# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CES}$ | Collector-emitter voltage ($V_{BE}$ = 0) | 40 | V |
| $V_{CEO}$ | Collector-emitter voltage ($I_B$ = 0) | 40 | V |
| $V_{EBO}$ | Emitter-base voltage ($I_C$ = 0) | 5 | V |
| $I_C$ | Collector current | 3 | A |
| $I_{CM}$ | Collector peak current ($t_P$ < 5 ms) | 6 | A |
| $P_{tot}$ | Total dissipation at $T_{amb}$ = 25 °C | 1.4 | W |
| $T_{stg}$ | Storage temperature | -65 to 150 | °C |
| $T_J$ | Max. operating junction temperature | 150 | °C |

**Table 3. Thermal data**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $R_{thJA}$(1) | Thermal resistance junction-ambient | max | 89 | °C/W |

1. Device mounted on PCB area of 1 cm²

# 2 Electrical characteristics

$T_{case}$ = 25 °C unless otherwise specified.

**Table 4. Electrical characteristics**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | Collector cut-off current ($I_E$ = 0) | $V_{CB}$ = 40 V | | | 0.1 | µA |
| $I_{EBO}$ | Emitter cut-off current ($I_C$ = 0) | $V_{EB}$ = 5 V | | | 0.1 | µA |
| $V_{(BR)CBO}$ | Collector-base breakdown voltage ($I_E$ = 0) | $I_C$ = 100 µA | 40 | | | V |
| $V_{(BR)CEO}$ (1) | Collector-emitter breakdown voltage ($I_B$ = 0) | $I_C$ = 10 mA | 40 | | | V |
| $V_{(BR)EBO}$ | Emitter-base breakdown voltage ($I_C$ = 0) | $I_E$ = 100 µA | 5 | | | V |
| $V_{CE(sat)}$ (1) | Collector-emitter saturation voltage | $I_C$ = 2 A $I_B$ = 100 mA<br>$I_C$ = 3 A $I_B$ = 150 mA | | | 250<br>350 | mV<br>mV |
| $V_{BE(sat)}$ (1) | Base-emitter saturation voltage | $I_C$ = 2 A $I_B$ = 100 mA | | | 1.2 | V |
| $h_{FE}$ (1) | DC current gain | $I_C$ = 0.1 A $V_{CE}$ = 2 V<br>$I_C$ = 1 A $V_{CE}$ = 2 V<br>$I_C$ = 3 A $V_{CE}$ = 2 V | 100<br>180 | <br><br>220 | 450 | |
| $f_T$ | Transition frequency | $I_C$ = 0.1 A $V_{CE}$ = 5 V<br>f = 100 MHz | 100 | | | MHz |
| $C_{CBO}$ | Collector-base capacitance ($I_E$ = 0) | f = 1 MHz $V_{CB}$ = 10 V | | 30 | | pF |
| $t_{on}$<br>$t_{off}$ | Resistive load<br>Turn-on time<br>Turn-off time | $I_C$ = 1.5 A $V_{CC}$ = 10 V<br>$I_{B(on)}$ = - $I_{B(off)}$ = 150 mA<br>$V_{BB(off)}$ = - 5 V | | 65<br>750 | | ns<br>ns |

