



# PBSS4250X

50 V, 2 A NPN low V<sub>CEsat</sub> transistor

11 September 2023

Product data sheet

## 1. General description

NPN low V<sub>CEsat</sub> transistor in a SOT89 (SC-62) flat lead Surface-Mounted Device (SMD) plastic package.

PNP complement: PBSS5250X

## 2. Features and benefits

- Low collector-emitter saturation voltage V<sub>CEsat</sub>
- High collector current capability: I<sub>C</sub> and I<sub>CM</sub>
- Higher efficiency leading to less heat generation
- Reduced printed-circuit board requirements
- AEC-Q101 qualified

## 3. Applications

- Power management
  - DC/DC converters
  - Supply line switching
  - Battery charger
  - LCD backlighting
- Peripheral drivers
  - Driver in low supply voltage applications (e.g. lamps and LEDs)
  - Inductive load driver (e.g. relays, buzzers and motors)

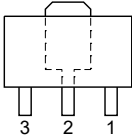
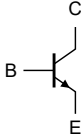
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base	-	-	50	V
I <sub>C</sub>	collector current		-	-	2	A
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = 2 V; I <sub>C</sub> = 0.1 A; T <sub>amb</sub> = 25 °C	300	-	-	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter	 SOT89	 sym123
2	C	collector		
3	B	base		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PBSS4250X</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[1]
PBSS4250X	%1M

[1] % = placeholder for manufacturing site code

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		-	50	V
$V_{CEO}$	collector-emitter voltage	open base		-	50	V
$V_{EBO}$	emitter-base voltage	open collector		-	5	V
$I_C$	collector current			-	2	A
$I_{CM}$	peak collector current	limited by $T_{j(max)}$ ; single pulse; $t_p \leq 1$ ms		-	5	A
$I_B$	base current			-	0.5	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	550	mW
			[2]	-	1	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 and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 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]	-	-	225	K/W
			[2]	-	-	125	K/W
			[3]	-	-	90	K/W
			[4]	-	-	80	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	16	K/W

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.  
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.  
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.  
[4] Device mounted on a ceramic PCB, 7 cm<sup>2</sup>, single-sided copper, tin-plated.

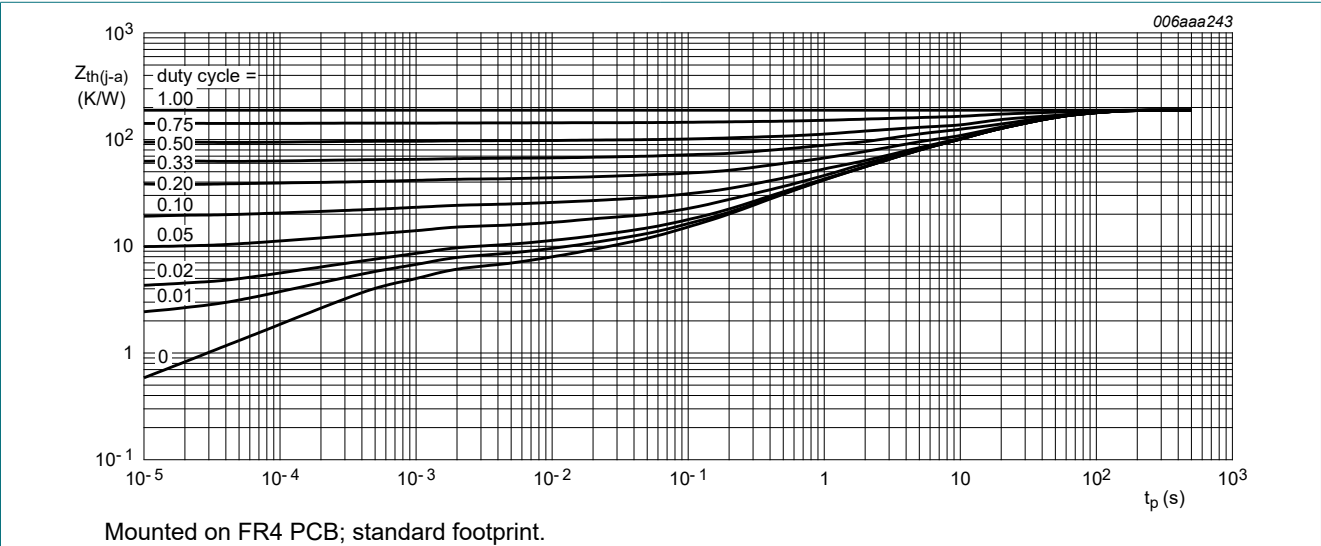


Fig. 1. Transient thermal impedance as a function of pulse duration; typical values

