | 5 | A |
| I_{CM} | Collector Peak Current ($t_p < 5$ ms) | 10 | 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 | 80 | W |
| T_{stg} | Storage Temperature | -65 to 150 | °C |
| T_j | Max. Operating Junction Temperature | 150 | °C |

BUL38D

THERMAL DATA

| | | | | |
|-----------------------|-------------------------------------|-----|------|------|
| R _{thj-case} | Thermal Resistance Junction-Case | Max | 1.56 | °C/W |
| R _{thj-amb} | Thermal Resistance Junction-Ambient | Max | 62.5 | °C/W |

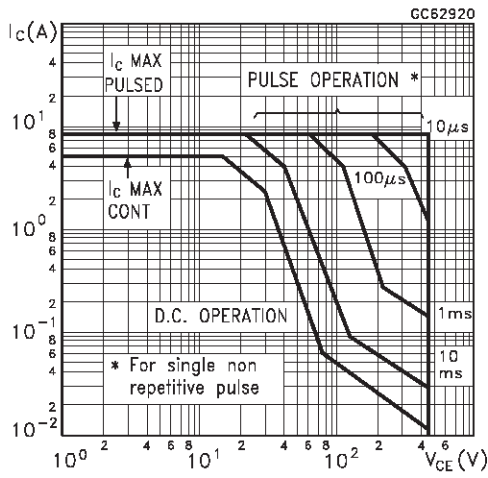
ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|---|---|------|------|------|------|
| I _{CES} | Collector Cut-off Current (V _{BE} = 0) | V _{CE} = 800 V | | | 100 | μA |
| | | V _{CE} = 800 V T _j = 125 °C | | | 500 | μA |
| I _{CEO} | Collector Cut-off Current (I _B = 0) | V _{CE} = 450 V | | | 250 | μA |
| V _{CEO(sus)*} | Collector-Emitter Sustaining Voltage (I _B = 0) | I _C = 100 mA L = 25 mH | 450 | | | V |
| V _{EBO} | Emitter-Base Voltage (I _C = 0) | I _E = 10 mA | 9 | | | V |
| V _{CE(sat)*} | Collector-Emitter Saturation Voltage | I _C = 1 A I _B = 0.2 A | | | 0.5 | V |
| | | I _C = 2 A I _B = 0.4 A | | | 0.7 | V |
| | | I _C = 3 A I _B = 0.75 A | | | 1.1 | V |
| V _{BE(sat)*} | Base-Emitter Saturation Voltage | I _C = 1 A I _B = 0.2 A | | | 1.1 | V |
| | | I _C = 2 A I _B = 0.4 A | | | 1.2 | V |
| h _{FE*} | DC Current Gain | I _C = 10 mA V _{CE} = 5 V | 10 | | | |
| | | I _C = 0.5 A V _{CE} = 5 V | | | 60 | |
| | | I _C = 2 A V _{CE} = 5 V | | | | |
| | | Group A | 13 | | 23 | |
| | Group B | 22 | | 32 | | |
| t _s t _f | RESISTIVE LOAD Storage Time Fall Time | I _C = 2.5 A V _{CC} = 150 V | 1.0 | | 2.2 | μs |
| | | I _{B1} = -I _{B2} = 0.5 A t _p = 30 μs | | | | |
| t _s t _f | INDUCTIVE LOAD Storage Time Fall Time | I _C = 2 A I _{B1} = 0.4 A | | 1 | 1.8 | μs |
| | | V _{BE(off)} = -5 V R _{BB} = 0 Ω | | | | |
| | | V _{CL} = 250 V L = 200 μH | | 55 | 100 | ns |
| t _s t _f | INDUCTIVE LOAD Storage Time Fall Time | I _C = 2 A I _{B1} = 0.4 A | | 1.3 | | μs |
| | | V _{BE(off)} = -5 V R _{BB} = 0 Ω | | | | |
| | | V _{CL} = 250 V L = 200 μH | | 100 | | ns |
| V _f | Diode Forward Voltage | I _C = 2 A | | | 1.5 | V |

