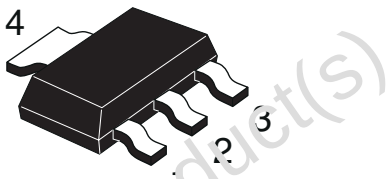
# 2STN2540-A

## Low voltage fast-switching PNP power bipolar transistor

### Features

- The device is qualified for automotive application
- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed
- Surface mounting device in medium power SOT-223 package




SOT-223

### Applications

- Emergency lighting
- LED
- CCFL drivers (back lighting)
- Voltage regulation
- Relay driver

### Description

The device in a PNP transistor 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**

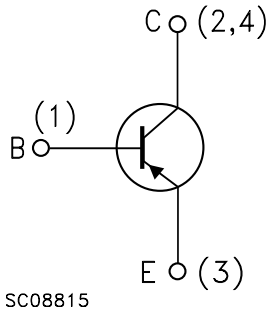





**Table 1. Device summary**

| Order code | Marking | Package | Packaging |
|---|---|---|---|
| 2STN2540-A | N2540 | SOT-223 | Tape & reel |

# 1 Electrical ratings

**Table 2. Absolute maximum rating**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-base voltage ($I_E$ = 0) | -40 | V |
| $V_{CEO}$ | Collector-emitter voltage ($I_B$ = 0) | -40 | V |
| $V_{EBO}$ | Emitter-base voltage ($I_C$ = 0) | -6 | V |
| $I_C$ | Collector current | -5 | A |
| $I_{CM}$ | Collector peak current ($t_P$ < 5ms) | -10 | A |
| $I_{BM}$ | Base peak current ($t_P$ < 5ms) | -2 | A |
| $P_{tot}$ | Total dissipation at $T_{amb}$ = 25°C | 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 | | Value | Unit |
|---|---|---|---|---|
| $R_{thj\text{-}amb}$ (1) | Thermal resistance junction-amb | max | 78 | °C/W |

1. Device mounted on PCB area of 1 $cm^2$

# 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) | $V_{CB}$ = -30 V | | | -0.1 | µA |
| $I_{EBO}$ | Emitter cut-off current ($I_C$ =0) | $V_{EB}$ = -5 V | | | -0.1 | µA |
| $V_{CE(sat)}$ (1) | Collector-emitter saturation voltage | $I_C$ = -0.5 A $I_B$ = -5 mA<br>$I_C$ = -1 A $I_B$ = -10 mA<br>$I_C$ = -2 A $I_B$ = -200 mA<br>$I_C$ = -5 A $I_B$ = -500 mA | | -80<br>-120<br>-140<br>-350 | -120<br>-180<br>-200<br>-450 | mV<br>mV<br>mV<br>mV |
| $V_{BE(sat)}$ (1) | Base-emitter saturation voltage | $I_C$ = -5 A $I_B$ = -500 mA | | | -1.3 | V |
| $V_{BE(on)}$ (1) | Base-emitter on voltage | $V_{CE}$ = -2 V $I_C$ = -2 A | | | -1.25 | V |
| $h_{FE}$ (1) | DC current gain | $I_C$ = -0.5 A $V_{CE}$ = -2 V<br>$I_C$ = -1 A $V_{CE}$ = -2 V<br>$I_C$ = -2 A $V_{CE}$ = -2 V<br>$I_C$ = -5 A $V_{CE}$ = -2 V | 250<br>200<br>150<br>50 | | | |
| $C_{CBO}$ | Collector-base capacitance | $I_E$ = 0 $V_{CB}$ = -10 V<br>f = 1MHz | | 80 | | pF |
| $t_{on}$<br>$t_s$<br>$t_f$ | Resistive load<br>Turn-on time<br>Storage time<br>Fall time | $I_C$ = -1 A $V_{CC}$ = -10 V<br>$-I_{B1} = I_{B2}$ = -0.1 A<br>$T_p$ = 30 µA | | 75<br>426<br>62 | | ns<br>ns<br>ns |