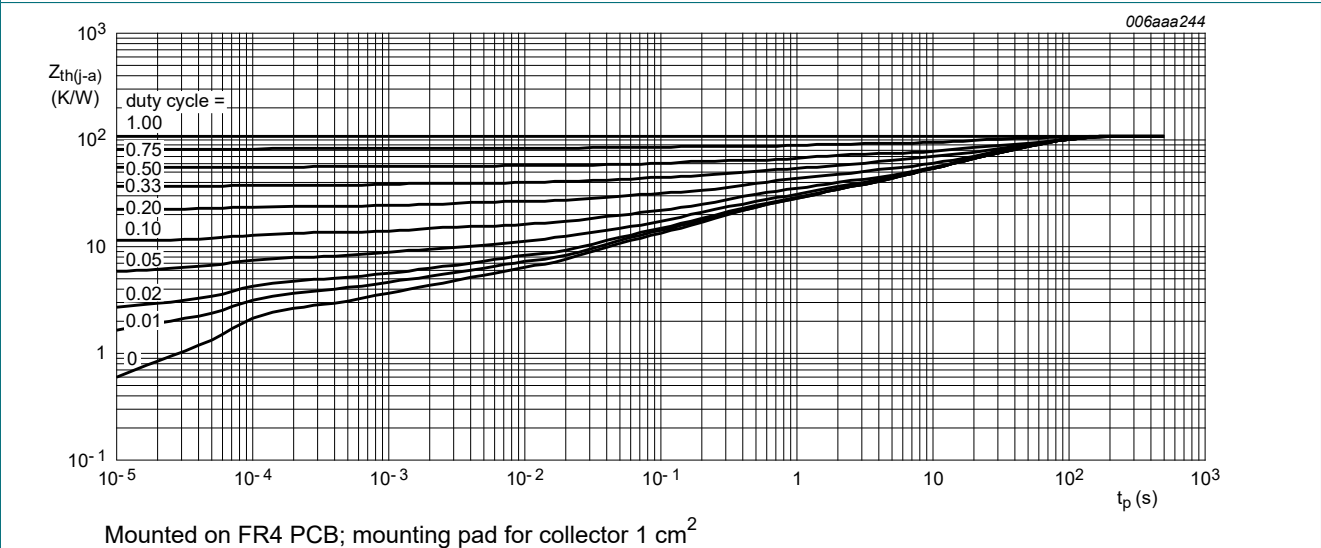
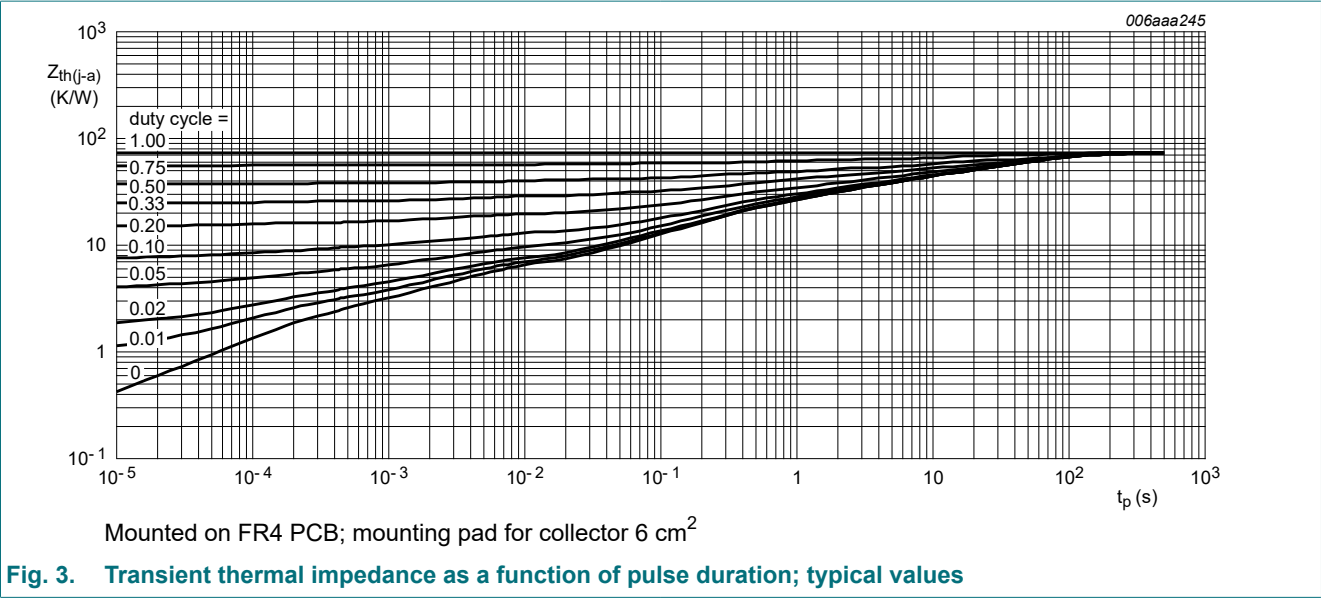


