

## NPN low voltage transistors

### Features

- Low voltage small devices for surface mounting
- High ruggedness

### Applications

- Voltage regulation
- Relay driver
- Generic switch

### Description

Both STF715 and STN715 are NPN transistors manufactured using planar technology. They are housed in surface mounting power packages.

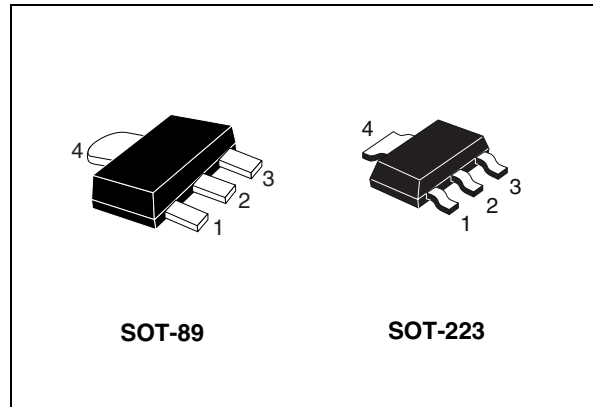


Figure 1. Internal schematic diagram

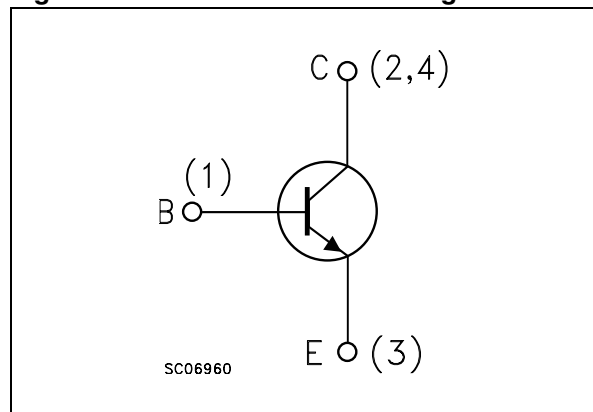


Table 1. Device summary

| Order codes | Marking | Packages | Packaging     |
|-------------|---------|----------|---------------|
| STF715      | 715     | SOT-89   | Tape and reel |
| STN715      | N715    | SOT-223  | Tape and reel |

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

| Symbol    | Parameter                                         | Value      | Unit |
|-----------|---------------------------------------------------|------------|------|
| $V_{CBO}$ | Collector-base voltage ( $I_E = 0$ )              | 140        | V    |
| $V_{CEO}$ | Collector-emitter voltage ( $I_B = 0$ )           | 80         | V    |
| $V_{EBO}$ | Emitter-base voltage ( $I_C = 0$ )                | 5          | V    |
| $I_C$     | Collector current                                 | 1.5        | A    |
| $I_{CM}$  | Collector peak current ( $t_P < 5$ ms)            | 2          | A    |
| $I_B$     | Base current                                      | 0.3        | A    |
| $I_{BM}$  | Base peak current ( $t_P < 5$ ms)                 | 0.6        | A    |
| $P_{TOT}$ | Total dissipation at $T_{amb} = 25$ °C for STF715 | 1.4        | W    |
|           | Total dissipation at $T_{amb} = 25$ °C for STN715 | 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 |
|------------------|-----------------------------------------|--------|---------|------|
| $R_{thJA}^{(1)}$ | Thermal resistance junction-ambient max | 89     | 78      | °C/W |

