

**THERMAL DATA**

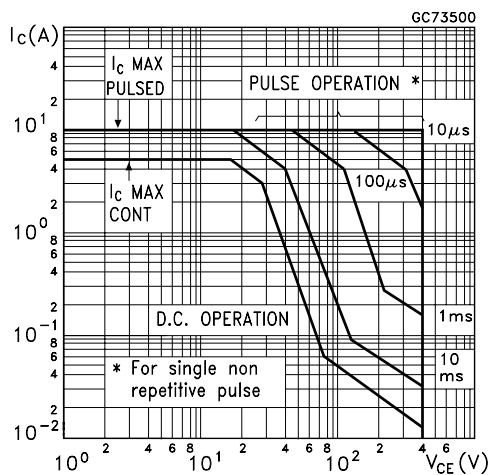
|                       |                                     |     |      |      |
|-----------------------|-------------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case    | Max | 1.56 | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-ambient | Max | 62.5 | °C/W |

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

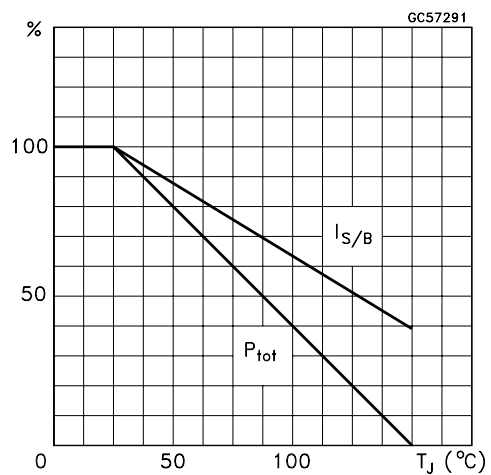
| Symbol                           | Parameter                                       | Test Conditions   | Min.    | Typ.      | Max.                 | Unit             |
|----------------------------------|---|---|---------|-----------|----------------------|------------------|
| I <sub>CES</sub>                 | Collector Cut-off Current (V <sub>BE</sub> = 0) | V <sub>CE</sub> = 800 V<br>V <sub>CE</sub> = 800 V T <sub>j</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> = 400 V   |         |           | 250                  | μA               |
| V <sub>CEO(sus)</sub>            | Collector-Emitter Sustaining Voltage            | I <sub>C</sub> = 100 mA L = 25 mH   | 400     |           |                      | V                |
| V <sub>EBO</sub>                 | Emitter-Base Voltage                            | I <sub>E</sub> = 10 mA  | 9       |           |                      | V                |
| V <sub>CE(sat)*</sub>            | Collector-Emitter Saturation Voltage            | I <sub>C</sub> = 1 A I <sub>B</sub> = 0.2 A<br>I <sub>C</sub> = 2 A I <sub>B</sub> = 0.4 A<br>I <sub>C</sub> = 3 A I <sub>B</sub> = 0.6 A<br>I <sub>C</sub> = 4 A I <sub>B</sub> = 1 A<br>I <sub>C</sub> = 5 A I <sub>B</sub> = 1 A |         | 0.7       | 0.5<br>0.7<br>1<br>1 | V<br>V<br>V<br>V |
| V <sub>BE(sat)*</sub>            | Base-Emitter Saturation Voltage                 | I <sub>C</sub> = 1 A I <sub>B</sub> = 0.2 A<br>I <sub>C</sub> = 2 A I <sub>B</sub> = 0.4 A<br>I <sub>C</sub> = 3 A I <sub>B</sub> = 0.6 A   |         |           | 1.1<br>1.3<br>1.5    | V<br>V<br>V      |
| h <sub>FE*</sub>                 | DC Current Gain                                 | I <sub>C</sub> = 2 A V <sub>CE</sub> = 5 V<br>I <sub>C</sub> = 10 mA V <sub>CE</sub> = 5 V  | 8<br>10 |           | 40                   |                  |
| t <sub>s</sub>                   | RESISTIVE LOAD Storage Time                     | I <sub>C</sub> = 2 A I <sub>B1</sub> = -I <sub>B2</sub> = 0.4 A<br>V <sub>CC</sub> = 250 V  | 2.4     |           | 3.5                  | μs               |
| t <sub>s</sub><br>t <sub>f</sub> | INDUCTIVE LOAD Storage Time<br>Fall Time        | I <sub>C</sub> = 2 A I <sub>B1</sub> = 0.4 A<br>V <sub>BE(off)</sub> = -5 V R <sub>BB</sub> = 0 Ω<br>V <sub>CL</sub> = 250 V L = 200 μH   |         | 0.7<br>50 | 1.4<br>100           | μs<br>ns         |
| t <sub>s</sub><br>t <sub>f</sub> | INDUCTIVE LOAD Storage Time<br>Fall Time        | I <sub>C</sub> = 2 A I <sub>B1</sub> = 0.4 A<br>V <sub>BE(off)</sub> = -5V R <sub>BB</sub> = 0 Ω<br>V <sub>CL</sub> = 250 V L = 200 μH<br>T <sub>j</sub> = 125 °C   |         | 1<br>75   |                      | μs<br>ns         |

