

BSR33

80 V, 1 A PNP medium power transistor

9 March 2023 **Product data sheet**

1. General description

PNP medium power transistor in a SOT89 Surface-Mounted Device (SMD) plastic package.

NPN complement: BSR43

2. Features and benefits

- High current
- High power dissipation capability
- Exposed heatsink for excellent thermal and electrical conductivity
- AEC-Q101 qualified

3. Applications

- Linear voltage regulators
- High-side switches
- Battery-driven devices
- MOSFET drivers
- Amplifiers

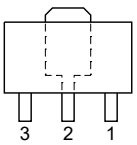
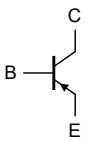
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	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 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.01; T_{amb} = 25 °C		100	-	300	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter	 SOT89	 006aaa231
2	C	collector		
3	B	base		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BSR33	SOT89	plastic, surface-mounted package; 3 leads; 1.5 mm pitch; 4.5 mm x 2.5 mm x 1.5 mm body	SOT89

7. Marking

Table 4. Marking codes

Type number	Marking code
BSR33	BR4

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			-	-1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-2	A
I_{BM}	peak base current			-	-200	mA
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^2.

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^2.

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10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current (emitter open)	V_{CB} = -60 V; I_E = 0 A; T_{amb} = 25 °C		-	-	-100	nA
		V_{CB} = -60 V; I_E = 0 A; T_j = 150 °C		-	-	-50	µA
I_{EBO}	emitter-base cut-off current (collector open)	V_{EB} = -5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	-100	nA
h_{FE}	DC current gain	V_{CE} = -5 V; I_C = -100 µA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.01; T_{amb} = 25 °C		30	-	-	
		V_{CE} = -5 V; I_C = -100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.01; T_{amb} = 25 °C		100	-	300	
		V_{CE} = -5 V; I_C = -500 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.01; T_{amb} = 25 °C		50	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -150 mA; I_B = -15 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.01; T_{amb} = 25 °C		-	-	-0.25	V
		I_C = -500 mA; I_B = -50 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.01; T_{amb} = 25 °C		-	-	-0.5	V
V_{BEsat}	base-emitter saturation voltage	I_C = -150 mA; I_B = -15 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.01; T_{amb} = 25 °C		-	-	-1	V
		I_C = -500 mA; I_B = -50 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.01; T_{amb} = 25 °C		-	-	-1.2	V
f_T	transition frequency	V_{CE} = -10 V; I_C = -50 mA; f = 100 MHz; T_{amb} = 25 °C		100	-	-	MHz

