



# BSR43

80 V, 1 A NPN medium power transistor

1 October 2022

Product data sheet

## 1. General description

NPN general-purpose transistor in a medium power SOT89 (SC-62) Surface-Mounted Device (SMD) plastic package. PNP complement: BSR33.

## 2. Features and benefits

- High current (max. 1 A)
- Low voltage (max. 80 V)

## 3. Applications

- Linear voltage regulators
- Low-side switches
- Battery-driven devices
- Power management
- MOSFET drivers
- Amplifiers

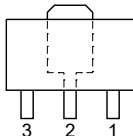
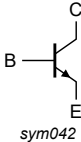
## 4. Quick reference data

Table 1. Quick reference data

| Symbol    | Parameter                 | Conditions                                                                                                  | Min | Typ | Max | Unit |
|-----------|---------------------------|-------------------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| $V_{CE0}$ | collector-emitter voltage | open base                                                                                                   | -   | -   | 80  | V    |
| $I_C$     | collector current         |                                                                                                             | -   | -   | 1   | A    |
| $I_{CM}$  | peak collector current    | single pulse; $t_p \leq 1$ ms                                                                               | -   | -   | 2   | A    |
| $h_{FE}$  | DC current gain           | $V_{CE} = 5$ V; $I_C = 100$ $\mu$ A; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.01$ ; $T_{amb} = 25$ °C | 30  | -   | -   |      |
|           |                           | $V_{CE} = 5$ V; $I_C = 100$ mA; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.01$ ; $T_{amb} = 25$ °C      | 100 | -   | 300 |      |
|           |                           | $V_{CE} = 5$ V; $I_C = 500$ mA; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.01$ ; $T_{amb} = 25$ °C      | 50  | -   | -   |      |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline                                                                             | Graphic symbol                                                                                    |
|-----|--------|-------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 1   | E      | emitter     |  <p>SOT89</p> |  <p>sym042</p> |
| 2   | C      | collector   |                                                                                                |                                                                                                   |
| 3   | B      | base        |                                                                                                |                                                                                                   |

## 6. Ordering information

Table 3. Ordering information

| Type number           | Package |                                                                                        |                       |
|-----------------------|---------|----------------------------------------------------------------------------------------|-----------------------|
|                       | Name    | Description                                                                            | Version               |
| <a href="#">BSR43</a> | SOT89   | plastic, surface-mounted package; 3 leads; 1.5 mm pitch; 4.5 mm x 2.5 mm x 1.5 mm body | <a href="#">SOT89</a> |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BSR43       | AR4          |

## 8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol    | Parameter                 | Conditions                    |     | Min | Max  | Unit |
|-----------|---------------------------|-------------------------------|-----|-----|------|------|
| $V_{CBO}$ | collector-base voltage    | open emitter                  |     | -   | 90   | V    |
| $V_{CEO}$ | collector-emitter voltage | open base                     |     | -   | 80   | V    |
| $V_{EBO}$ | emitter-base voltage      | open collector                |     | -   | 5    | V    |
| $I_C$     | collector current         | single pulse; $t_p \leq 1$ ms |     | -   | 1    | A    |
| $I_{CM}$  | peak collector current    |                               |     | -   | 2    | A    |
| $I_{BM}$  | peak base current         |                               |     | -   | 0.2  | A    |
| $P_{tot}$ | total power dissipation   | $T_{amb} \leq 25$ °C          | [1] | -   | 1.35 | W    |
| $T_j$     | junction temperature      |                               |     | -   | 150  | °C   |
| $T_{amb}$ | ambient temperature       |                               |     | -65 | 150  | °C   |
| $T_{stg}$ | storage temperature       |                               |     | -65 | 150  | °C   |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.

## 9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol         | Parameter                                        | Conditions  |     | Min | Typ | Max | Unit |
|----------------|--------------------------------------------------|-------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$  | thermal resistance from junction to ambient      | in free air | [1] | -   | -   | 93  | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             |     | -   | -   | 13  | K/W  |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.

