

Low voltage high performance PNP power transistors

Preliminary Data

Features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed
- Surface mounting devices in medium power SOT-89 and SOT-223 packages

Applications

- Emergency lighting
- LED
- Motherboard and hard disk drive
- Mobile equipment
- Battery charger
- Voltage regulation

Description

The 2STF2550 and 2STN2550 are PNP transistors manufactured using new "PB-HCD" (Power bipolar high current density) technology. The resulting transistor shows exceptional high gain performances coupled with very low saturation voltage.

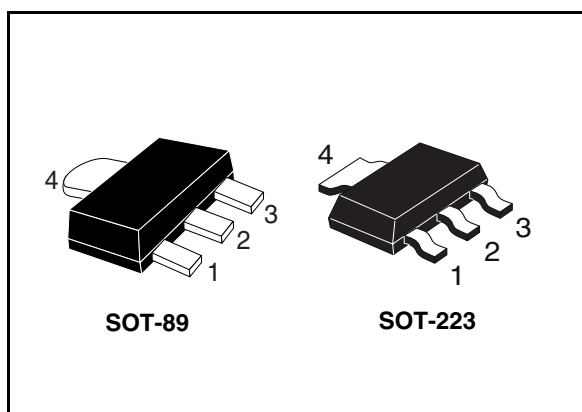


Figure 1. Internal schematic diagram

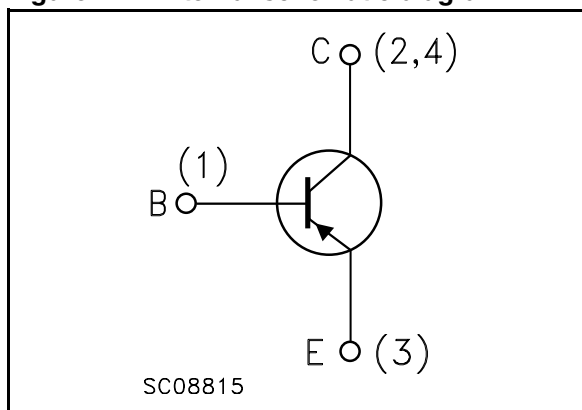


Table 1. Device summary

| Order codes | Marking | Package | Packaging |
|-------------|---------|---------|---------------|
| 2STF2550 | 2550 | SOT-89 | Tape and reel |
| 2STN2550 | N2550 | SOT-223 | |

1 Electrical ratings

Table 2. Absolute maximum rating

| Symbol | Parameter | Value | | Unit |
|-----------|--|------------|----------|------|
| | | 2STF2550 | 2STN2550 | |
| | | SOT-89 | SOT-223 | |
| V_{CES} | Collector-emitter voltage ($V_{CE} = 0$) | -50 | | V |
| V_{CEO} | Collector-emitter voltage ($I_B = 0$) | -50 | | V |
| V_{EBO} | Emitter-base voltage ($I_C = 0$) | -5 | | V |
| I_C | Collector current | -5 | | A |
| I_{CM} | Collector peak current ($t_P < 5$ ms) | -10 | | A |
| I_B | Base current | -1 | | A |
| P_{TOT} | Total dissipation at $T_{amb} = 25$ °C | 1.4 | 1.6 | W |
| T_{stg} | Storage temperature | -65 to 150 | | °C |
| T_J | Max. operating junction temperature | 150 | | °C |

Table 3. Thermal data

| Symbol | Parameter | SOT-89 | SOT-223 | Unit |
|---------------------|-------------------------------------|--------|---------|------|
| $R_{thj-amb}^{(1)}$ | Thermal resistance junction-amb max | 89 | 78 | °C/W |

