

High voltage fast switching NPN power transistor

Preliminary data

Features

- High voltage capability
- Fast switching speed

Applications

- Lighting
- Switch mode power supply

Description

This device is a high voltage fast-switching NPN power transistor. It is manufactured using high voltage multi epitaxial planar technology for high switching speeds and medium voltage capability.

It uses a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA. The device is designed for use in lighting applications and low cost switch-mode power supplies.

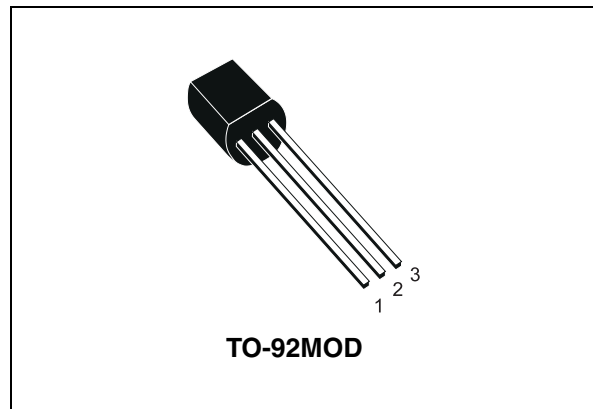


Figure 1. Internal schematic diagram

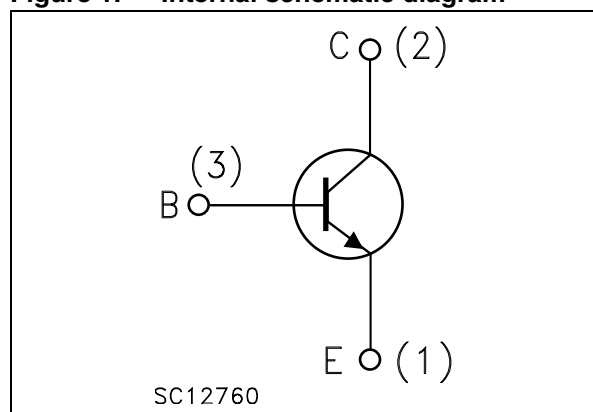


Table 1. Device summary

| Order codes | Marking | Package | Packaging |
|-------------|----------|----------|-----------|
| 2STL2580 | 2STL2580 | TO-92MOD | Bag |

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1 Electrical ratings

Table 2. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|-----------|--|------------|------|
| V_{CES} | Collector-emitter voltage ($V_{BE} = 0$) | 800 | V |
| V_{CEO} | Collector-emitter voltage ($I_B = 0$) | 400 | V |
| V_{EBO} | Emitter-base voltage ($I_C = 0$) | 9 | V |
| I_C | Collector current | 1 | A |
| I_{CM} | Collector peak current ($t_P < 5$ ms) | 2 | A |
| I_B | Base current | 0.5 | A |
| P_{TOT} | Total dissipation at $T_{amb} = 25$ °C | 1.5 | 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} | Thermal resistance junction-ambient max | 83 | °C/W |

2 Electrical characteristics

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

Table 4. Electrical characteristics

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|--|--|------|------|------|---------------|
| I_{CBO} | Collector cut-off current ($I_{\text{E}} = 0$) | $V_{\text{CB}} = 800\text{ V}$ | | | 10 | μA |
| I_{EBO} | Emitter cut-off current ($I_{\text{C}} = 0$) | $V_{\text{EB}} = 8\text{ V}$ | | | 100 | μA |
| $V_{(\text{BR})\text{CEO}}^{(1)}$ | Collector-emitter breakdown voltage ($I_{\text{B}} = 0$) | $I_{\text{C}} = 10\text{ mA}$ | 400 | | | V |
| $V_{(\text{BR})\text{EBO}}$ | Emitter-base breakdown voltage ($I_{\text{C}} = 0$) | $I_{\text{E}} = 100\text{ }\mu\text{A}$ | 9 | | | V |
| $h_{\text{FE}}^{(1)}$ | DC current gain | $I_{\text{C}} = 250\text{ mA}$ $V_{\text{CE}} = 5\text{ V}$ | 60 | 100 | | |
| $V_{\text{CE}(\text{sat})}^{(1)}$ | Collector-emitter saturation voltage | $I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 0.2\text{ A}$ | | | 1 | V |
| $V_{\text{BE}(\text{sat})}^{(1)}$ | Base-emitter saturation voltage | $I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 0.2\text{ A}$ | | | 1.1 | V |
| t_{r} | Resistive load Rise time | $V_{\text{CC}}=200\text{ V}$, $I_{\text{C}}=0.3\text{ A}$ | | 140 | | ns |
| t_{s} | Storage time | $I_{\text{B}1}=20\text{ mA}$, $I_{\text{B}2}=-50\text{ mA}$ | | 4 | | μs |
| t_{f} | Fall time | $T_{\text{p}}=30\text{ }\mu\text{s}$ | | 90 | | ns |

