



# PBSS4480X

80 V, 4 A NPN low V<sub>CEsat</sub> transistor

5 June 2024

Product data sheet

## 1. General description

NPN low V<sub>CEsat</sub> transistor in a SOT89 (SC-62) medium power and flat lead plastic package.

PNP complement: PBSS5480X

## 2. Features and benefits

- High h<sub>FE</sub> and low V<sub>CEsat</sub> at high current operation
- High collector current capability: I<sub>C</sub> maximum 4 A
- High efficiency leading to less heat generation
- AEC-Q101 qualified

## 3. Applications

- Medium power peripheral drivers; e.g. fan, motor
- Strobe flash units for DSC and mobile phones
- Inverter applications; e.g. TFT displays
- Power switch for LAN and ADSL systems
- Medium power DC-to-DC conversion
- Battery chargers

## 4. Quick reference data

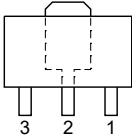
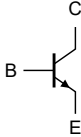
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base		-	-	80	V
I <sub>C</sub>	collector current		[1]	-	-	4	A
I <sub>CM</sub>	peak collector current	limited by T <sub>j(max)</sub> ; single pulse; t <sub>p</sub> ≤ 1 ms		-	-	10	A
R <sub>CEsat</sub>	collector-emitter saturation resistance	I <sub>C</sub> = 5 A; I <sub>B</sub> = 500 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C		-	40	54	mΩ

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

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="#">PBSS4480X</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]
PBSS4480X	%1Y

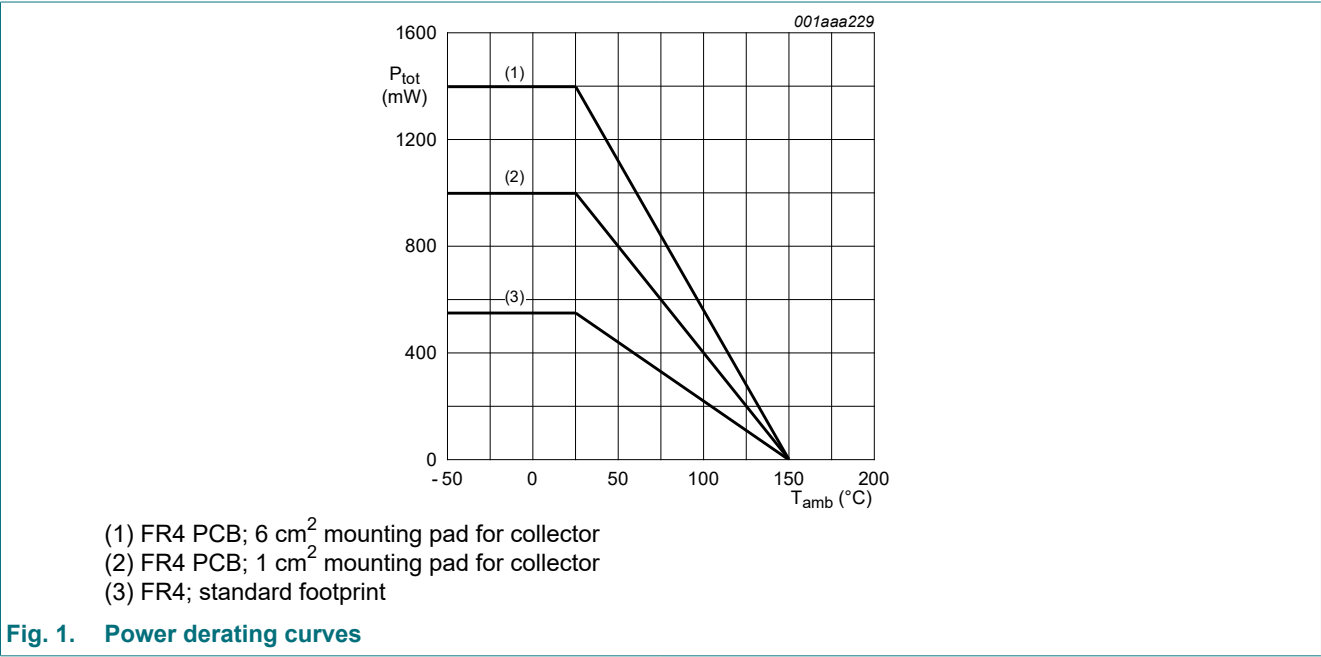
[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V <sub>CBO</sub>	collector-base voltage	open emitter		-	80	V
V <sub>CEO</sub>	collector-emitter voltage	open base		-	80	V
V <sub>EBO</sub>	emitter-base voltage	open collector		-	5	V
I <sub>C</sub>	collector current		[1]	-	4	A
I <sub>CRM</sub>	repetitive peak collector current	t <sub>p</sub> ≤ 10 ms		-	6	A
I <sub>CM</sub>	peak collector current	limited by T <sub>j(max)</sub> ; single pulse; t <sub>p</sub> ≤ 1 ms		-	10	A
I <sub>B</sub>	base current			-	1	A
I <sub>BM</sub>	peak base current	single pulse; t <sub>p</sub> ≤ 300 μs		-	2	A
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[2] [3]	-	2.5	W
			[2]	-	550	mW
			[4]	-	1	W
			[1]	-	1.4	W
			[5]	-	1.6	W
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-65	150	°C
T <sub>stg</sub>	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>.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [3] Operated under pulsed conditions; t<sub>p</sub> ≤ 10 ms; δ ≤ 0.2.
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.
- [5] Device mounted on a 7 cm<sup>2</sup> ceramic PCB, 1 cm<sup>2</sup> single-sided copper and tin-plated.