1. Pulse test: pulse duration ≤ 300 µs, duty cycle ≤ 2 %

## 2.1 Electrical characteristics (curves)

**Figure 2. Output characteristics**

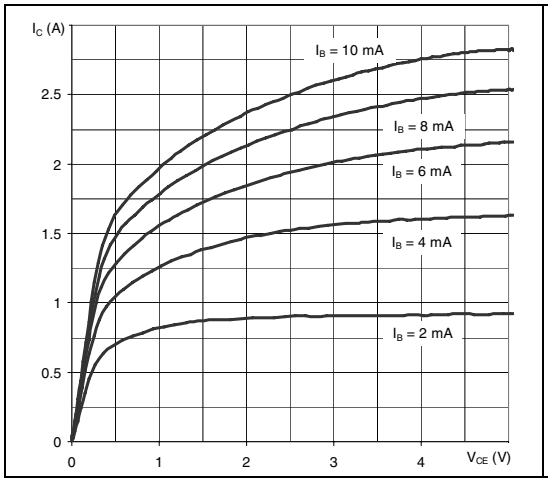



**Figure 3. Derating curve**

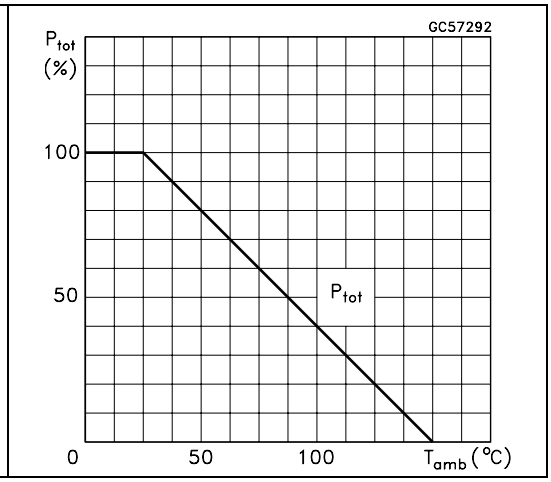



**Figure 4. DC current gain ($V_{CE}$ = 2 V)**

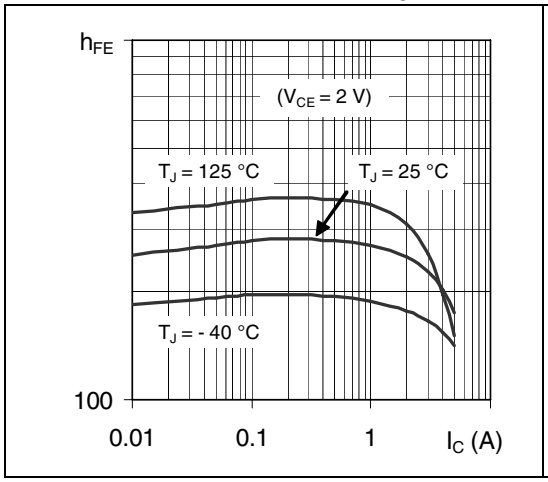



**Figure 5. DC current gain ($V_{CE}$ = 5 V)**

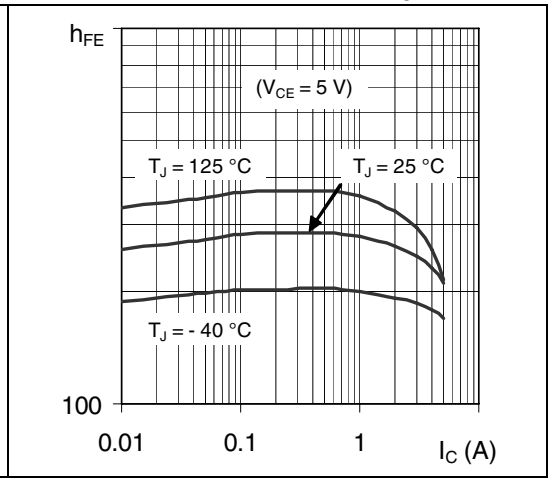