1. Pulse test: pulse duration $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

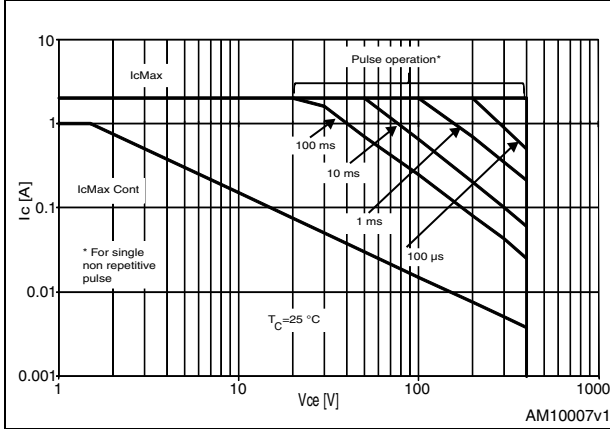


Figure 3. Derating curve

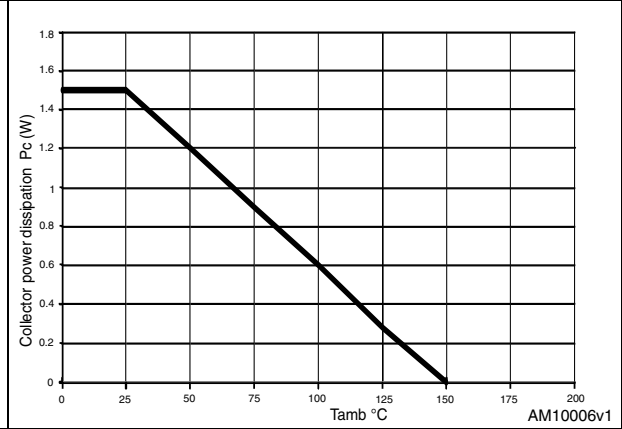


Figure 4. Output curves up to $V_{CE}=2 V$

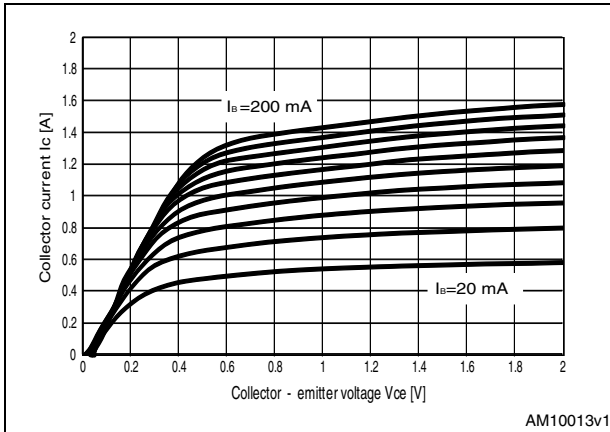


Figure 5. Output curves up to $V_{CE}=10 V$

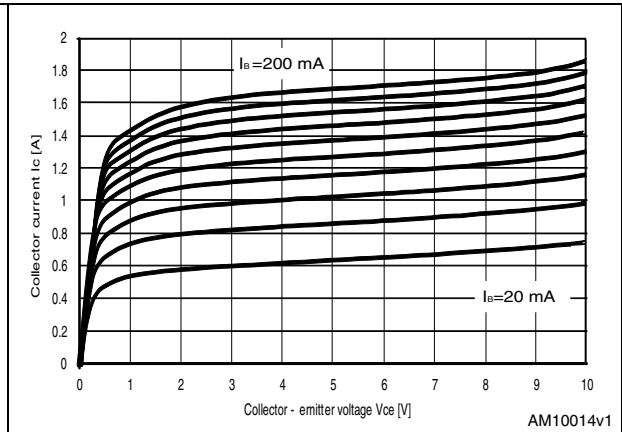


Figure 6. DC current gain ($V_{CE} = 1 V$)