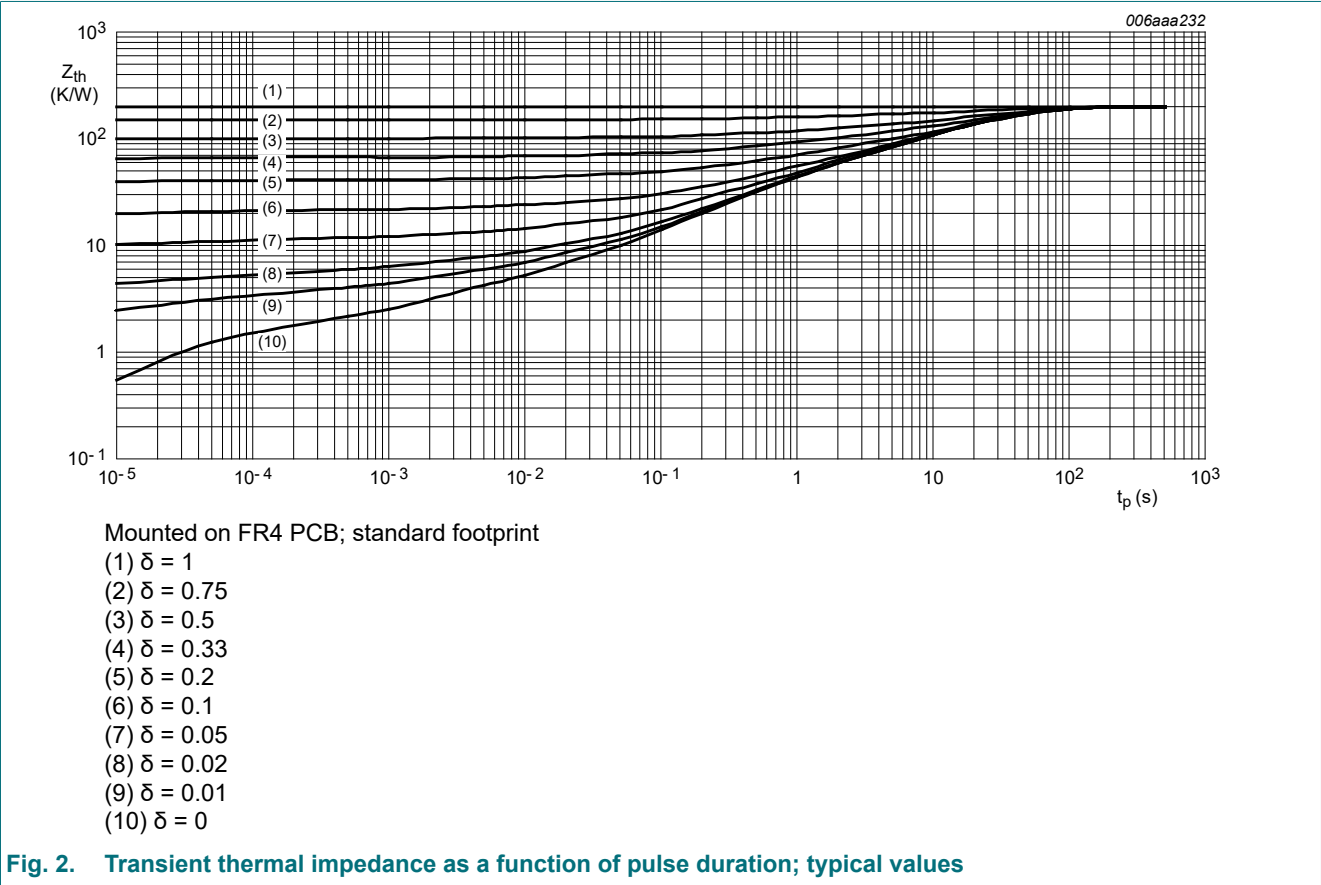


9. Thermal characteristics

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] [2]	-	-	50	K/W
			[1]	-	-	225	K/W
			[3]	-	-	125	K/W
			[4]	-	-	90	K/W
			[5]	-	-	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] Operated under pulsed conditions;  $t_p \leq 10$  ms;  $\delta \leq 0.2$ .  
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.  
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.  
[5] Device mounted on a 7 cm<sup>2</sup> ceramic PCB, 1 cm<sup>2</sup> single-sided copper and tin-plated.