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

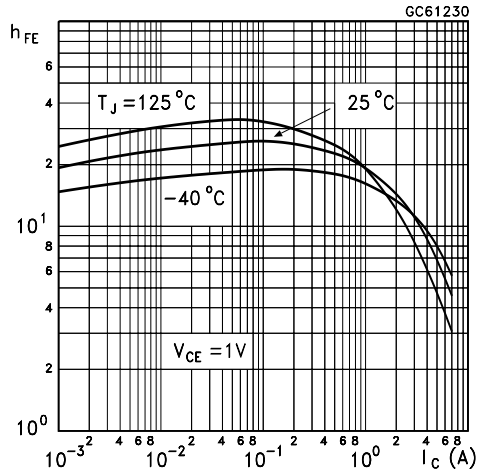
**Safe Operating Areas**



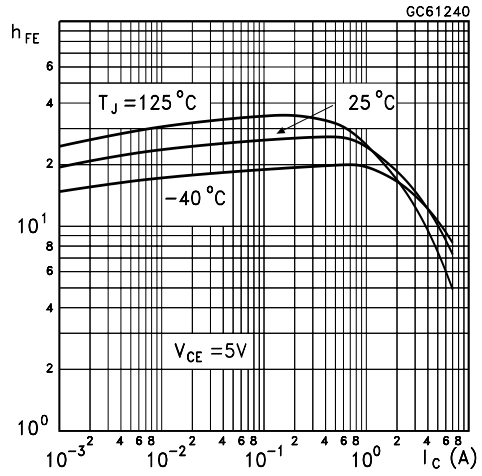
**Derating Curve**



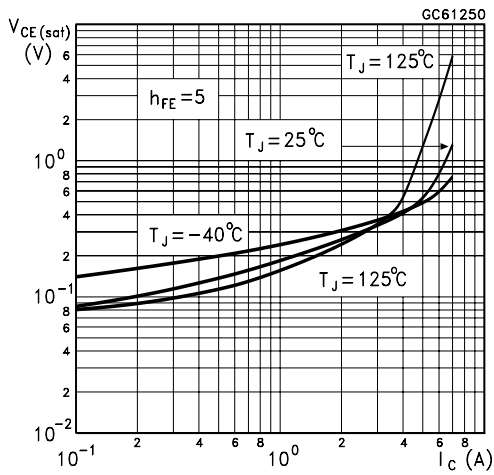
DC Current Gain



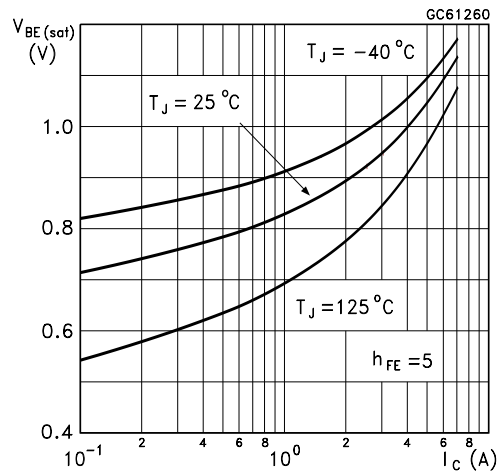
DC Current Gain



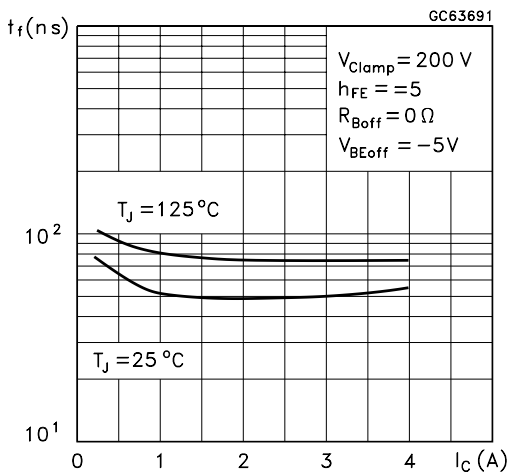
Collector-Emitter Saturation Voltage



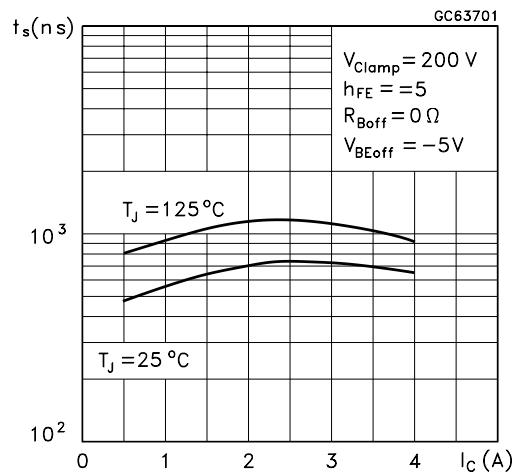