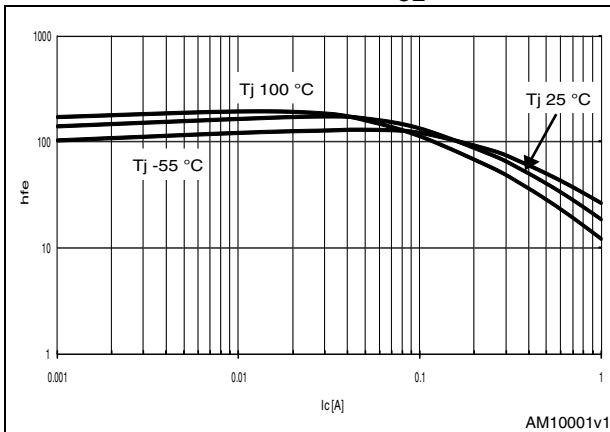


Figure 7. DC current gain ($V_{CE} = 5 V$)

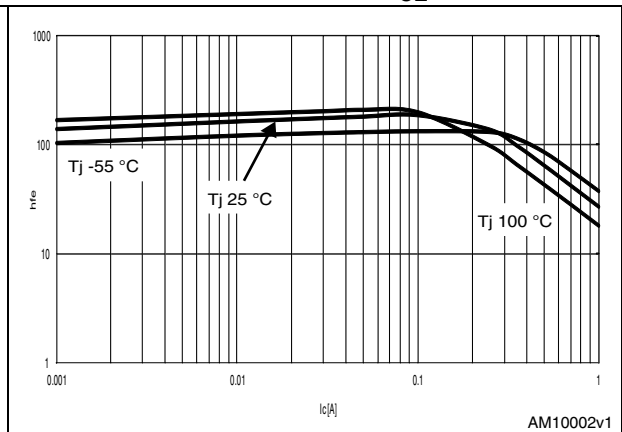


Figure 8. Collector-emitter saturation voltage Figure 9. Base-emitter saturation voltage