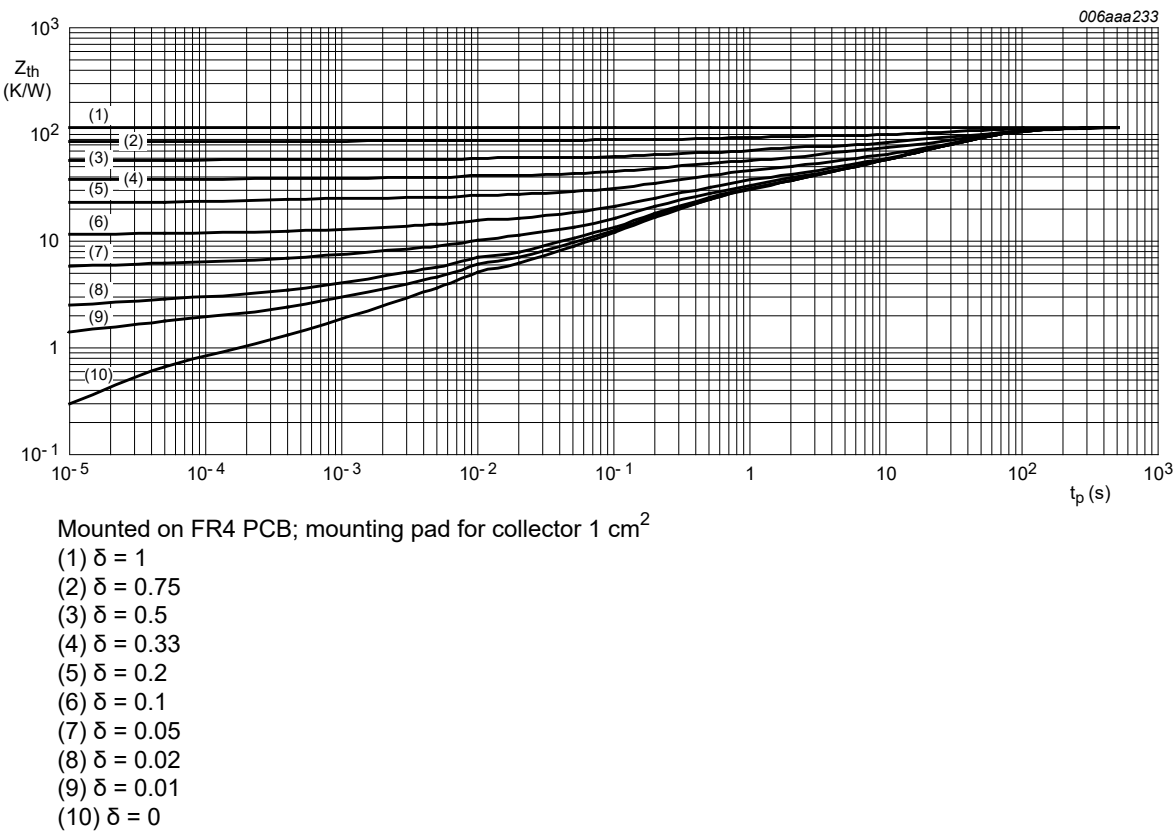


Fig. 3. Transient thermal impedance as a function of pulse duration; typical values