## 10. Characteristics

Table 7. Characteristics

| Symbol                                              | Parameter                                     | Conditions                                                                                                                                                        |  | Min | Typ | Max | Unit          |
|-----------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----|-----|-----|---------------|
| $I_{CBO}$                                           | collector-base cut-off current (emitter open) | $V_{CB} = 60 \text{ V}; I_E = 0 \text{ A}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                                 |  | -   | -   | 100 | nA            |
|                                                     |                                               | $V_{CB} = 60 \text{ V}; I_E = 0 \text{ A}; T_j = 150 \text{ }^{\circ}\text{C}$                                                                                    |  | -   | -   | 50  | $\mu\text{A}$ |
| $I_{EBO}$                                           | emitter-base cut-off current (collector open) | $V_{EB} = 5 \text{ V}; I_C = 0 \text{ A}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                                                  |  | -   | -   | 100 | nA            |
| $h_{FE}$                                            | DC current gain                               | $V_{CE} = 5 \text{ V}; I_C = 100 \text{ } \mu\text{A}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.01; T_{amb} = 25 \text{ }^{\circ}\text{C}$ |  | 30  | -   | -   |               |
|                                                     |                                               | $V_{CE} = 5 \text{ V}; I_C = 100 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.01; T_{amb} = 25 \text{ }^{\circ}\text{C}$           |  | 100 | -   | 300 |               |
|                                                     |                                               | $V_{CE} = 5 \text{ V}; I_C = 500 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.01; T_{amb} = 25 \text{ }^{\circ}\text{C}$           |  | 50  | -   | -   |               |
| $V_{CEsat}$                                         | collector-emitter saturation voltage          | $I_C = 150 \text{ mA}; I_B = 15 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.01; T_{amb} = 25 \text{ }^{\circ}\text{C}$            |  | -   | -   | 250 | mV            |
|                                                     |                                               | $I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.01; T_{amb} = 25 \text{ }^{\circ}\text{C}$            |  | -   | -   | 500 | mV            |
| $V_{BEsat}$                                         | base-emitter saturation voltage               | $I_C = 150 \text{ mA}; I_B = 15 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.01; T_{amb} = 25 \text{ }^{\circ}\text{C}$            |  | -   | -   | 1   | V             |
|                                                     |                                               | $I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.01; T_{amb} = 25 \text{ }^{\circ}\text{C}$            |  | -   | -   | 1.2 | V             |
| $C_c$                                               | collector capacitance                         | $V_{CB} = 10 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                           |  | -   | -   | 12  | pF            |
| $C_e$                                               | emitter capacitance                           | $V_{EB} = 0.5 \text{ V}; I_C = 0 \text{ A}; i_c = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                          |  | -   | -   | 90  | pF            |
| $f_T$                                               | transition frequency                          | $V_{CE} = 10 \text{ V}; I_C = 50 \text{ mA}; f = 100 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                          |  | 100 | -   | -   | MHz           |
| <b>Switching times (between 10% and 90% levels)</b> |                                               |                                                                                                                                                                   |  |     |     |     |               |
| $t_{on}$                                            | turn-on time                                  | $I_C = 100 \text{ mA}; I_{Bon} = 5 \text{ mA}; I_{Boff} = -5 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$                                                   |  | -   | -   | 250 | ns            |
| $t_{off}$                                           | turn-off time                                 |                                                                                                                                                                   |  | -   | -   | 1   | $\mu\text{s}$ |