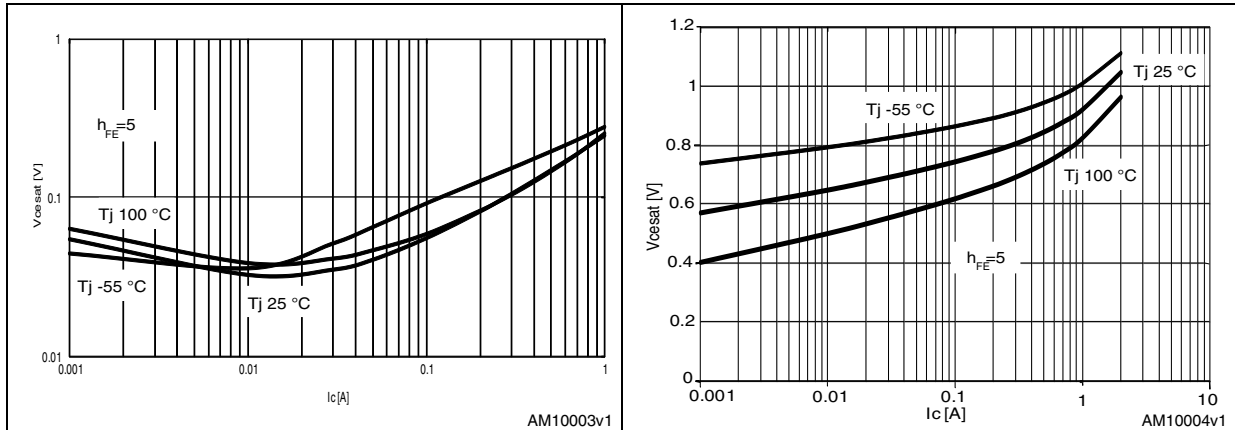


Figure 10. Base-emitter on voltage

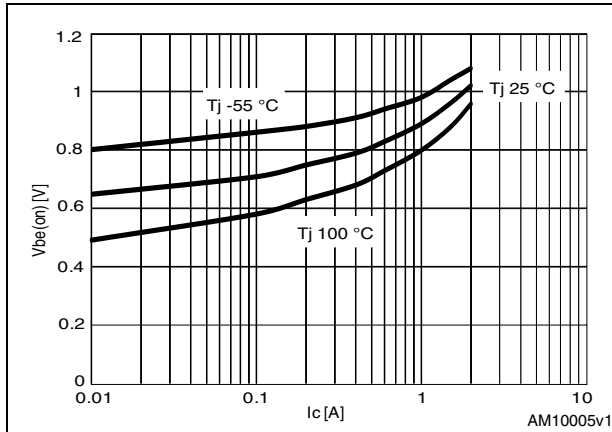


Figure 11. Capacitance variation

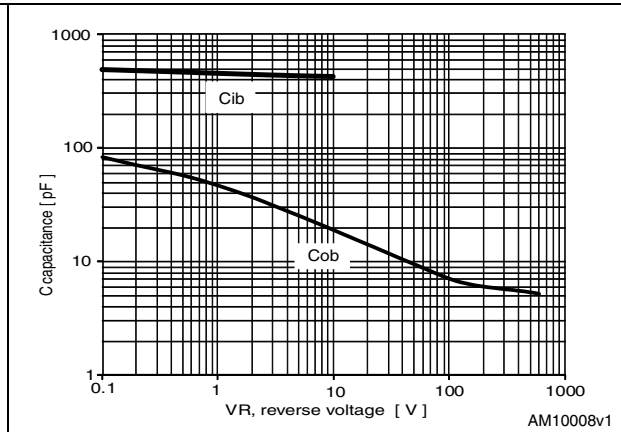


Figure 12. Resistive switching time

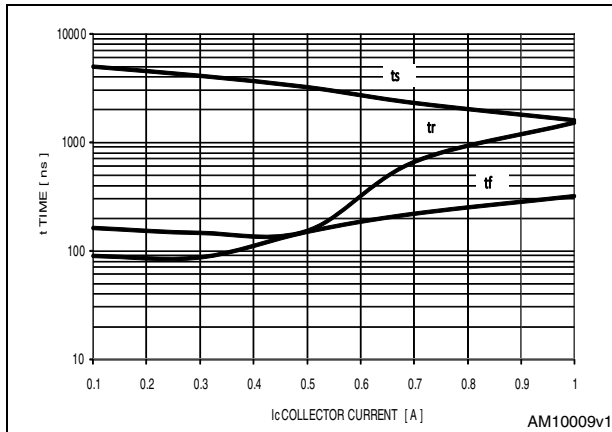


Figure 13. $V_{be(sat)}$ vs. I_c

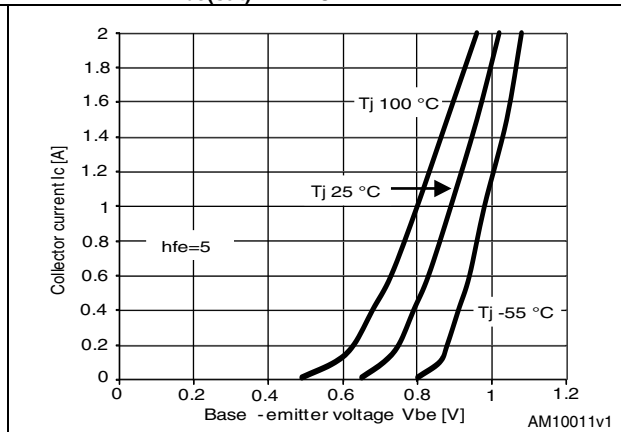
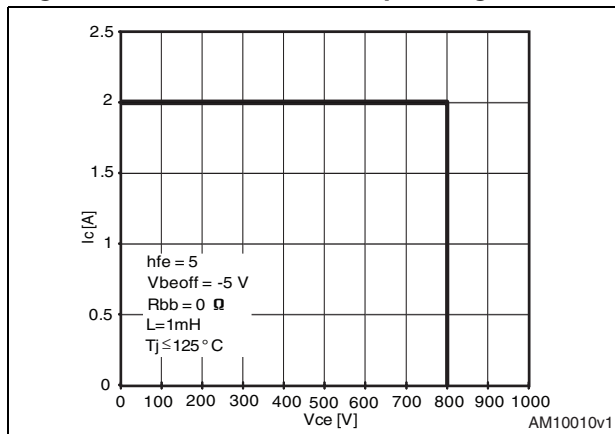


