



BSR31-Q

60 V, 1 A PNP medium power transistor

10 March 2023

Product data sheet

1. General description

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

NPN complement: BSR41-Q

2. Features and benefits

- High current
- High power dissipation capability
- Exposed heatsink for excellent thermal and electrical conductivity
- Qualified according to AEC-Q101 and recommended for use in automotive applications

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	-	-	-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; $I_C = -100$ mA; pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.01$; $T_{amb} = 25$ °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
BSR31-Q	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
BSR31-Q	BR2

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 ≤ 1 ms		-	-2	A
I _{BM}	peak base current			-	-200	mA
P _{tot}	total power dissipation	T _{amb} ≤ 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 cm².

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 cm².

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 ≤ 300 μs; δ ≤ 0.01; T _{amb} = 25 °C		30	-	-	
		V _{CE} = -5 V; I _C = -100 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.01; T _{amb} = 25 °C		100	-	300	
		V _{CE} = -5 V; I _C = -500 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.01; T _{amb} = 25 °C		50	-	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = -150 mA; I _B = -15 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.01; T _{amb} = 25 °C		-	-	-0.25	V
		I _C = -500 mA; I _B = -50 mA; pulsed; t _p ≤ 300 μs; δ ≤ 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 ≤ 300 μs; δ ≤ 0.01; T _{amb} = 25 °C		-	-	-1	V
		I _C = -500 mA; I _B = -50 mA; pulsed; t _p ≤ 300 μs; δ ≤ 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