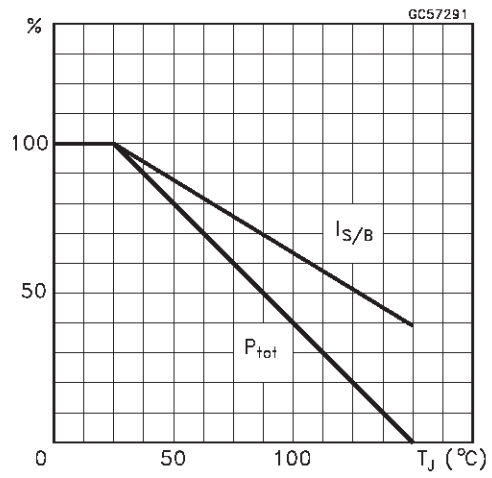
* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %.

The product is pre-selected in DC current gain (Group A and Group B). STMicroelectronics reserves the right to ship either groups according to production availability. Please contact your nearest STMicroelectronics sales office for delivery details.

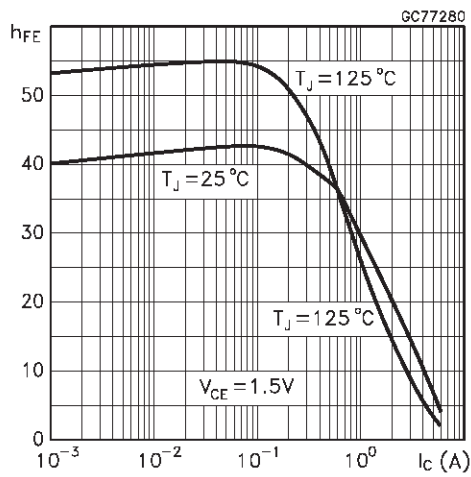
Safe Operating Area



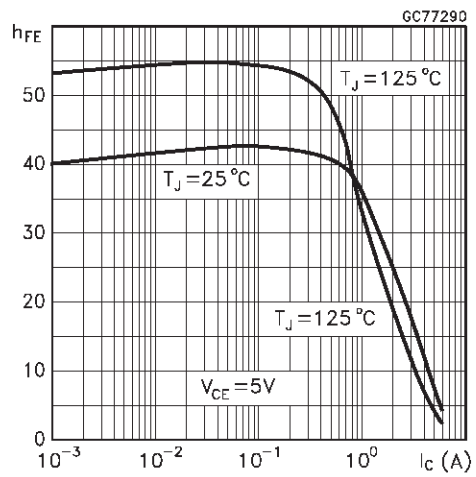
Derating Curve



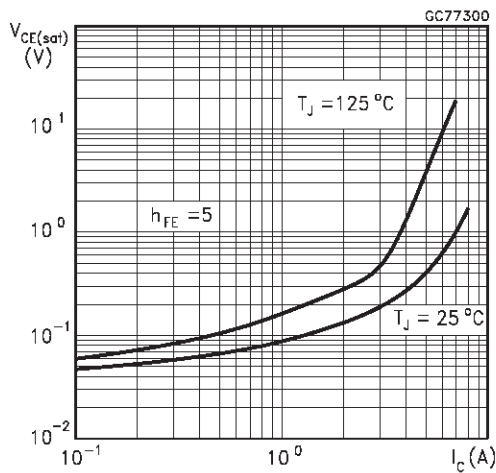
DC Current Gain