Figure 14. Reverse biased operating area



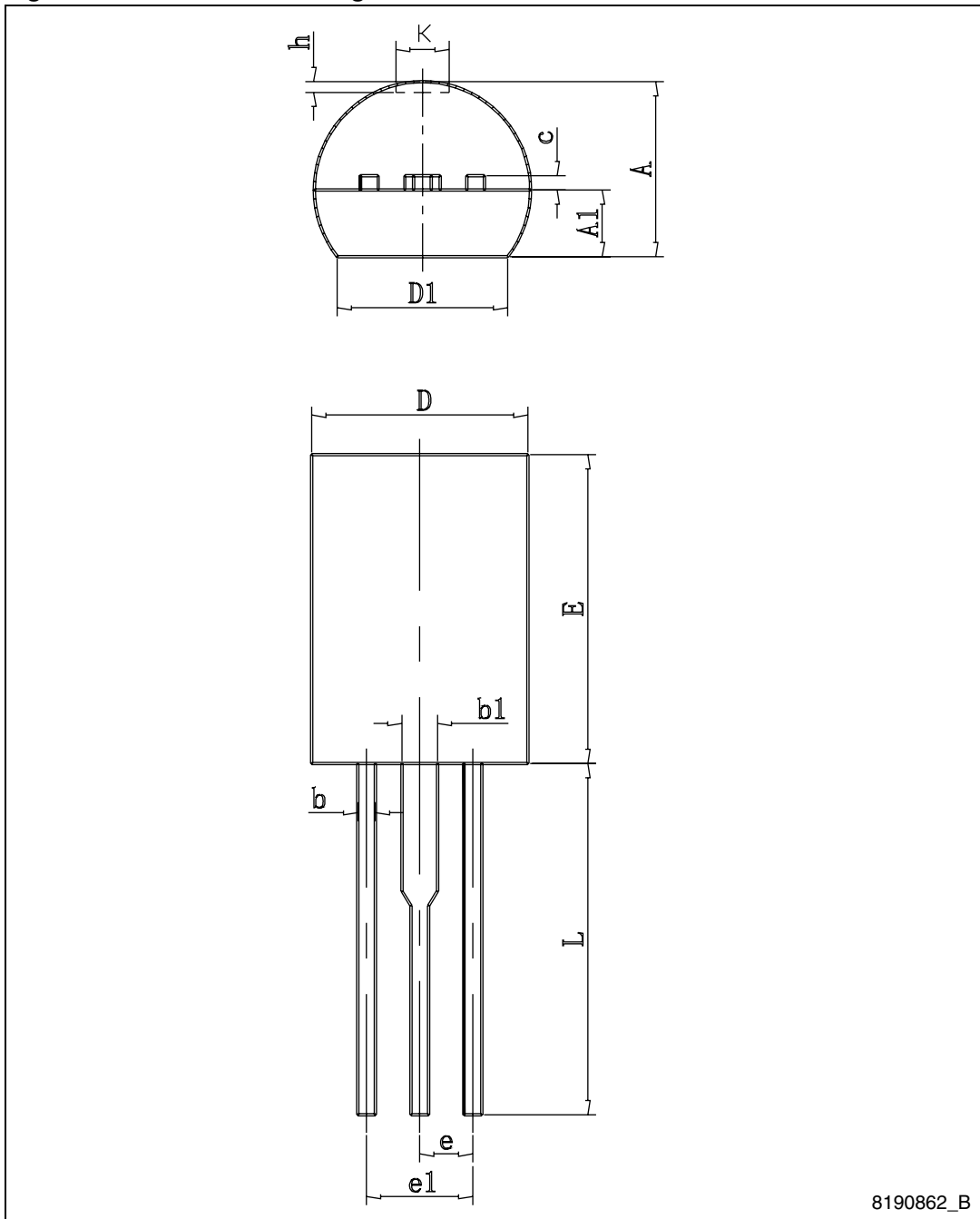
3 Package mechanical data

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. ECOPACK[®] is an ST trademark.

Table 5. TO-92MOD mechanical data

| Dim. | mm. | | |
|------|-------|------|-------|
| | Min. | Typ. | Max. |
| A | 4.7 | | 5.1 |
| A1 | 1.730 | | 2.030 |
| b | 0.4 | | 0.6 |
| b1 | 0.9 | | 1.1 |
| c | 0.4 | | 0.5 |
| D | 5.8 | | 6.2 |
| D1 | 4.0 | | |
| E | 8.4 | | 8.8 |
| e | | 1.5 | |
| e1 | 2.9 | | 3.1 |
| L | 13.8 | | 14.2 |
| K | | | 1.6 |
| h | 0.0 | | 0.380 |

Figure 15. TO-92MOD drawing mechanical data



8190862_B

4 Revision history

Table 6. Document revision history

| Date | Revision | Changes |
|-------------|----------|------------------|
| 30-Nov-2010 | 1 | Initial release. |
| 08-Jul-2011 | 2 | Curves inserted |

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