**Figure 6. Collector-emitter saturation voltage**

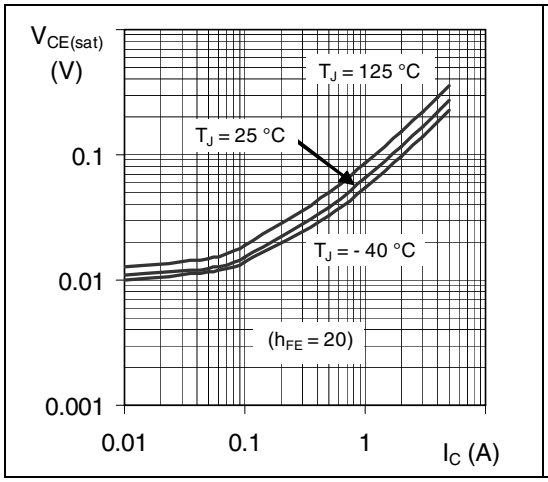



**Figure 7. Base-emitter saturation voltage**

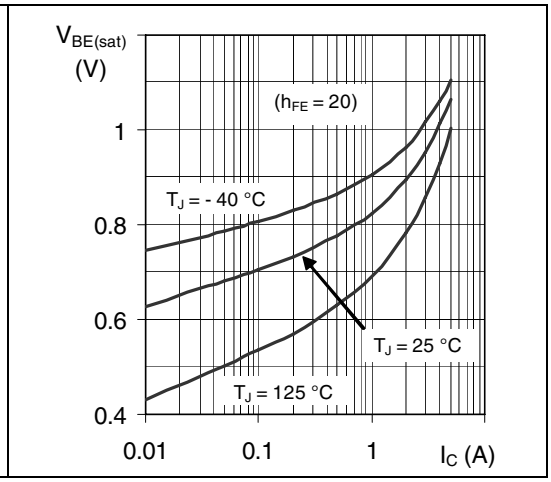


**Figure 8. Resistive load switching on**

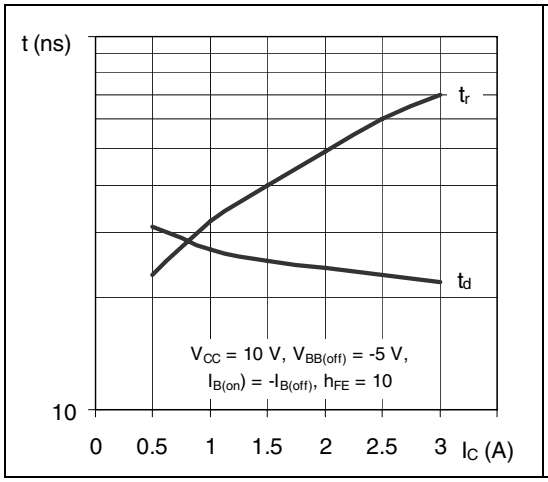



**Figure 9. Resistive load switching off**

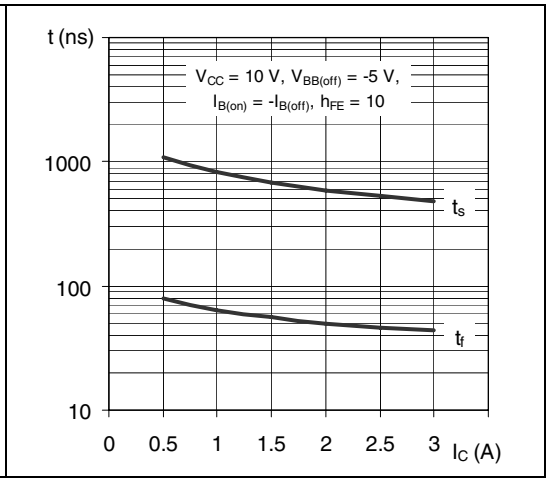
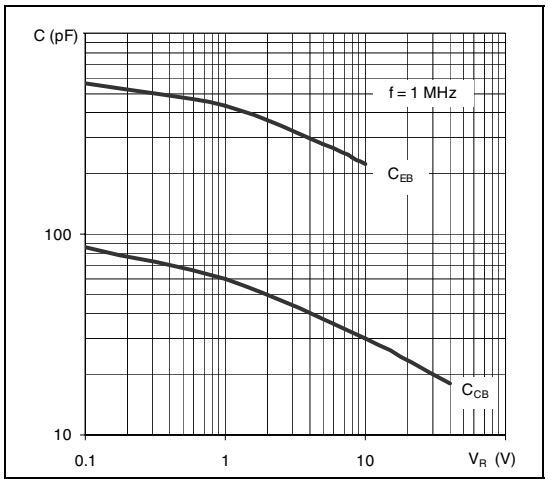
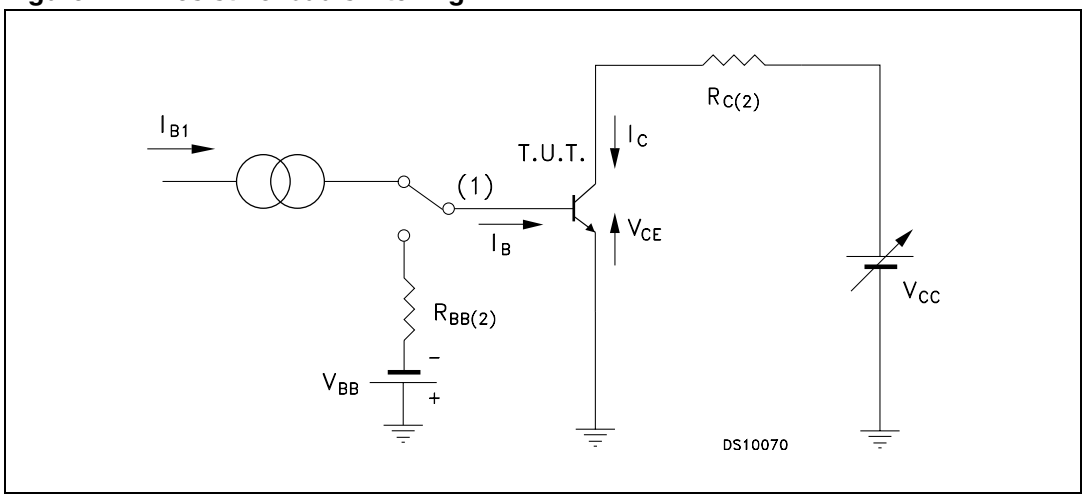