Fig. 2. Transient thermal impedance as a function of pulse duration; typical values



10. Characteristics

Table 7. Characteristics

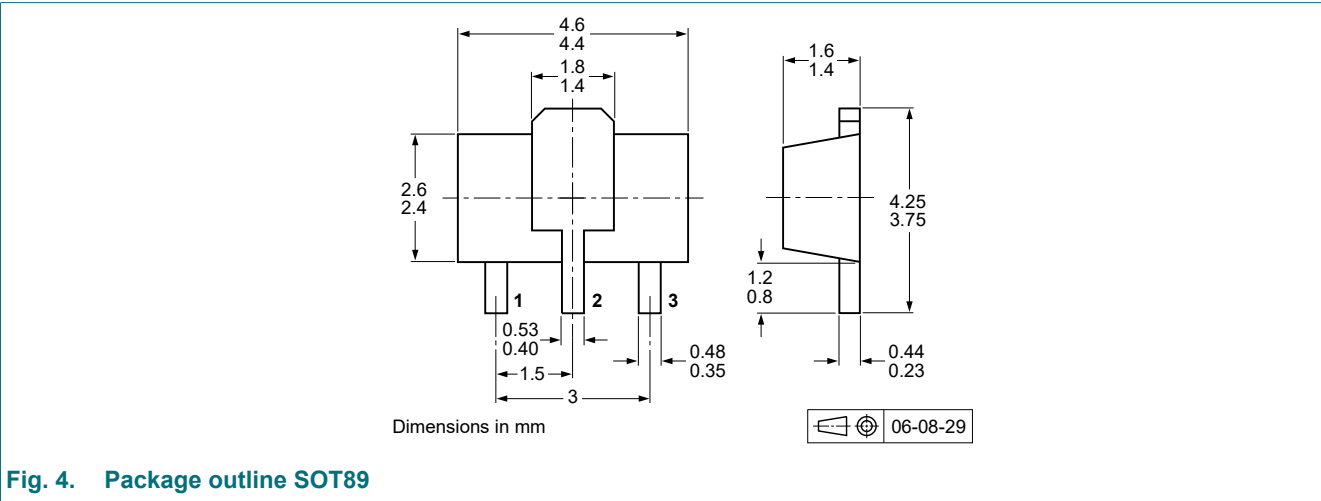
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = 50 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C	-	-	100	nA
		V <sub>CB</sub> = 50 V; I <sub>E</sub> = 0 A; T <sub>J</sub> = 150 °C	-	-	50	μA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C	-	-	100	nA
I <sub>CES</sub>	collector-emitter cut-off current	V <sub>CE</sub> = 50 V; V <sub>BE</sub> = 0 V; T <sub>amb</sub> = 25 °C	-	-	100	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = 2 V; I <sub>C</sub> = 0.1 A; T <sub>amb</sub> = 25 °C	300	-	-	
		V <sub>CE</sub> = 2 V; I <sub>C</sub> = 0.5 A; T <sub>amb</sub> = 25 °C	300	-	-	
		V <sub>CE</sub> = 2 V; I <sub>C</sub> = 1 A; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	300	-	-	
		V <sub>CE</sub> = 2 V; I <sub>C</sub> = 2 A; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	150	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 0.5 A; I <sub>B</sub> = 50 mA; T <sub>amb</sub> = 25 °C	-	-	90	mV
		I <sub>C</sub> = 1 A; I <sub>B</sub> = 50 mA; T <sub>amb</sub> = 25 °C	-	-	250	mV
		I <sub>C</sub> = 2 A; I <sub>B</sub> = 100 mA; T <sub>amb</sub> = 25 °C	-	-	380	mV
		I <sub>C</sub> = 2 A; I <sub>B</sub> = 200 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-	320	mV
R <sub>CEsat</sub>	collector-emitter saturation resistance		-	-	160	mΩ
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = 2 A; I <sub>B</sub> = 100 mA; T <sub>amb</sub> = 25 °C	-	-	1.1	V
V <sub>BEon</sub>	base-emitter turn-on voltage	V <sub>CE</sub> = 2 V; I <sub>C</sub> = 1 A; T <sub>amb</sub> = 25 °C	-	-	1.1	V
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = 5 V; I <sub>C</sub> = 100 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C	100	-	-	MHz
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = 10 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C	-	-	25	pF