11. Package outline

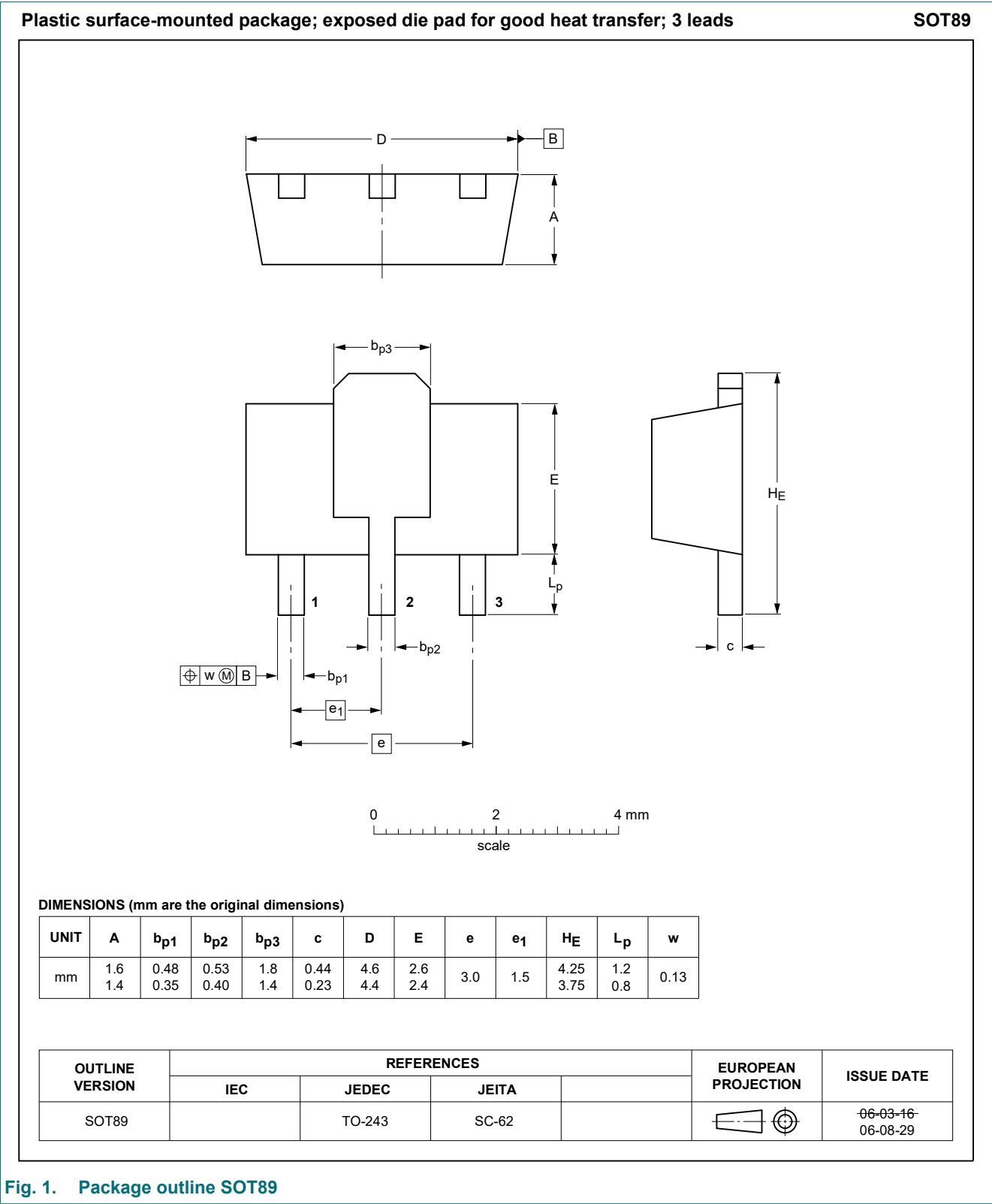


Fig. 1. Package outline SOT89

12. Soldering

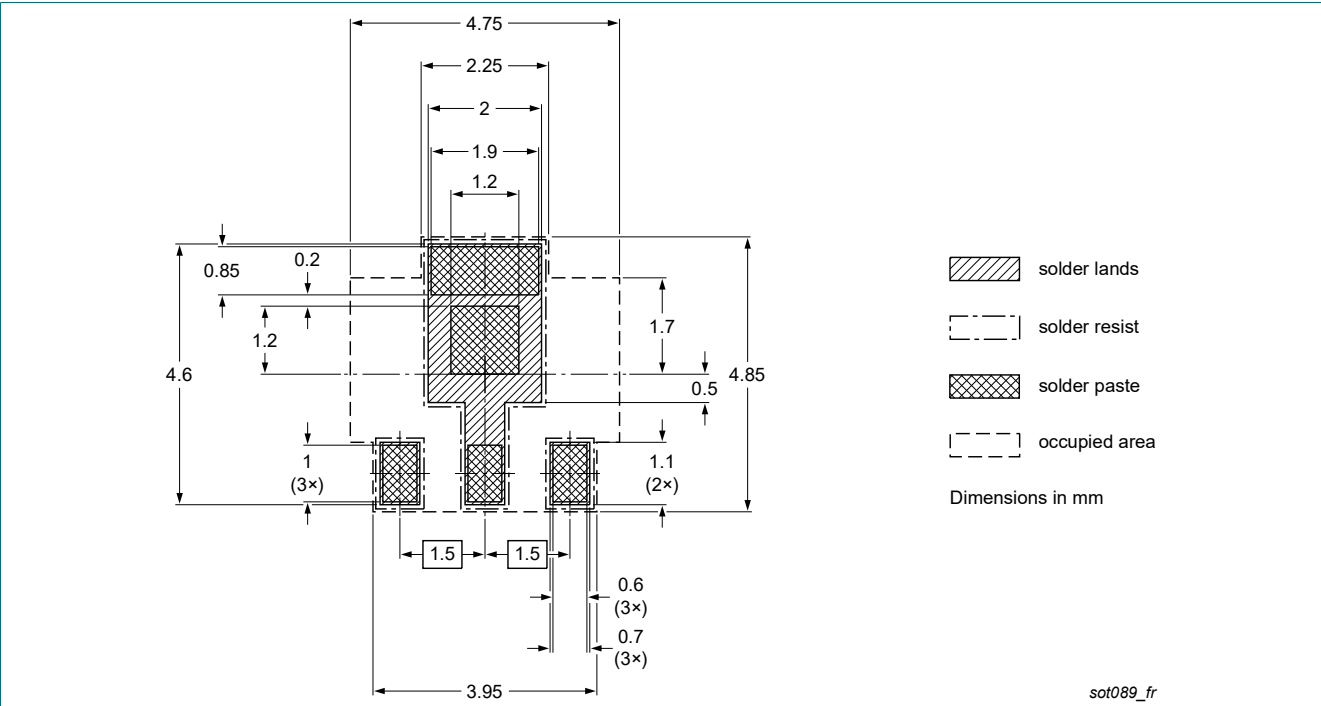


Fig. 2. Reflow soldering footprint for SOT89

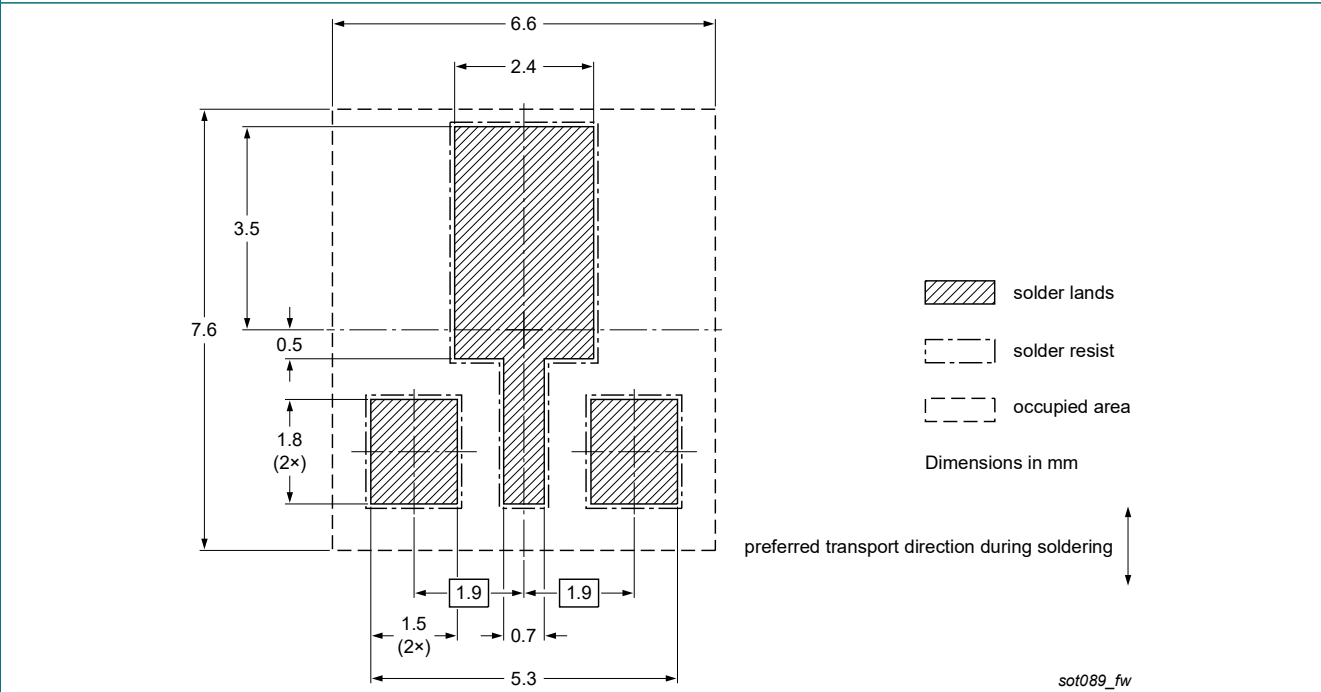


Fig. 3. Wave soldering footprint for SOT89

## 13. Revision history

**Table 8. Revision history**

| Data sheet ID  | Release date                                                                                                                                                                                                                                                                                                                               | Data sheet status     | Change notice | Supersedes |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|------------|
| BSR43 v.3      | 20221001                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | BSR43 v.2  |
| Modifications: | <ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• Product changed to non automotive. Please refer to the automotive product(s) with -Q.</li></ul> |                       |               |            |
| BSR43 v.2      | 20041213                                                                                                                                                                                                                                                                                                                                   | Product data sheet    | -             | BSR43 v.1  |
| BSR43 v.1      | 19990428                                                                                                                                                                                                                                                                                                                                   | Product specification | -             | -          |

## 14. Legal information

### Data sheet status

| Document status [1][2]         | Product status [3] | Definition                                                                            |
|--------------------------------|--------------------|---------------------------------------------------------------------------------------|
| Objective [short] data sheet   | Development        | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification      | This document contains data from the preliminary specification.                       |
| Product [short] data sheet     | Production         | This document contains the product specification.                                     |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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