



BUL1203E

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

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

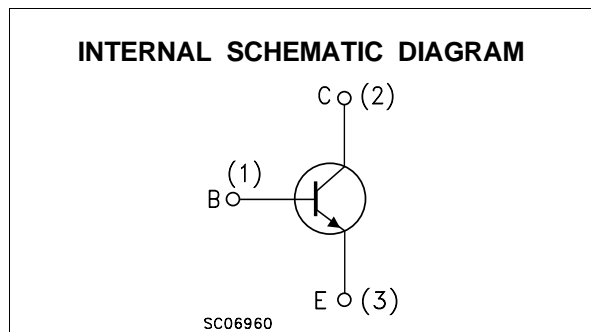
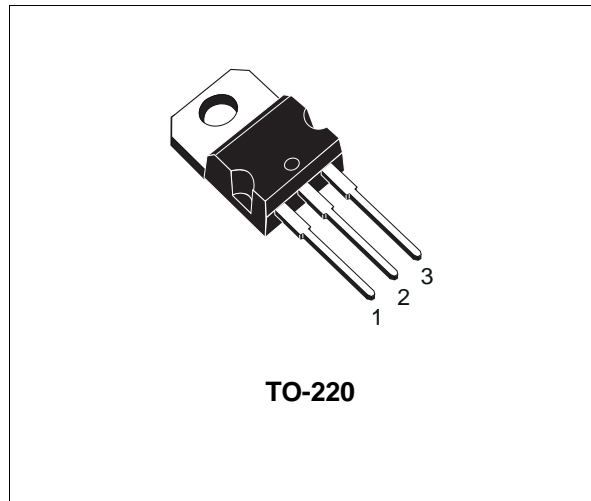
APPLICATIONS

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING (277 V HALF BRIDGE AND 120 V PUSH-PULL TOPOLOGIES)

DESCRIPTION

The BUL1203E is a new device manufactured using Diffused Collector technology to enhance switching speeds and tight h_{FE} range while maintaining a wide RBSOA.

Thanks to his structure it has an intrinsic ruggedness which enables the transistor to withstand a high collector current level during Breakdown condition, without using the transil protection usually necessary in typical converters for lamp ballast.



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------|--|------------|------|
| V_{CBO} | Collector-Base Voltage ($I_E = 0$) | 1200 | V |
| V_{CES} | Collector-Emitter Voltage ($V_{BE} = 0$) | 1200 | V |
| V_{CEO} | Collector-Emitter Voltage ($I_B = 0$) | 550 | 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) | 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 | 100 | W |
| T_{stg} | Storage Temperature | -65 to 150 | °C |
| T_j | Max. Operating Junction Temperature | 150 | °C |

THERMAL DATA

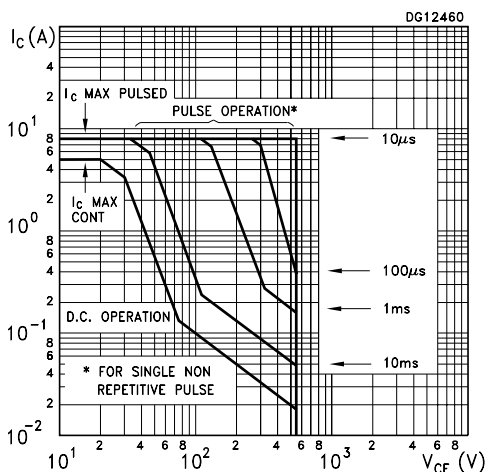
| | | | | |
|-----------------------|----------------------------------|-----|------|------|
| R _{thj-case} | Thermal Resistance Junction-case | Max | 1.25 | °C/W |
|-----------------------|----------------------------------|-----|------|------|