**Figure 10. Capacitance curves**



## 2.2 Test circuits

**Figure 11. Resistive load switching**




1. Fast electronic switch
2. Non-inductive resistor

# 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*.
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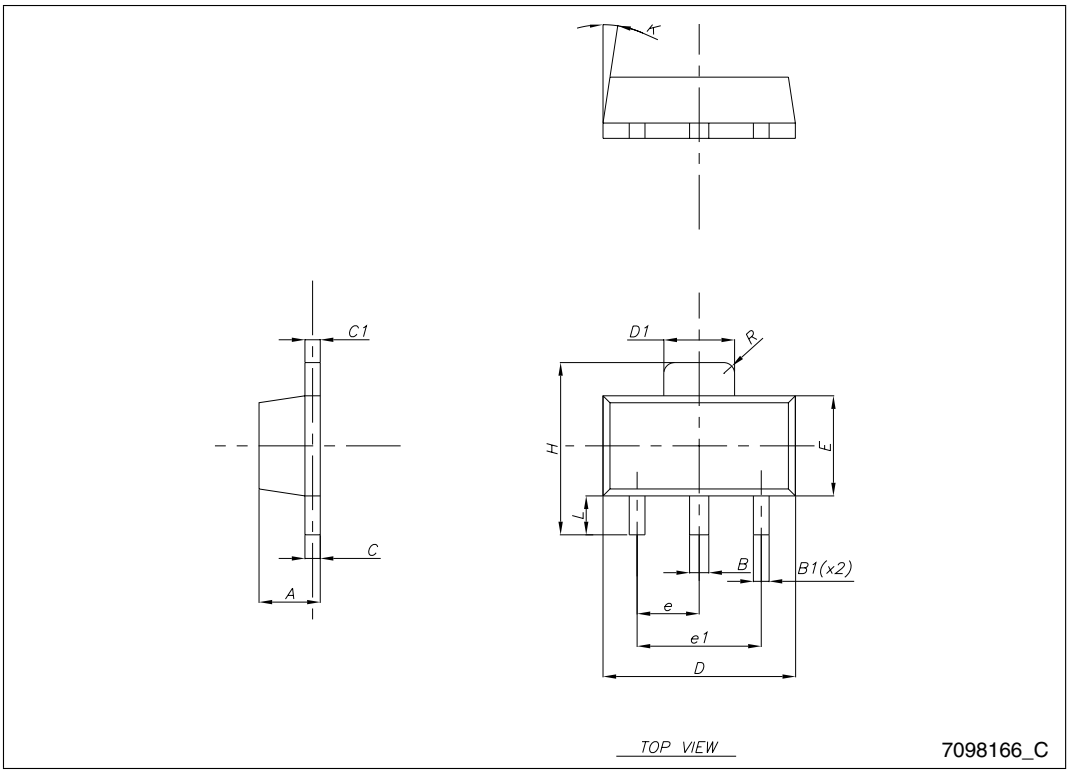
## SOT-89 mechanical data

| Dim. | mm | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | 1.40 | | 1.60 |
| B | 0.44 | | 0.56 |
| B1 | 0.36 | | 0.48 |
| C | 0.35 | | 0.44 |
| C1 | 0.35 | | 0.44 |
| D | 4.40 | | 4.60 |
| D1 | 1.62 | | 1.83 |
| E | 2.29 | | 2.60 |
| e | 1.42 | | 1.57 |
| e1 | 2.92 | | 3.07 |
| H | 3.94 | | 4.25 |
| K | 1° | | 8° |
| L | 0.89 | | 1.20 |
| R | | 0.25 | |



# 4 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 20-Oct-2006 | 1 | Initial release |
| 19-Oct-2009 | 2 | Document status promoted from preliminary data to datasheet, inserted electrical characteristics (curves) section and updated mechanical data |

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