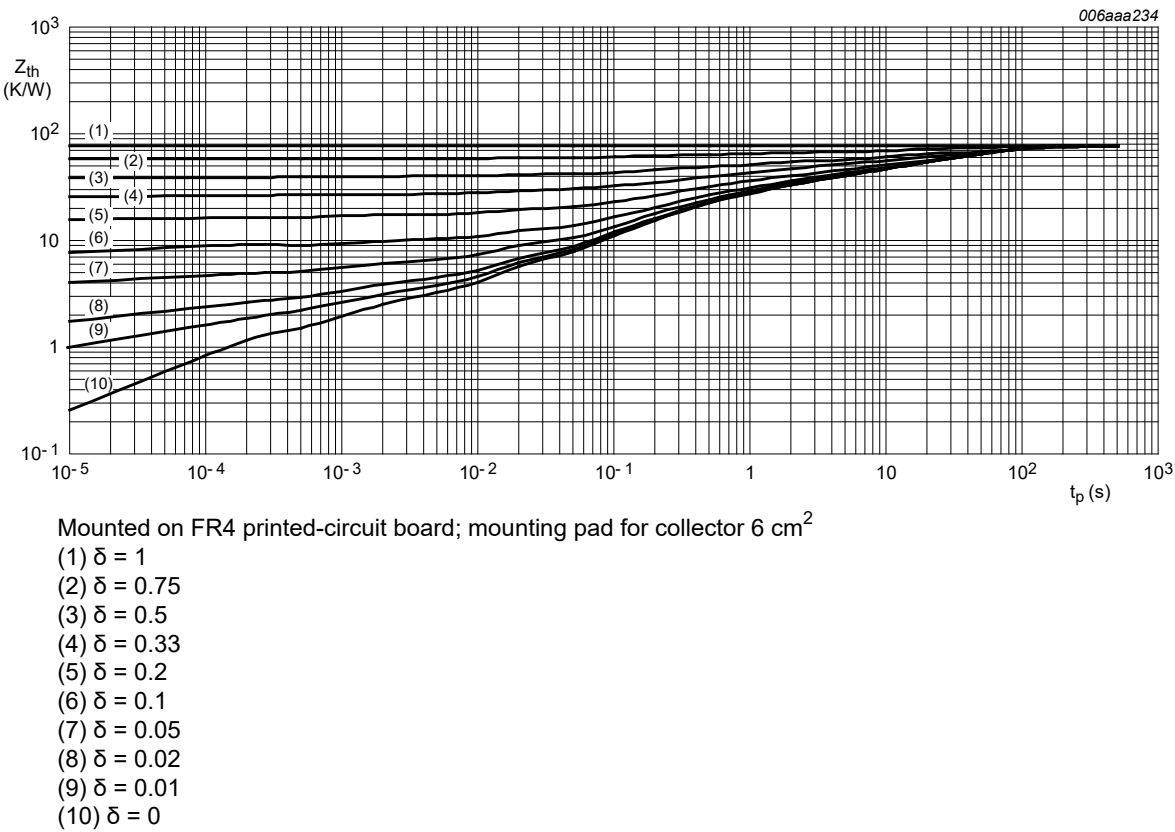


Fig. 4. Transient thermal impedance as a function of pulse duration; typical values