1. Pulsed duration = 300 µs, duty cycle ≤1.5%

## 2.1 Electrical characteristics (curves)

**Figure 2. Output characteristics**

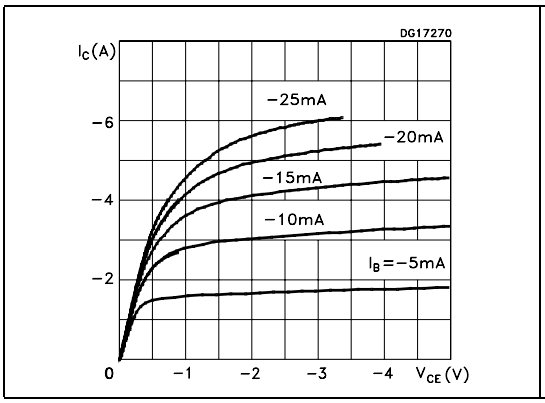



**Figure 3. DC current gain**

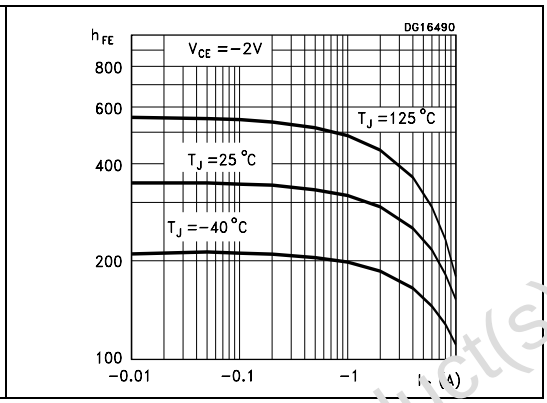



**Figure 4. Collector-emitter saturation voltage**

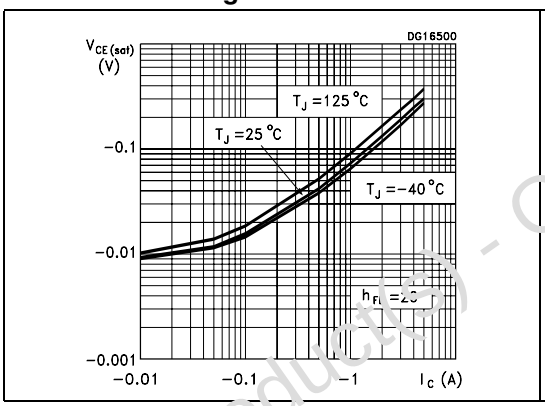



**Figure 5. Base-emitter saturation voltage**

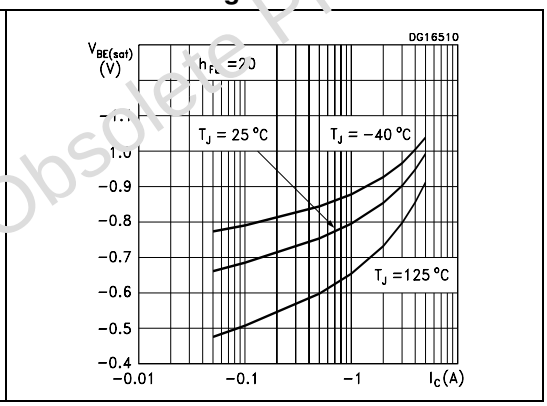



**Figure 6. Base-emitter on voltage**

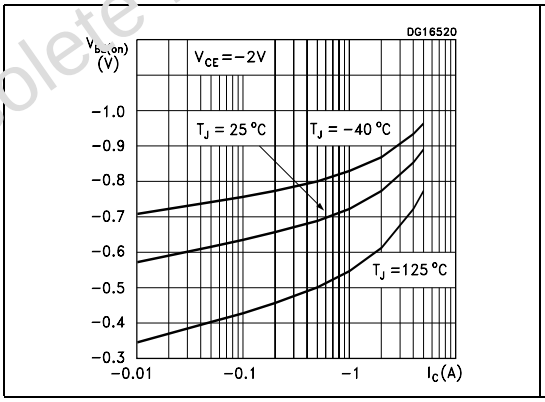



**Figure 7. Resistive load switching times**

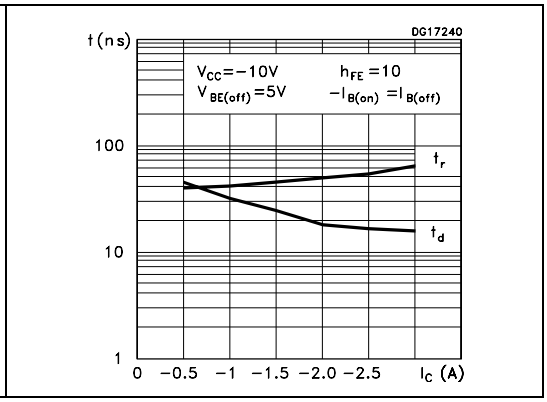


**Figure 8. Resistive load switching times**

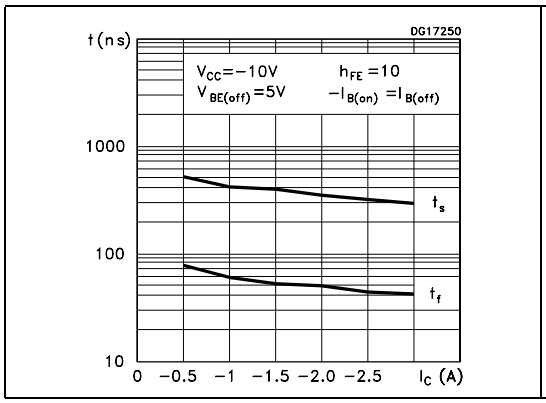