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

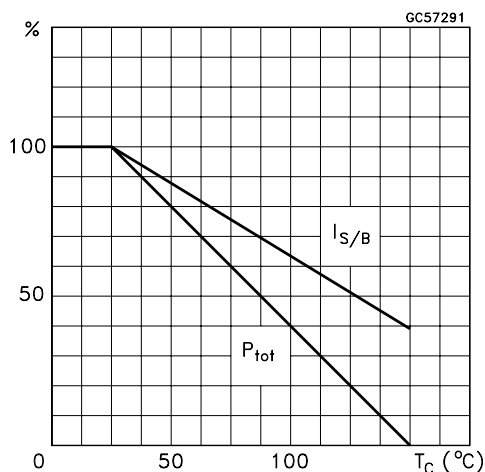
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---------------------|------------|-------------------|----------------|
| I _{CES} | Collector Cut-off Current (V _{BE} = 0) | V _{CE} = 1200 V | | | 100 | μA |
| I _{CEO} | Collector Cut-off Current (I _B = 0) | V _{CE} = 550 V | | | 100 | μA |
| V _{CEO(sus)*} | Collector-Emitter Sustaining Voltage (I _B = 0) | I _C = 100 mA L = 25 mH | 550 | | | 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 I _C = 2 A I _B = 0.4 A I _C = 3 A I _B = 1 A | | | 0.5 0.7 1.5 | V V V |
| V _{BE(sat)*} | Base-Emitter Saturation Voltage | I _C = 2 A I _B = 0.4 A I _C = 3 A I _B = 1 A | | | 1.5 1.5 | V V |
| h _{FE*} | DC Current Gain | I _C = 1 mA V _{CE} = 5 V I _C = 10 mA V _{CE} = 5 V I _C = 0.8 A V _{CE} = 3 V I _C = 2 A V _{CE} = 5 V | 10 10 14 9 | | 32 28 | |
| t _{on} t _s t _f | RESISTIVE LOAD Turn-on Time Storage Time Fall Time | I _C = 2 A I _{B1} = 0.4 A I _{B2} = -0.8 A t _p = 30 μs V _{CC} = 150 V (see figure 2) | | 2.5 0.2 | 0.5 3.0 0.3 | μs μs μs |
| E _{ar} | Repetitive Avalanche Energy | L = 2 mH C = 1.8 nF V _{CC} = 50 V V _{BE} = -5 V (see figure 3) | 6 | | | mJ |