11. Test information

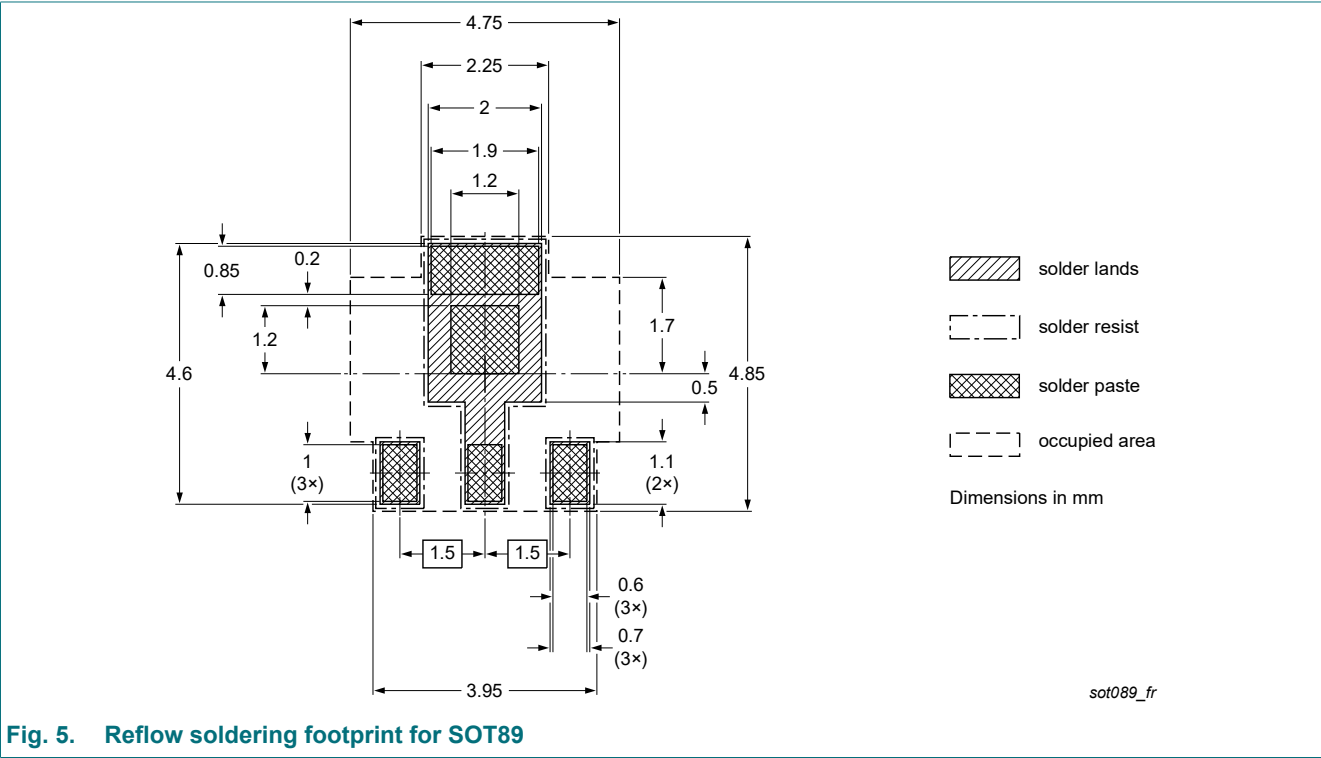
Quality information

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



13. Soldering



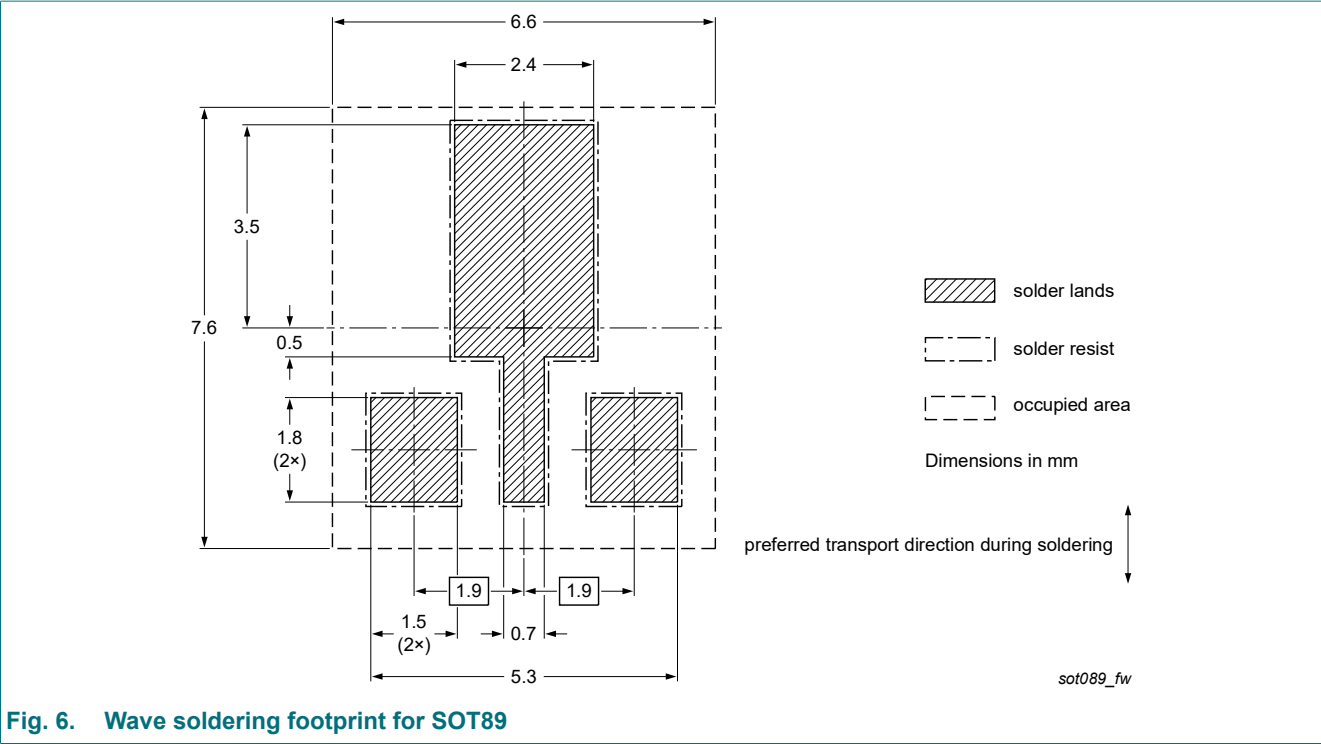


Fig. 6. Wave soldering footprint for SOT89

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5250X v.4	20230911	Product data sheet	-	PBSS5250X v.2
Modifications:	• Characteristics, typo corrected at $V_{BEon}$ : value changed from min to max			
PBSS5250X v.3	20230424	Product data sheet	-	PBSS5250X v.2
PBSS5250X v.2	20041108	Product data sheet	-	PBSS5250X v.1
PBSS5250X v.1	20030617	Product specification	-	-

## 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.

- [1] Please consult the most recently issued document before initiating or completing a design.
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