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> = 80 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C		-	-	100	nA
		V <sub>CB</sub> = 80 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> = 80 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> = 0.5 A; T <sub>amb</sub> = 25 °C		250	400	-	
		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		250	400	-	
		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		175	270	-	
		V <sub>CE</sub> = 2 V; I <sub>C</sub> = 4 A; pulsed; t <sub>p</sub> ≤ 300 µs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C		80	140	-	
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		-	25	40	mV
		I <sub>C</sub> = 1 A; I <sub>B</sub> = 50 mA; T <sub>amb</sub> = 25 °C		-	55	80	mV
		I <sub>C</sub> = 2 A; I <sub>B</sub> = 40 mA; T <sub>amb</sub> = 25 °C		-	110	160	mV
		I <sub>C</sub> = 4 A; I <sub>B</sub> = 200 mA; pulsed; t <sub>p</sub> ≤ 300 µs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C		-	170	230	mV
		I <sub>C</sub> = 5 A; I <sub>B</sub> = 500 mA; pulsed; t <sub>p</sub> ≤ 300 µs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C		-	200	270	mV
R <sub>CEsat</sub>	collector-emitter saturation resistance			-	40	54	mΩ
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = 0.5 A; I <sub>B</sub> = 50 mA; T <sub>amb</sub> = 25 °C		-	0.78	0.85	V
		I <sub>C</sub> = 1 A; I <sub>B</sub> = 50 mA; T <sub>amb</sub> = 25 °C		-	0.79	0.9	V
		I <sub>C</sub> = 1 A; I <sub>B</sub> = 100 mA; pulsed; t <sub>p</sub> ≤ 300 µs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C		-	0.82	0.95	V
		I <sub>C</sub> = 4 A; I <sub>B</sub> = 400 mA; pulsed; t <sub>p</sub> ≤ 300 µs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C		-	0.95	1.05	V
V <sub>BEon</sub>	base-emitter turn-on voltage	V <sub>CE</sub> = 2 V; I <sub>C</sub> = 2 A; T <sub>amb</sub> = 25 °C		-	0.78	0.85	V
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = 10 V; I <sub>C</sub> = 100 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C		120	150	-	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		-	35	50	pF