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

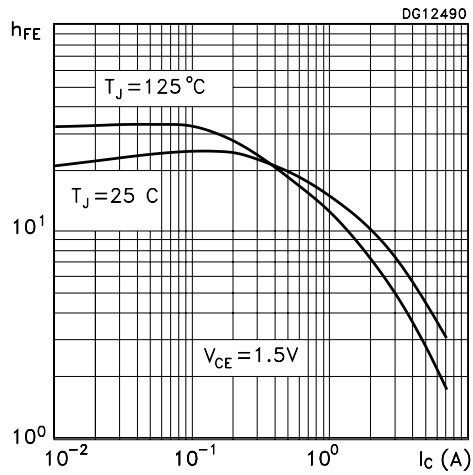
Safe Operating Area



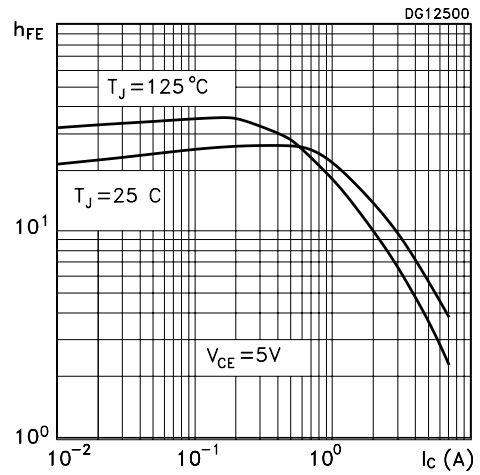
Derating Curve



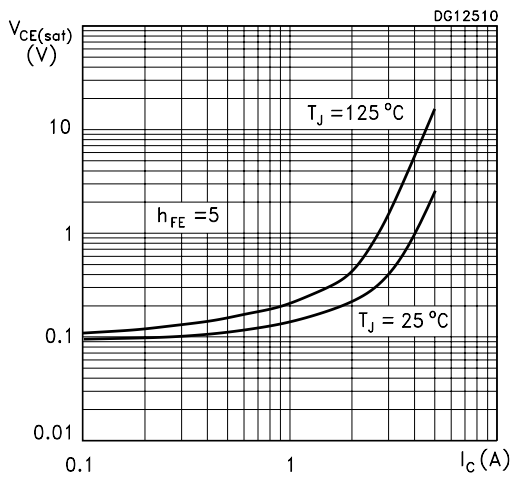
DC Current Gain



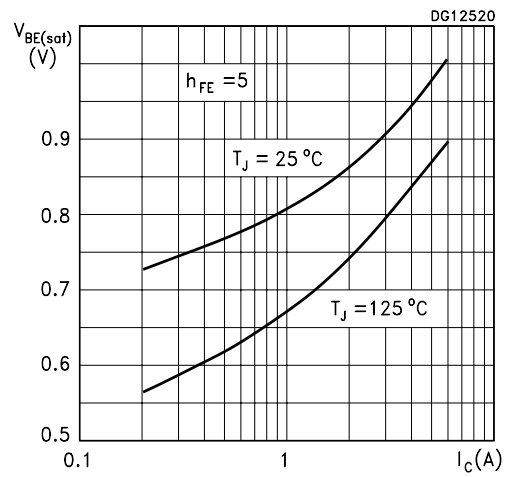
DC Current Gain



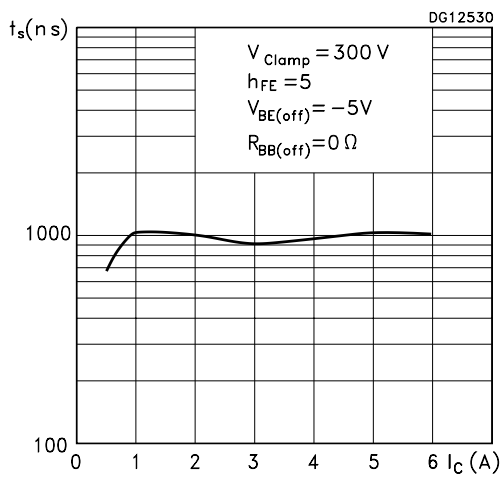