1. Device mounted on PCB area of 1 cm<sup>2</sup>

## 2 Electrical characteristics

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

**Table 4. Electrical characteristics**

| Symbol                     | Parameter                                                         | Test conditions                                                                                                                                                                                 | Min.            | Typ. | Max.        | Unit                     |
|----------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------|-------------|--------------------------|
| $I_{\text{CES}}$           | Collector cut-off current<br>( $V_{\text{BE}} = 0$ )              | $V_{\text{CE}} = 140\text{ V}$                                                                                                                                                                  |                 |      | 500         | $\mu\text{A}$            |
| $I_{\text{CEO}}$           | Collector cut-off current<br>( $I_{\text{B}} = 0$ )               | $V_{\text{CE}} = 80\text{ V}$                                                                                                                                                                   |                 |      | 1           | $\text{mA}$              |
| $I_{\text{EBO}}$           | Emitter cut-off current<br>( $I_{\text{C}} = 0$ )                 | $V_{\text{EB}} = 5\text{ V}$                                                                                                                                                                    |                 |      | 100         | $\mu\text{A}$            |
| $V_{\text{CEO(sus)}}$      | Collector-emitter<br>sustaining voltage<br>( $I_{\text{B}} = 0$ ) | $I_{\text{C}} = 10\text{ mA}$                                                                                                                                                                   | 80              |      |             | $\text{V}$               |
| $V_{\text{CE(sat)}}^{(1)}$ | Collector-emitter<br>saturation voltage                           | $I_{\text{C}} = 100\text{ mA}$ $I_{\text{B}} = 10\text{ mA}$<br>$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 100\text{ mA}$                                                                      |                 |      | 0.25<br>0.5 | $\text{V}$<br>$\text{V}$ |
| $V_{\text{BE(sat)}}^{(1)}$ | Base-emitter saturation<br>voltage                                | $I_{\text{C}} = 100\text{ mA}$ $I_{\text{B}} = 10\text{ mA}$<br>$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 100\text{ mA}$                                                                      |                 |      | 1<br>1.1    | $\text{V}$<br>$\text{V}$ |
| $h_{\text{FE}}^{(1)}$      | DC current gain                                                   | $I_{\text{C}} = 100\text{ }\mu\text{A}$ $V_{\text{CE}} = 2\text{ V}$<br>$I_{\text{C}} = 500\text{ mA}$ $V_{\text{CE}} = 2\text{ V}$<br>$I_{\text{C}} = 1\text{ A}$ $V_{\text{CE}} = 2\text{ V}$ | 140<br>80<br>40 |      |             |                          |
| $f_{\text{T}}$             | Transition frequency                                              | $I_{\text{C}} = 100\text{ mA}$ $V_{\text{CE}} = 10\text{ V}$                                                                                                                                    |                 | 50   |             | $\text{MHz}$             |

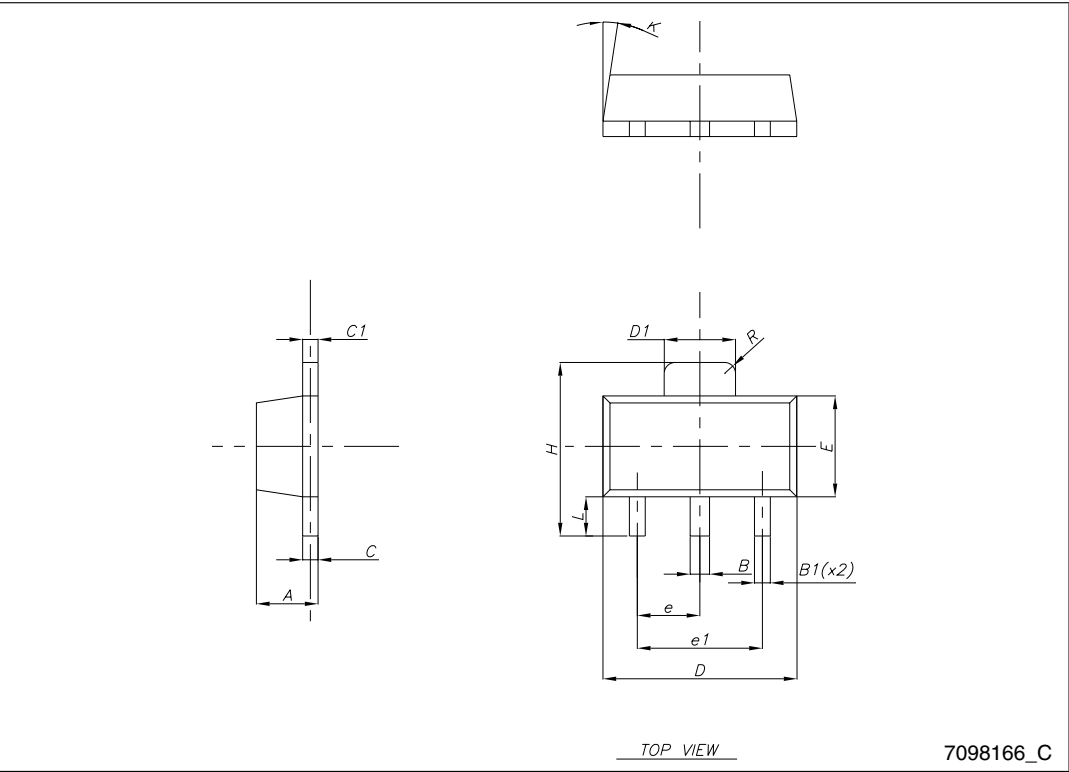
1. Pulse test: pulse duration  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