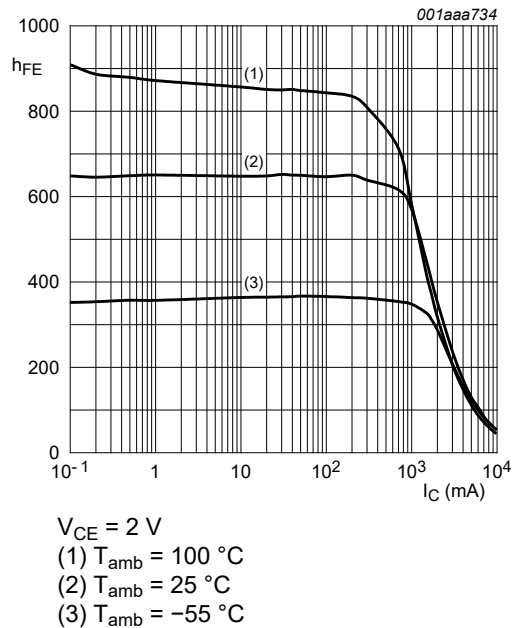


Fig. 5. DC current gain as a function of collector current; typical values

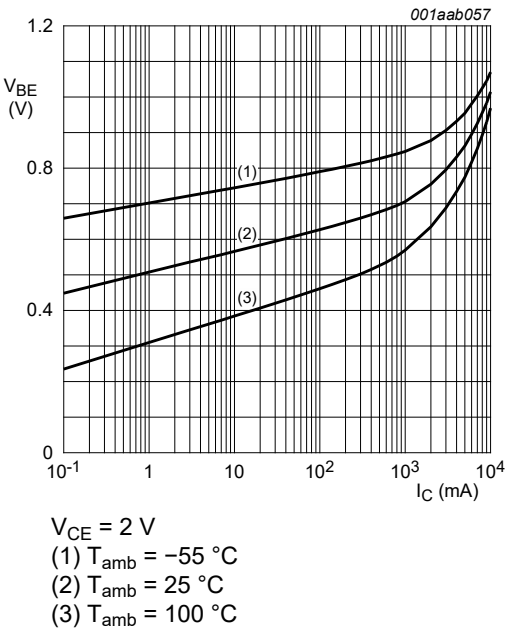


Fig. 6. Base-emitter voltage as a function of collector current; typical values

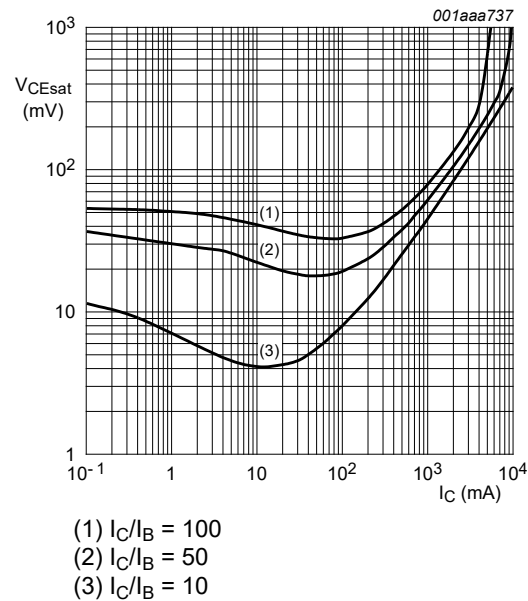


Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values

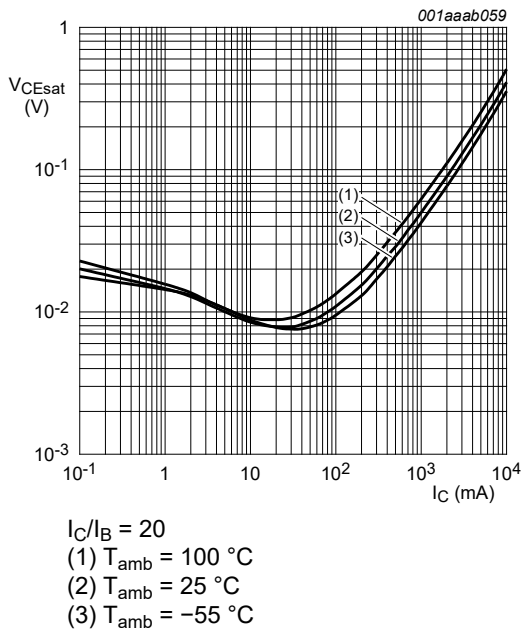