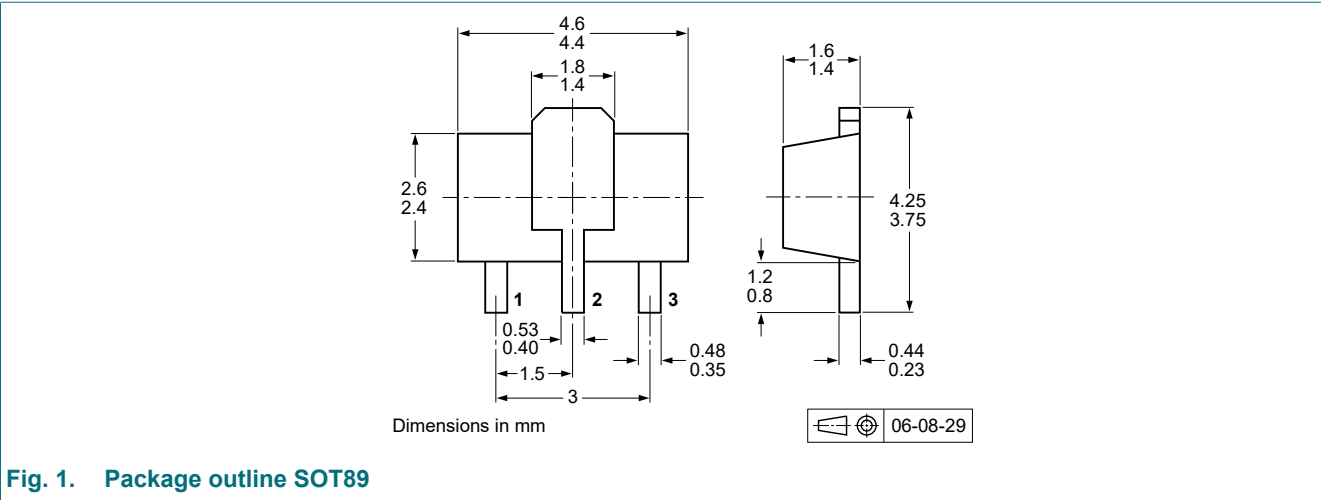


Fig. 1. Package outline SOT89

13. Soldering

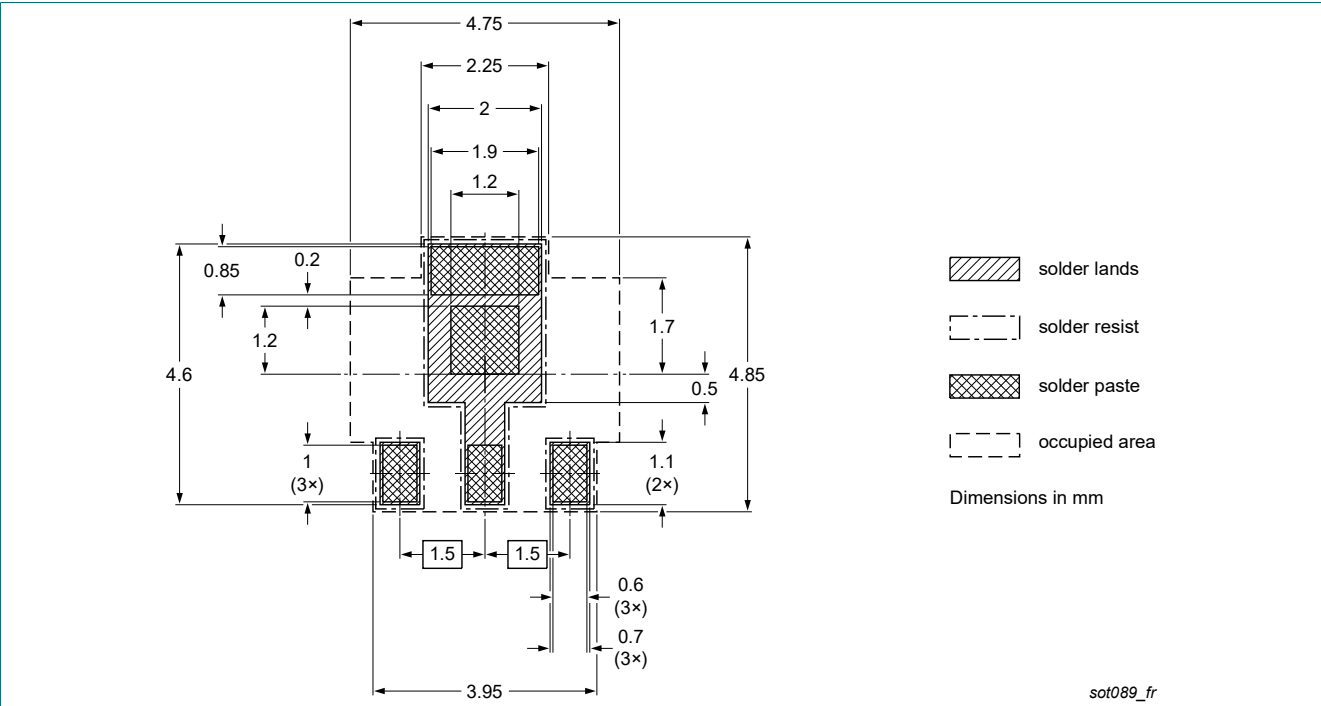


Fig. 2. Reflow soldering footprint for SOT89

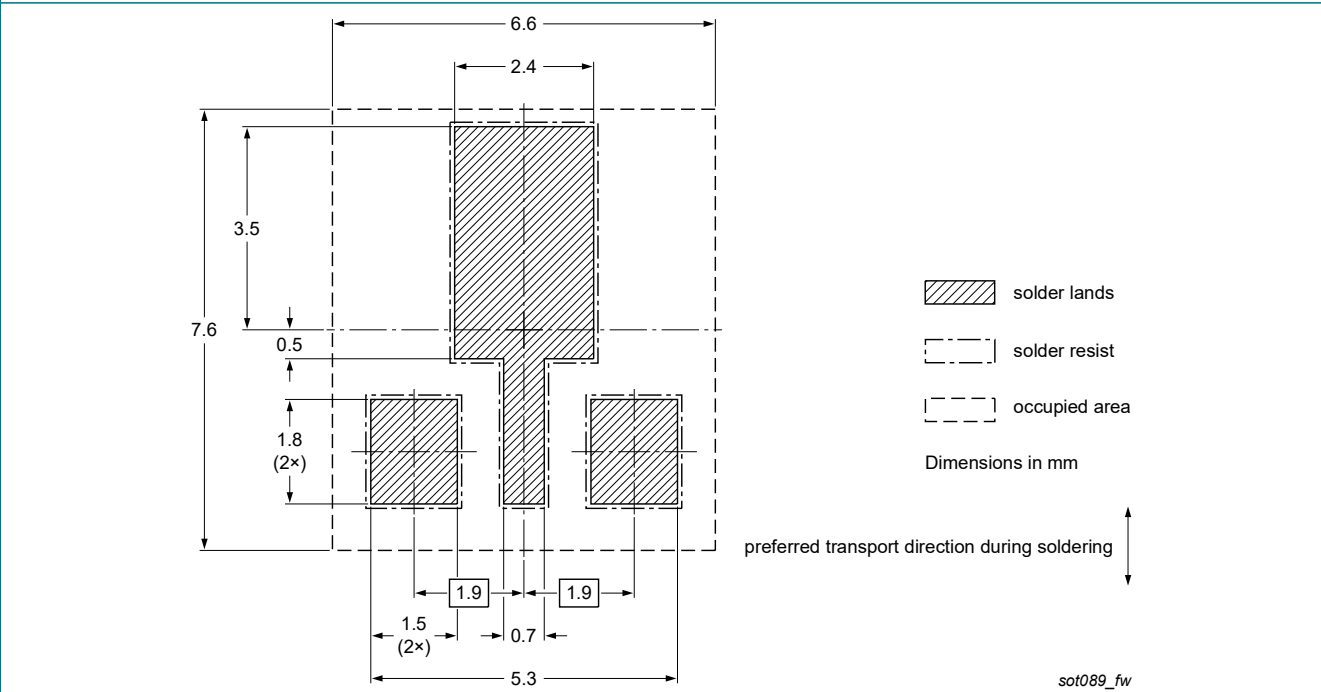


Fig. 3. Wave soldering footprint for SOT89

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BSR31-Q v.1	20230310	Product data sheet	-	-

15. 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.

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