### 3      **Package mechanical data**

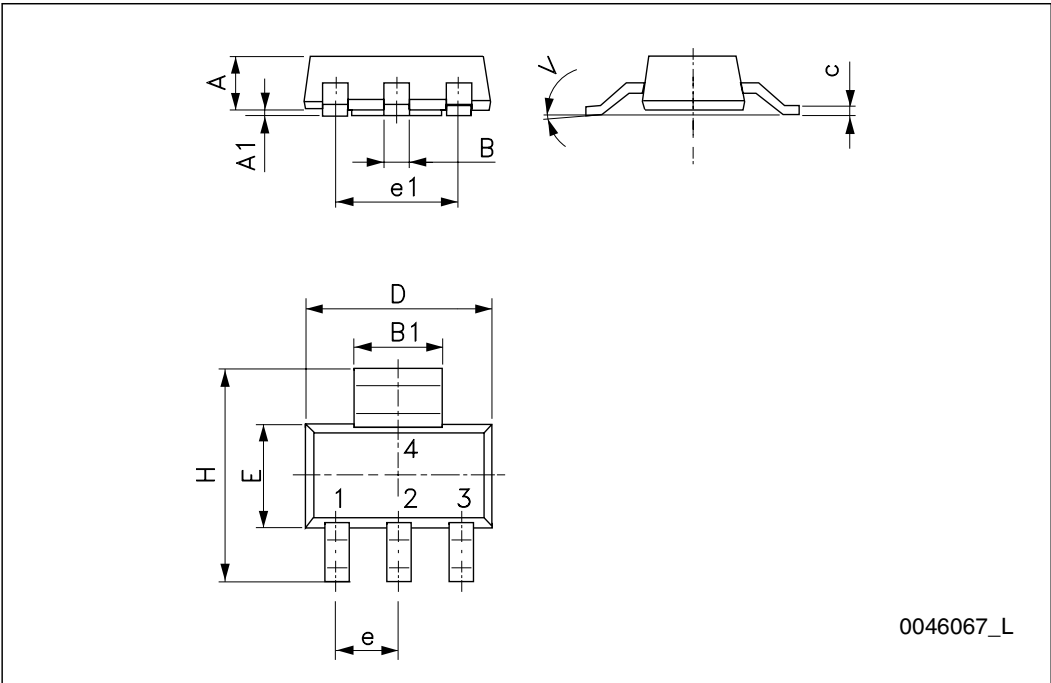
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SOT-89 mechanical data

| 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 |      |



| 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 Document revision history

**Table 5. Document revision history**

| Date        | Revision | Changes                         |
|-------------|----------|---------------------------------|
| 21-Jun-2004 | 1        | Initial release                 |
| 08-Feb-2010 | 2        | Updated package mechanical data |

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