11. Test information

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline

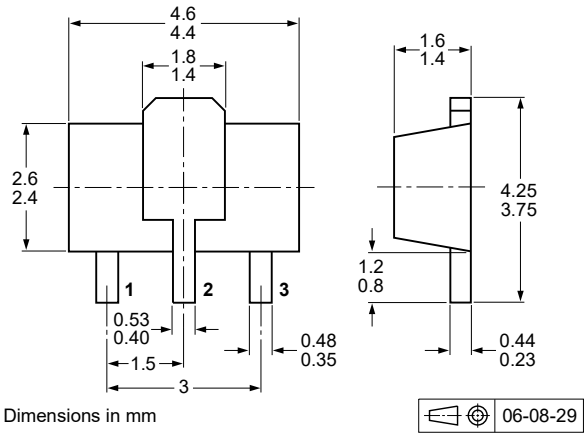


Fig. 1. Package outline SOT89

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13. Soldering

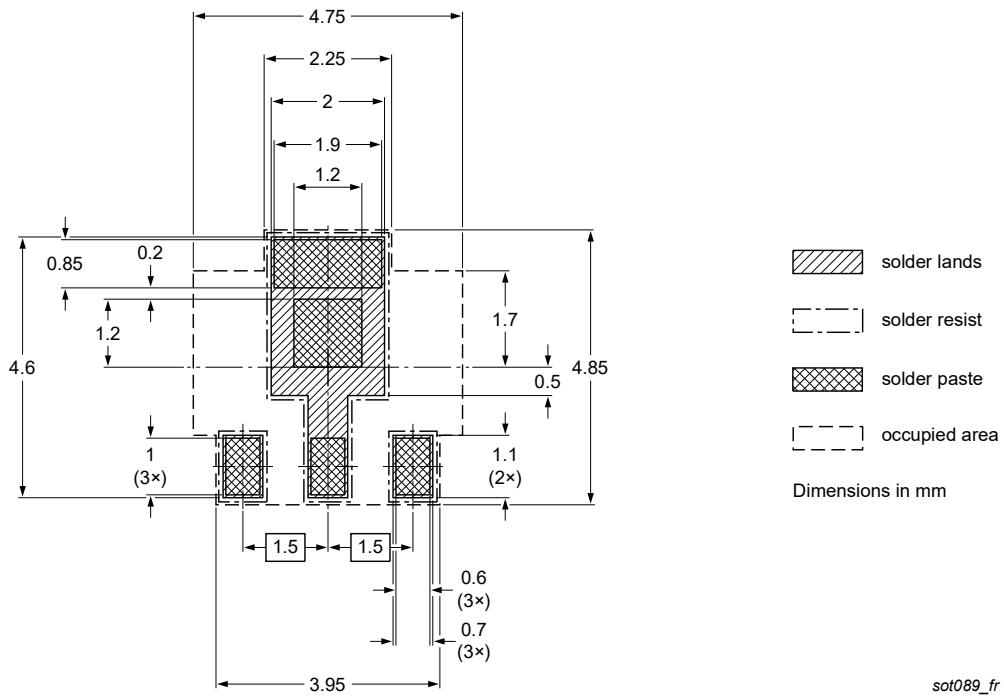


Fig. 2. Reflow soldering footprint for SOT89

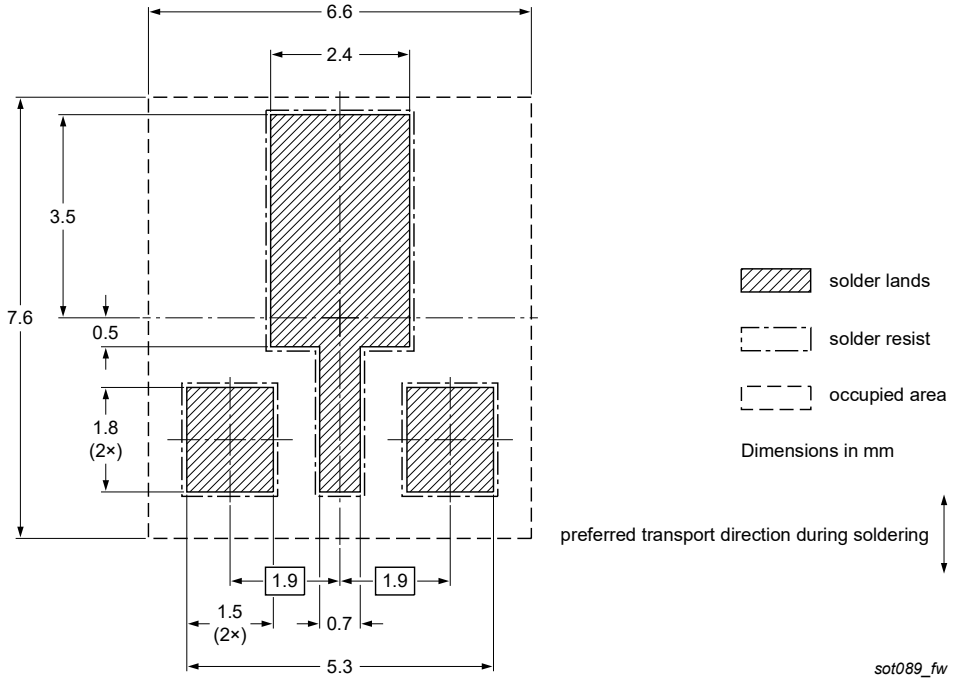


Fig. 3. Wave soldering footprint for SOT89

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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BSR33 v.3	20230309	Product data sheet	-	BSR30_31_33 v.2
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Family data sheet splitted to single type data sheets.			
BSR30_31_33 v.2	20041213	Product data sheet	-	BSR30_31_33 v.1
BSR30_31_33 v.1	19990426	Product data sheet	-	-

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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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