Base-Emitter Saturation Voltage



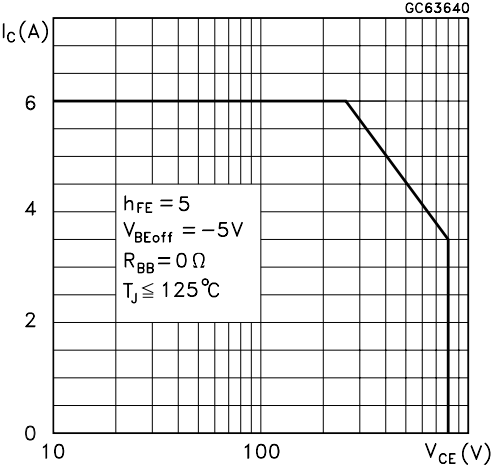
Inductive Fall Time



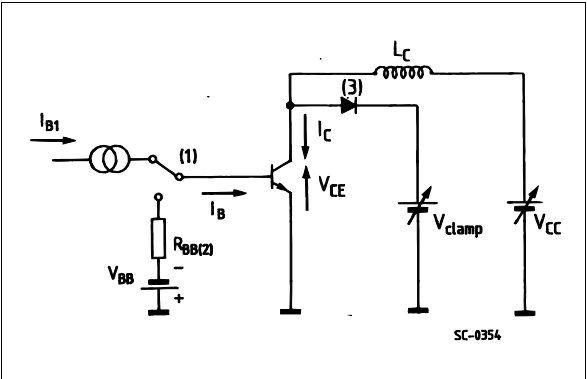
Inductive Storage Time



Reverse Biased SOA



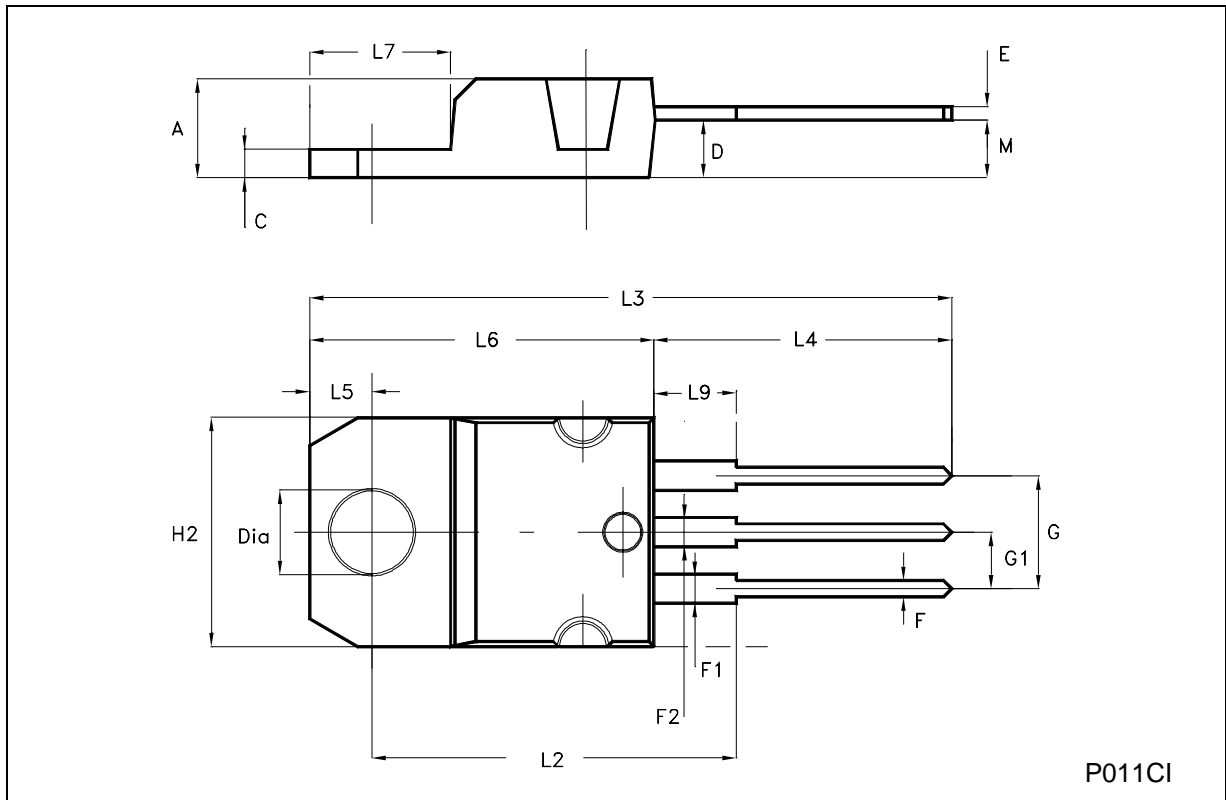
RBSOA and Inductive Load Switching Test Circuits



- 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 |



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