

# BSR41

60 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: BSR31.

## 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

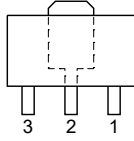
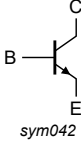
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CE0}$	collector-emitter voltage	open base	-	-	60	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 style="text-align: center;">SOT89</p>	 <p style="text-align: center;">sym042</p>
2	C	collector		
3	B	base		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">BSR41</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
BSR41	AR2

## 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	-	70	V
$V_{CEO}$	collector-emitter voltage	open base	-	60	V
$V_{EBO}$	emitter-base voltage	open collector	-	5	V
$I_C$	collector current		-	1	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	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

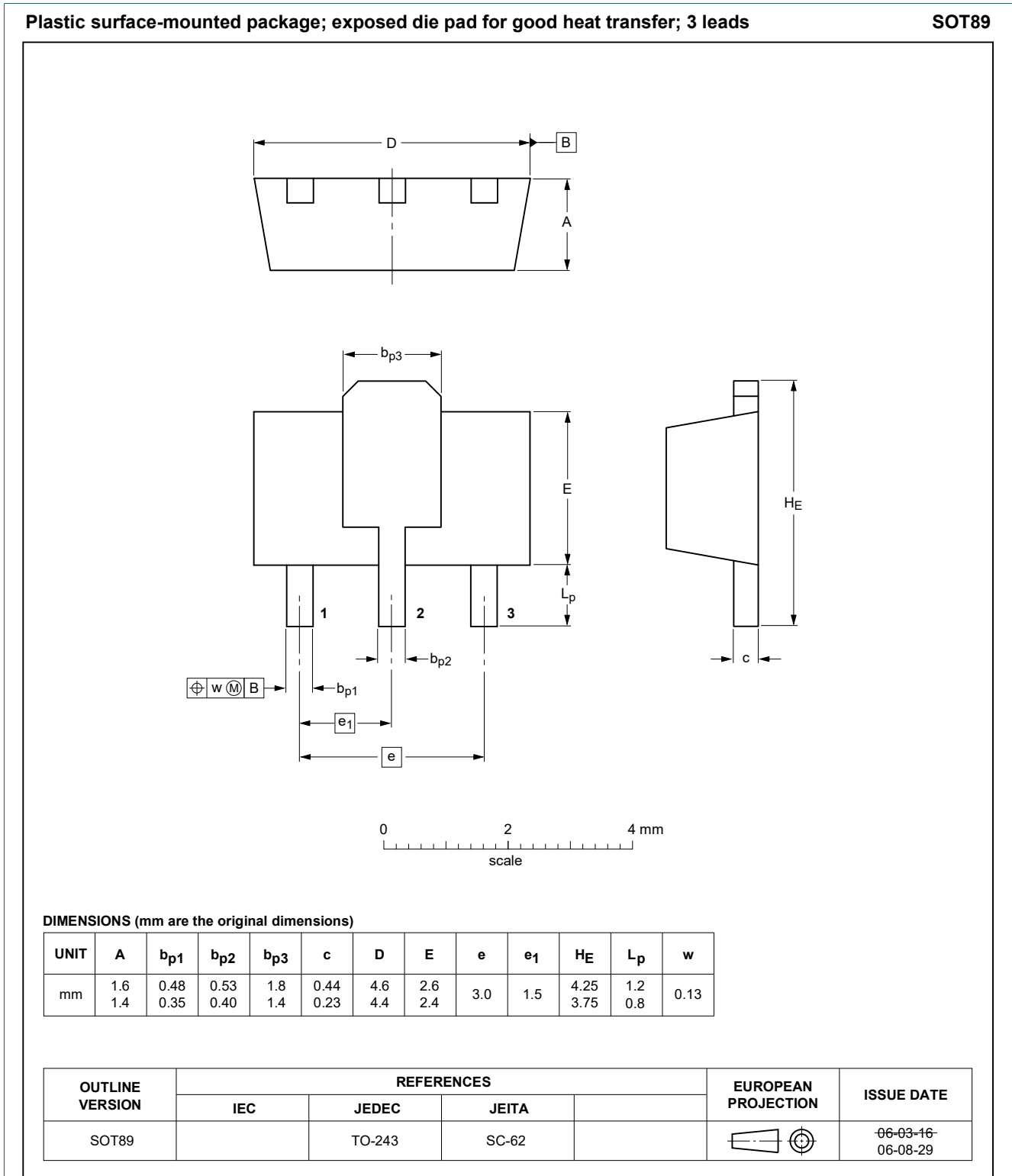


Fig. 1. Package outline SOT89

## 12. Soldering

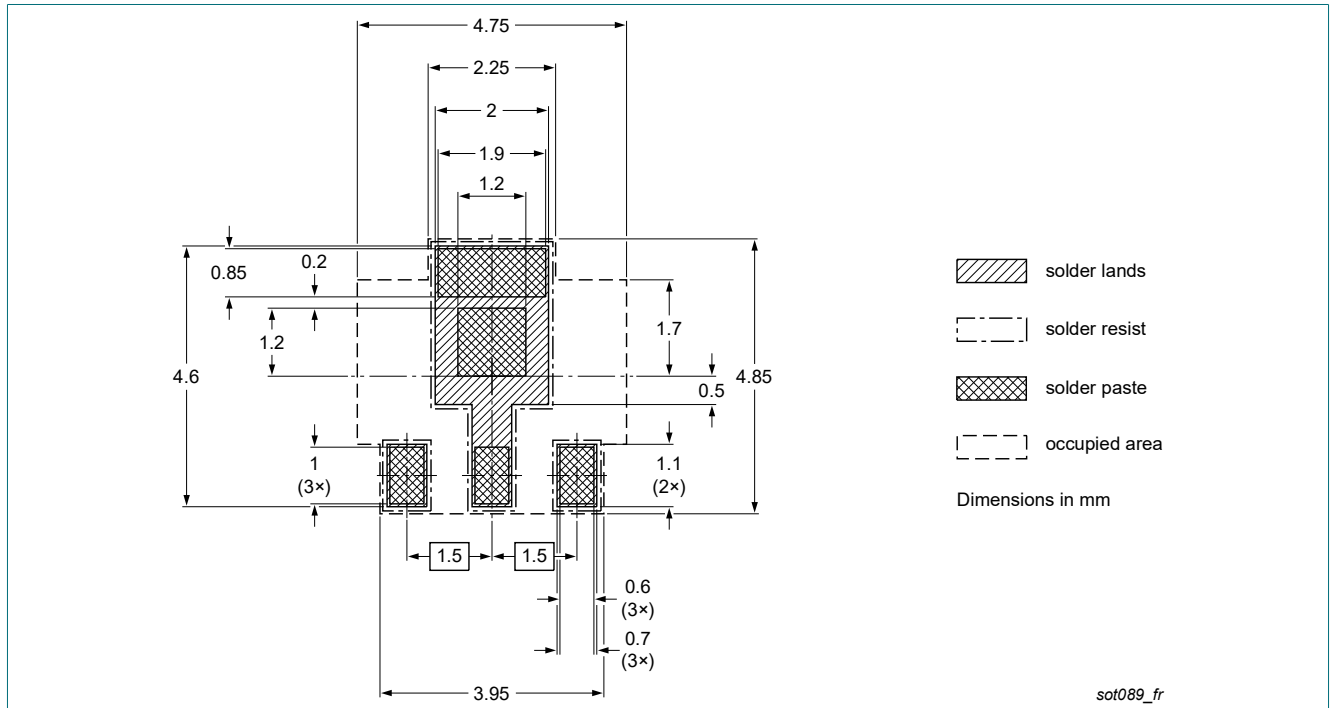


Fig. 2. Reflow soldering footprint for SOT89

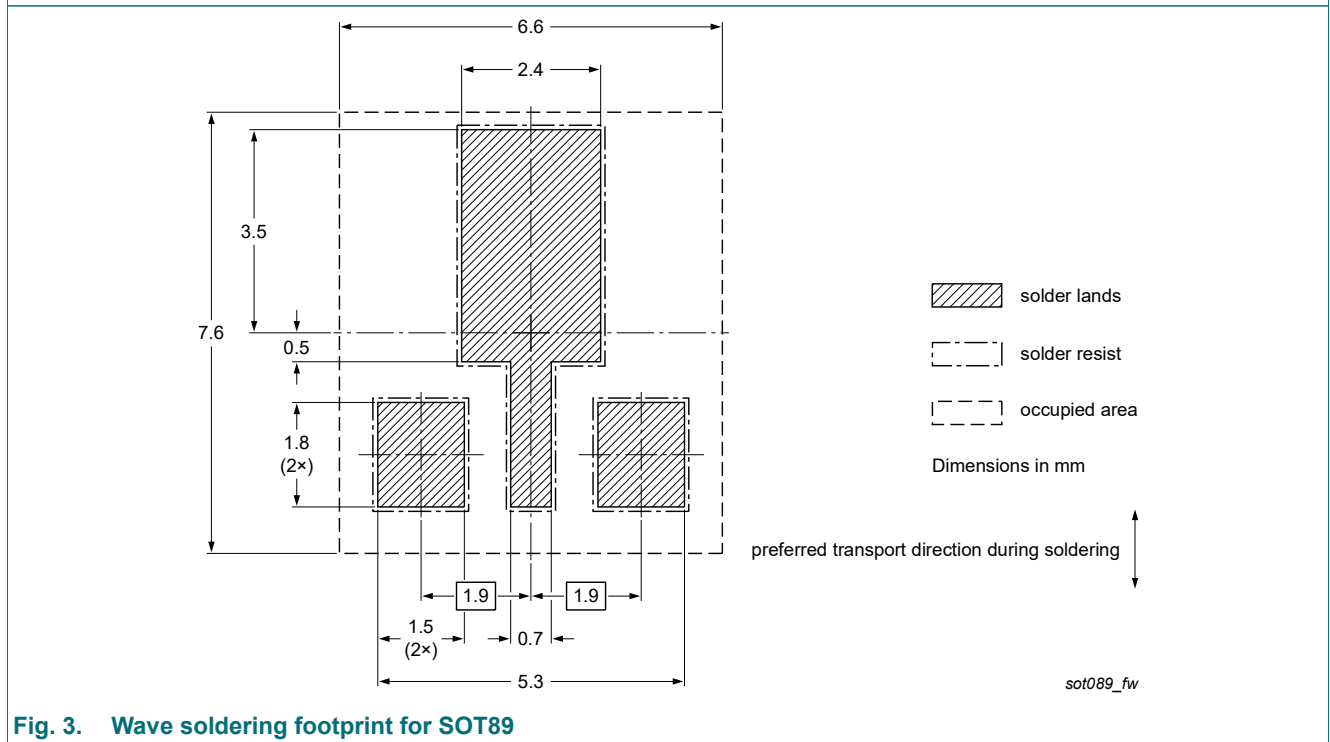


Fig. 3. Wave soldering footprint for SOT89

## 13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BSR41 v.3	20221001	Product data sheet	-	BSR41 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>			
BSR41 v.2	20041213	Product data sheet	-	BSR41 v.1
BSR41 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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