Collector-Emitter Saturation Voltage



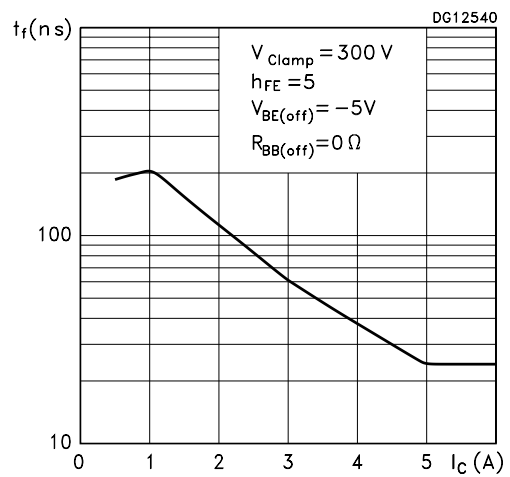
Base-Emitter Saturation Voltage



Inductive Load Storage Time



Inductive Load Fall Time



Reverse Biased Safe Operating Area

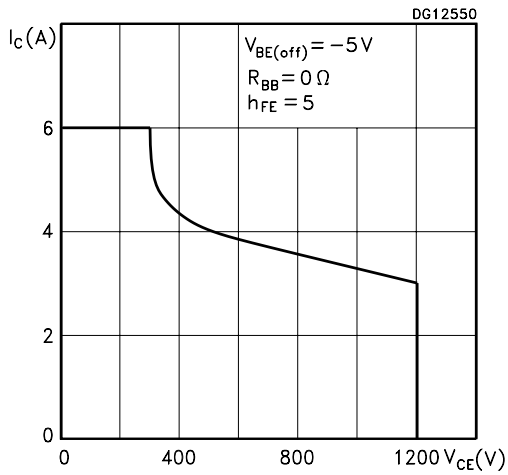


Figure 1: Inductive Load Switching Test Circuit

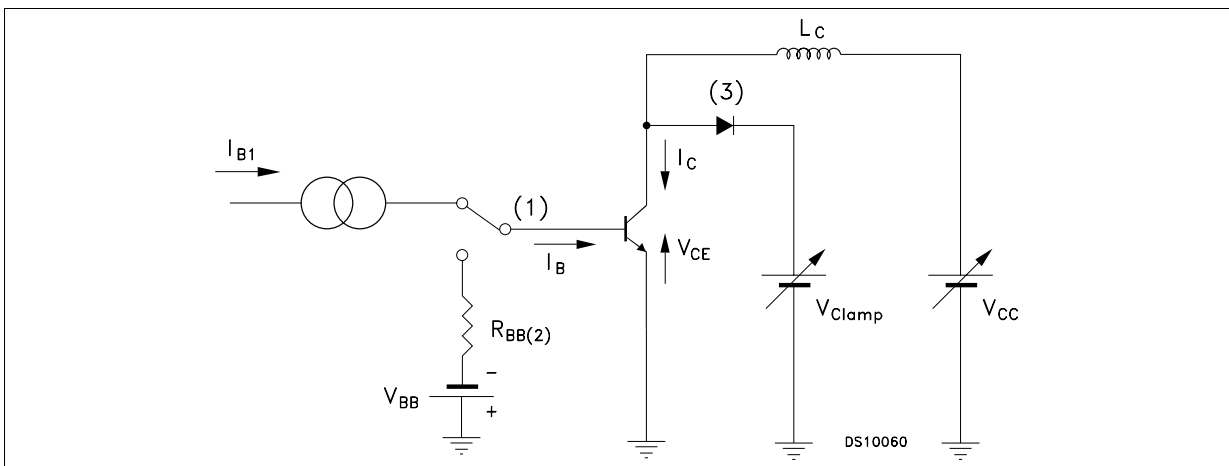