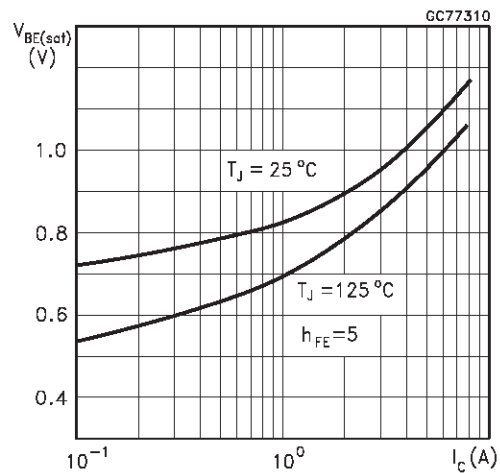
DC Current Gain



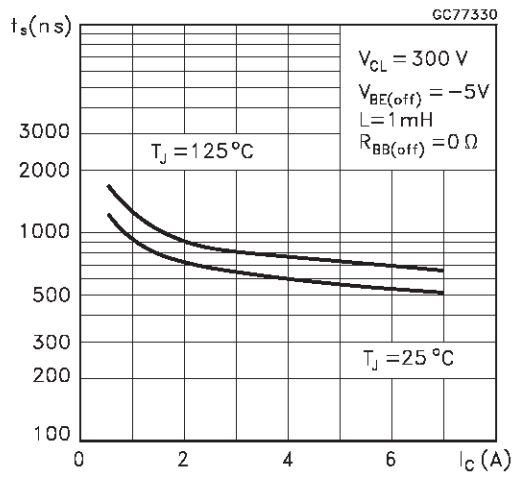
Collector-Emitter Saturation Voltage



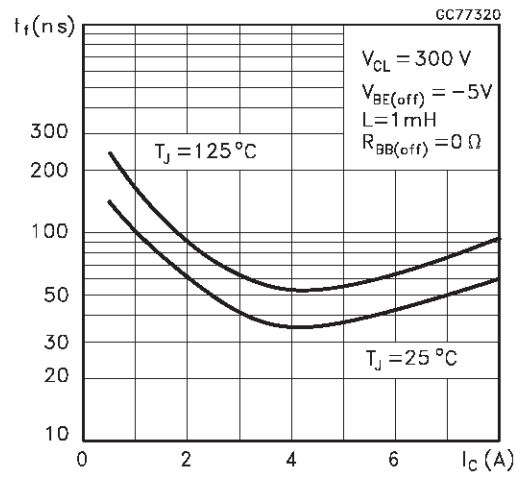
Base-Emitter Saturation Voltage



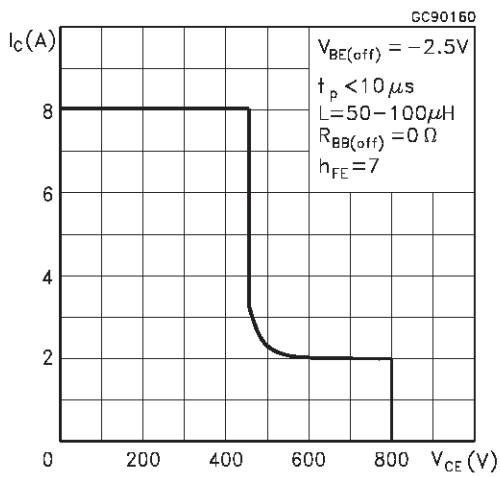
Inductive Storage Time



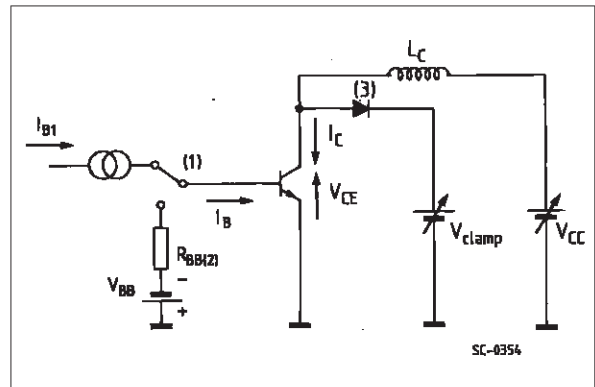
Inductive Fall Time



Reverse Biased SOA



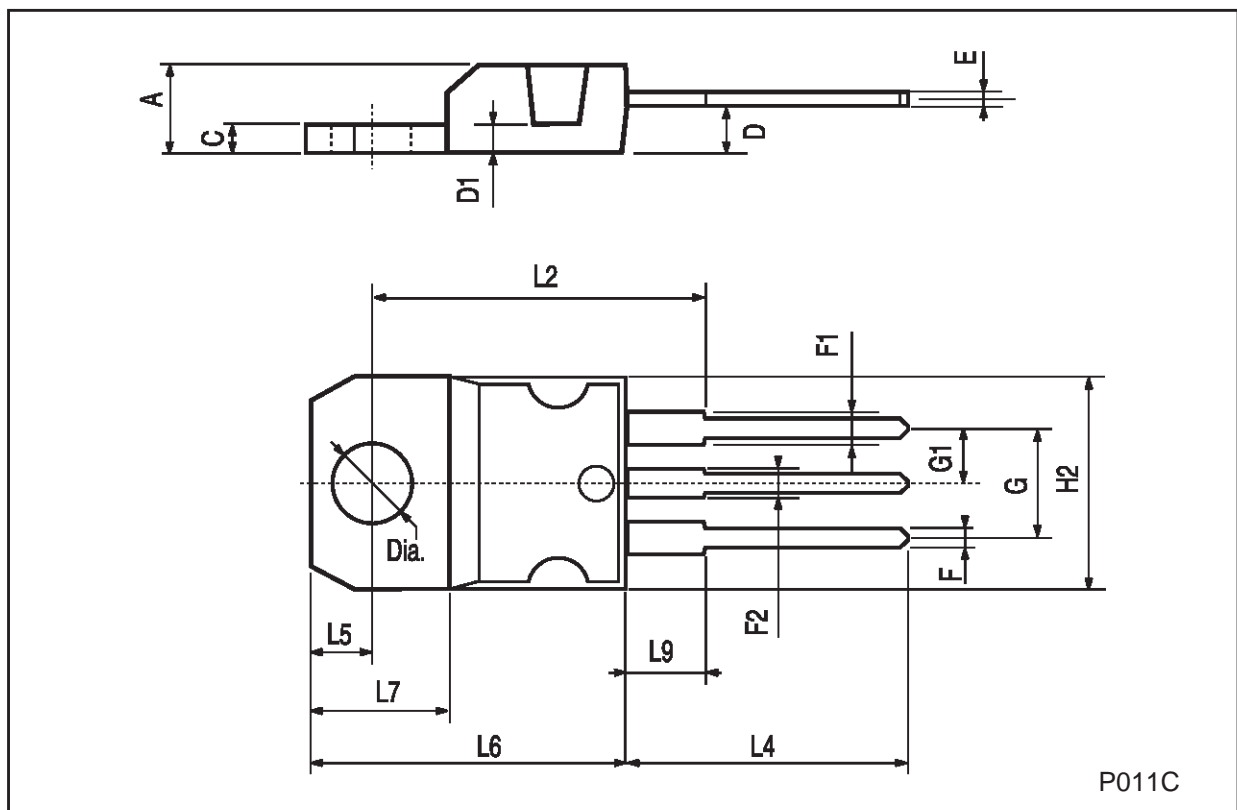
RBSOA and Inductive Load Switching Test Circuit



- (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 | | 0.051 |
| D | 2.40 | | 2.72 | 0.094 | | 0.107 |
| D1 | | 1.27 | | | 0.050 | |
| 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 | | 0.203 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H2 | 10.0 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16.4 | | | 0.645 | |
| L4 | 13.0 | | 14.0 | 0.511 | | 0.551 |
| L5 | 2.65 | | 2.95 | 0.104 | | 0.116 |
| L6 | 15.25 | | 15.75 | 0.600 | | 0.620 |
| L7 | 6.2 | | 6.6 | 0.244 | | 0.260 |
| L9 | 3.5 | | 3.93 | 0.137 | | 0.154 |
| DIA. | 3.75 | | 3.85 | 0.147 | | 0.151 |



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