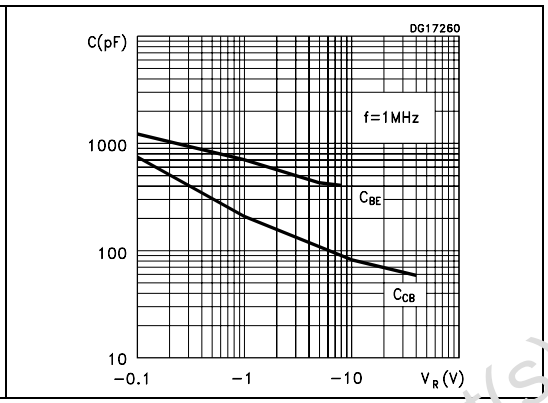
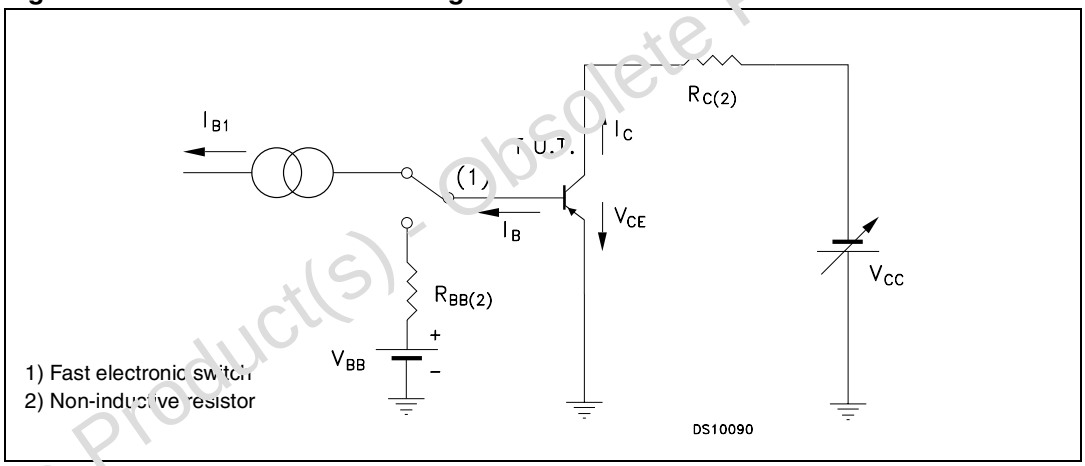



**Figure 9. Capacitance**




## 2.2 Test circuit

**Figure 10. Resistive load switching test circuit**



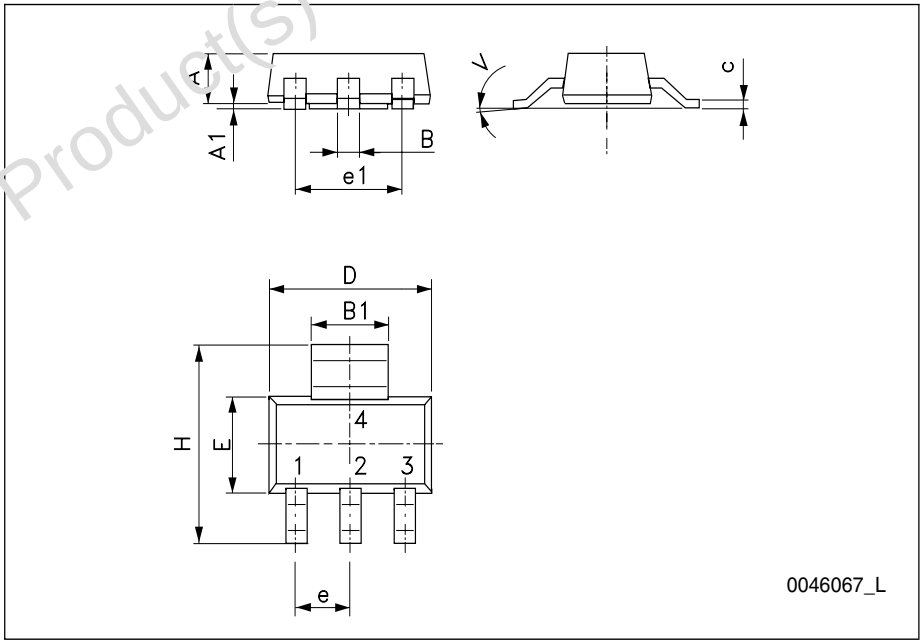
# 3 Package mechanical data

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

**Figure 11. Package mechanical data**

**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 ° |



# 4 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 23-Oct-2007 | 1 | Initial release |
| 15-Jan-2008 | 2 | Updated max package dimensions in lines “B” and “c” of the package mechanical data, *Figure 11.* |

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