Figure 2: Resistive Load Switching Test Circuit

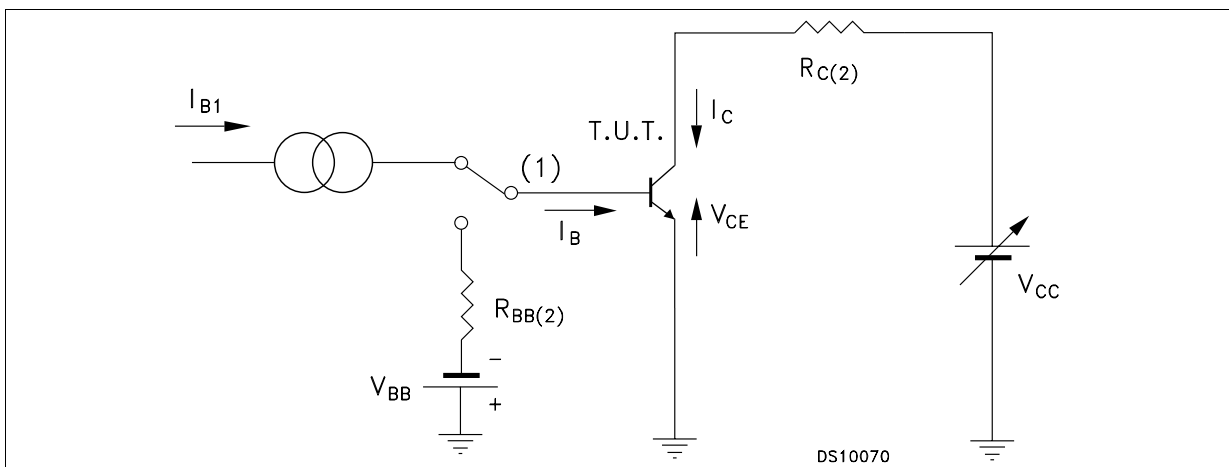
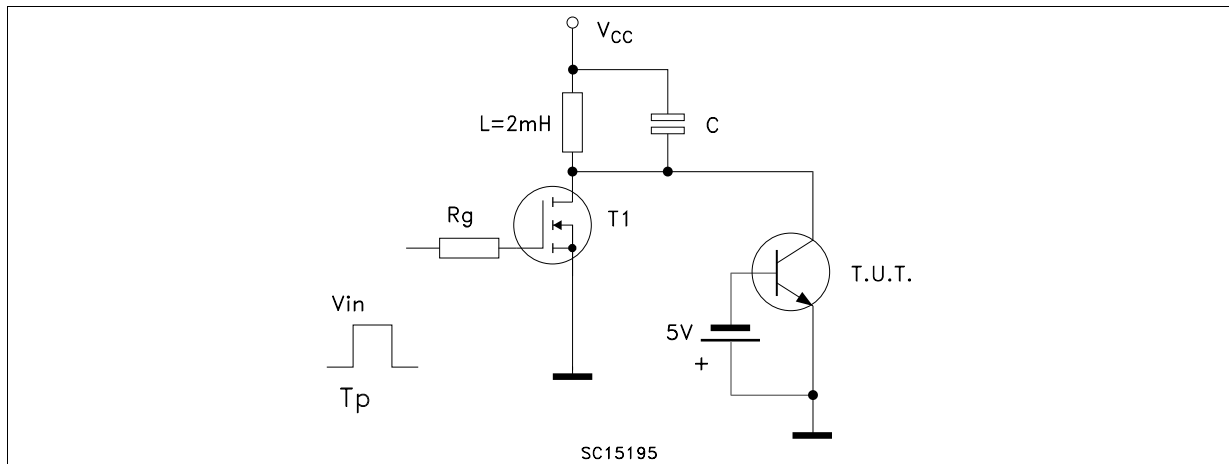
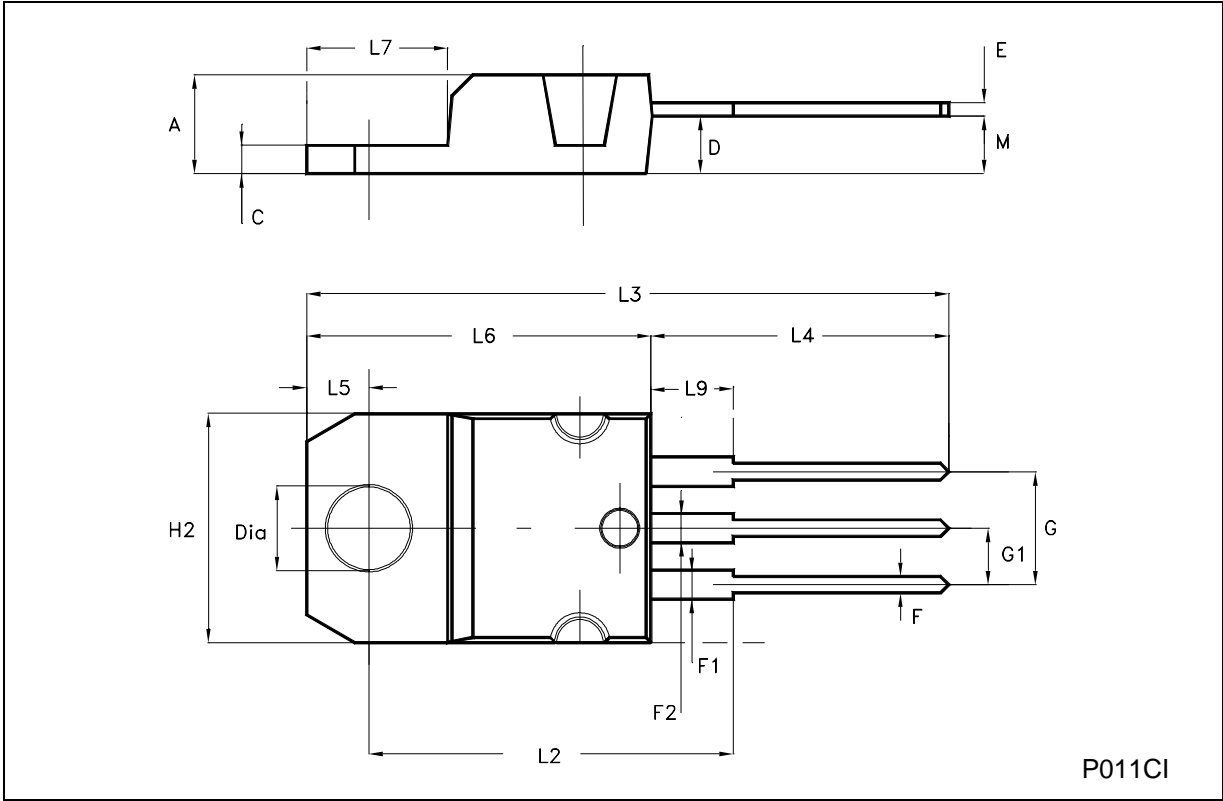


Figure 3: Energy Rating Test Circuit



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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