1. Device mounted on PCB area of 1 cm²

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 ($I_{\text{E}} = 0$) | $V_{\text{CB}} = -50\text{ V}$ | | | -0.1 | μA |
| I_{EBO} | Emitter cut-off current ($I_{\text{C}} = 0$) | $V_{\text{EB}} = -4\text{ V}$ | | | -0.1 | μA |
| $V_{(\text{BR})\text{CBO}}$ | Collector-base breakdown voltage ($I_{\text{E}} = 0$) | $I_{\text{C}} = -100\ \mu\text{A}$ | -50 | | | V |
| $V_{(\text{BR})\text{CEO}}^{(1)}$ | Collector-emitter breakdown voltage ($I_{\text{B}} = 0$) | $I_{\text{C}} = -10\text{ mA}$ | -50 | | | V |
| $V_{(\text{BR})\text{EBO}}$ | Emitter-base breakdown voltage ($I_{\text{C}} = 0$) | $I_{\text{E}} = -100\ \mu\text{A}$ | -5 | | | V |
| $h_{\text{FE}}^{(1)}$ | DC current gain | $I_{\text{C}} = -0.5\text{ A}$ $V_{\text{CE}} = -2\text{ V}$ $I_{\text{C}} = -2\text{ A}$ $V_{\text{CE}} = -2\text{ V}$ $I_{\text{C}} = -3\text{ A}$ $V_{\text{CE}} = -2\text{ V}$ $I_{\text{C}} = -5\text{ A}$ $V_{\text{CE}} = -5\text{ V}$ | 110 80 | 350 70 | 350 | |
| $V_{\text{CE}(\text{sat})}^{(1)}$ | Collector-emitter saturation voltage | $I_{\text{C}} = -3\text{ A}$ $I_{\text{B}} = -300\text{ mA}$ | | -0.39 | -0.55 | V |
| $V_{\text{BE}(\text{sat})}^{(1)}$ | Base-emitter saturation voltage | $I_{\text{C}} = -3\text{ A}$ $I_{\text{B}} = -300\text{ mA}$ | | -1 | -1.2 | V |
| C_{CBO} | Collector-base capacitance ($I_{\text{E}} = 0$) | $V_{\text{CB}} = -10\text{ V}$, $f = 1\text{ MHz}$ | | 30 | | pF |
| t_{on} t_{off} | Resistive load Turn-on time Turn-off time | $I_{\text{C}} = -1.5\text{ A}$ $V_{\text{CC}} = -10\text{ V}$ $I_{\text{B1}} = -I_{\text{B2}} = -150\text{ mA}$ | | 80 3 00 | | ns ns |

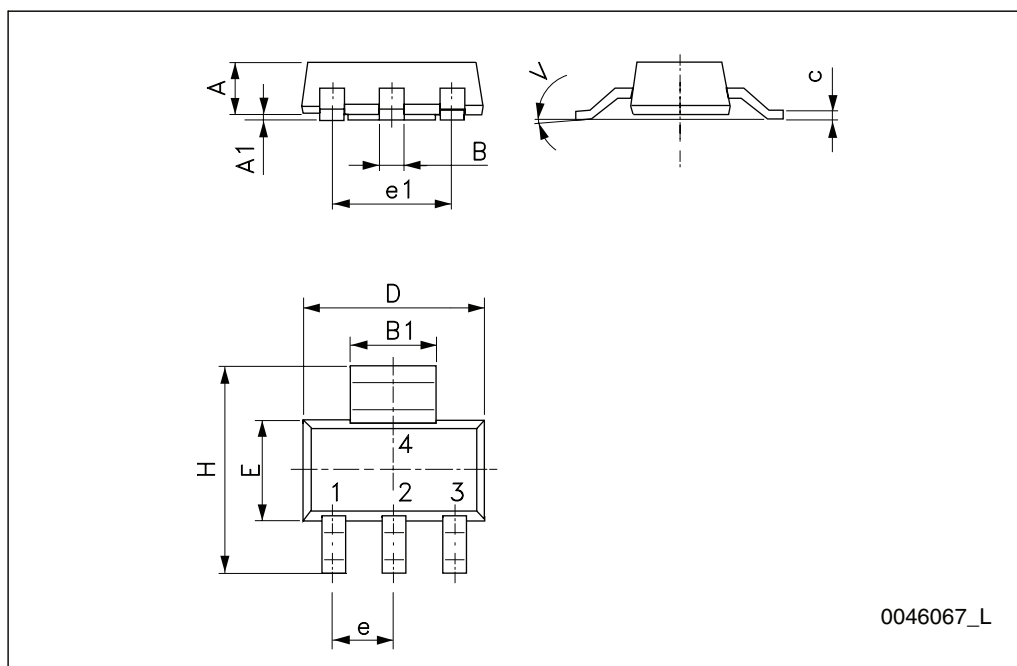
1. Pulsed duration = 300 μs , duty cycle $\leq 1.5\%$

3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

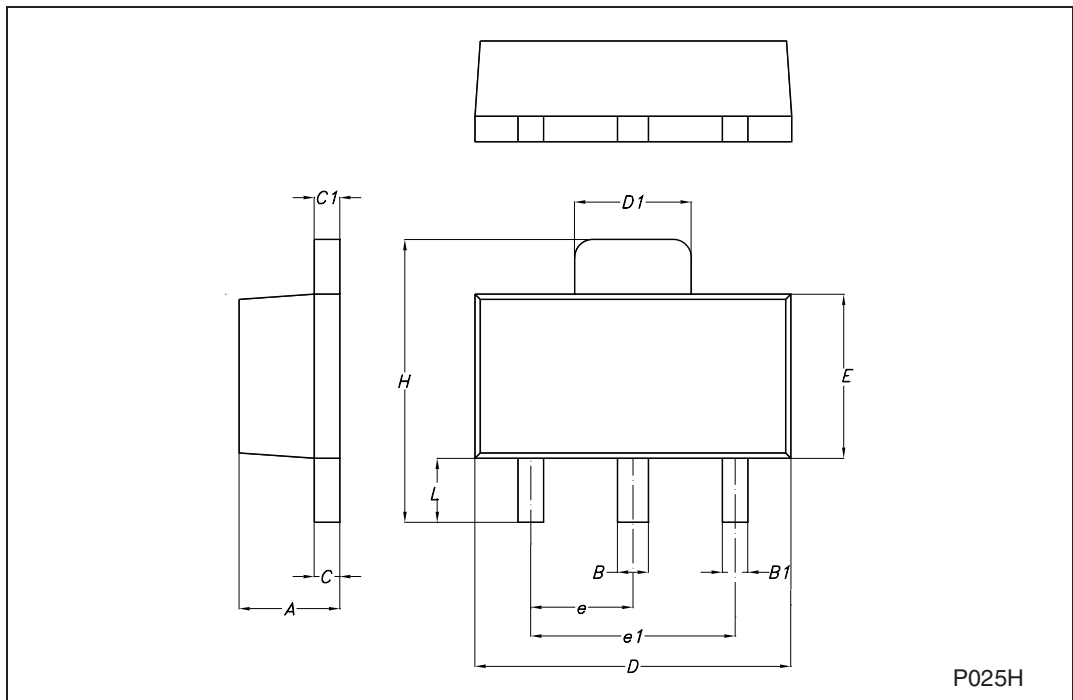
SOT-223 mechanical data

| DIM. | mm. | | |
|------|------|------|------|
| | min. | typ | max. |
| A | | | 1.80 |
| A1 | 0.02 | | 0.1 |
| B | 0.60 | 0.70 | 0.85 |
| B1 | 2.90 | 3.00 | 3.15 |
| c | 0.24 | 0.26 | 0.35 |
| D | 6.30 | 6.50 | 6.70 |
| e | | 2.30 | |
| e1 | | 4.60 | |
| E | 3.30 | 3.50 | 3.70 |
| H | 6.70 | 7.00 | 7.30 |
| V | | | 10° |



SOT-89 MECHANICAL DATA

| DIM. | mm | | | mils | | |
|------|------|------|------|-------|------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 1.4 | | 1.6 | 55.1 | | 63.0 |
| B | 0.44 | | 0.56 | 17.3 | | 22.0 |
| B1 | 0.36 | | 0.48 | 14.2 | | 18.9 |
| C | 0.35 | | 0.44 | 13.8 | | 17.3 |
| C1 | 0.35 | | 0.44 | 13.8 | | 17.3 |
| D | 4.4 | | 4.6 | 173.2 | | 181.1 |
| D1 | 1.62 | | 1.83 | 63.8 | | 72.0 |
| E | 2.29 | | 2.6 | 90.2 | | 102.4 |
| e | 1.42 | | 1.57 | 55.9 | | 61.8 |
| e1 | 2.92 | | 3.07 | 115.0 | | 120.9 |
| H | 3.94 | | 4.25 | 155.1 | | 167.3 |
| L | 0.89 | | 1.2 | 35.0 | | 47.2 |



4 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|-------------|----------|-----------------|
| 12-Nov-2008 | 1 | Initial release |

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