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

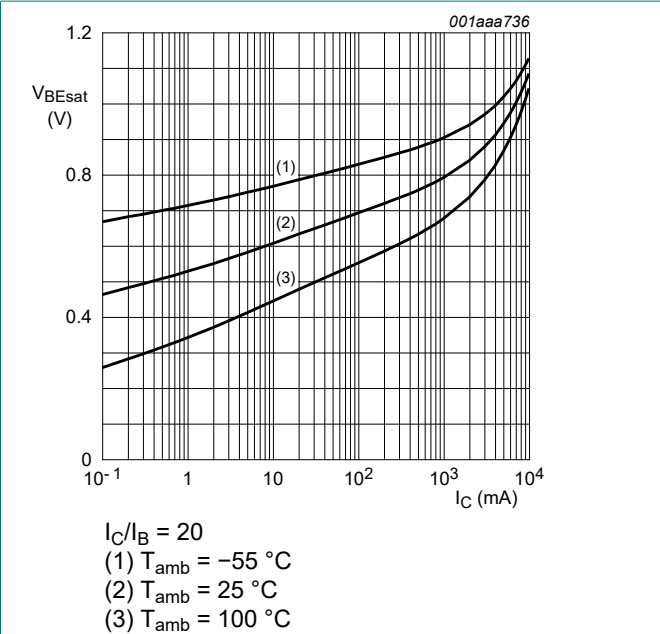


Fig. 9. Base-emitter saturation voltage as a function of collector current; typical values

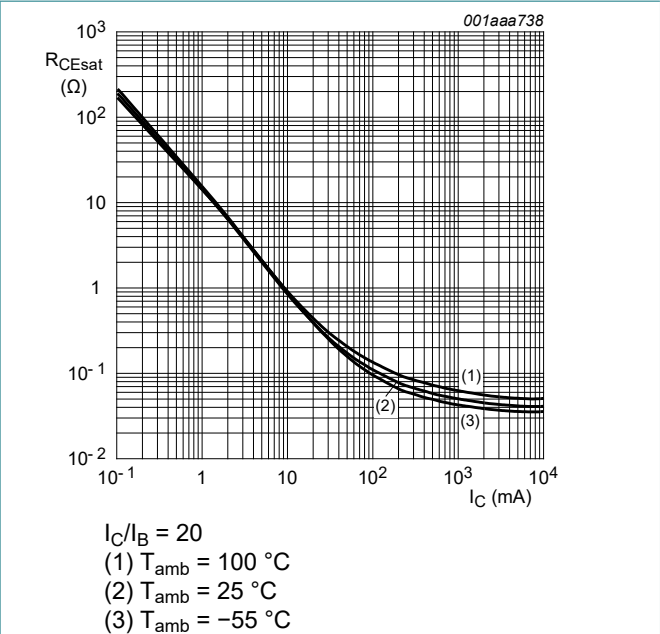


Fig. 10. Equivalent on-resistance as a function of collector current; typical values

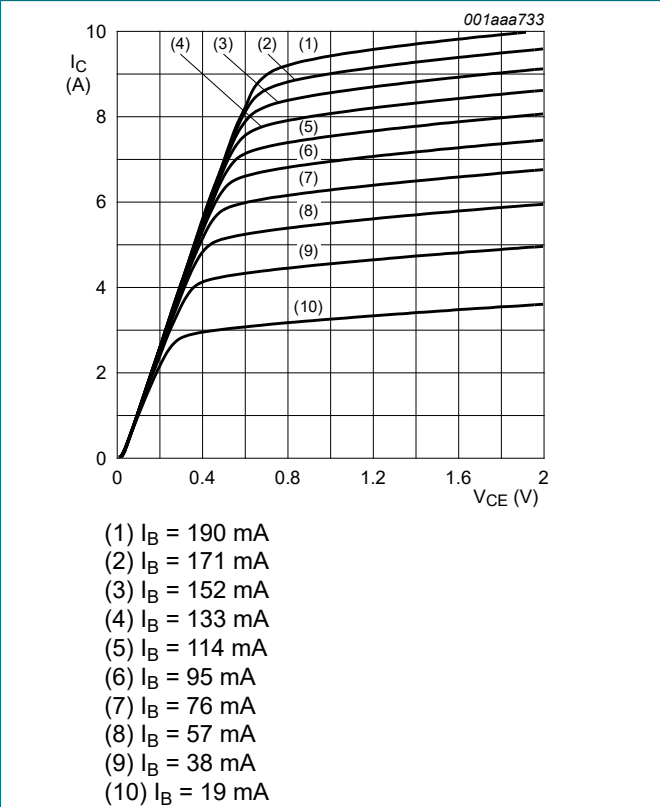


Fig. 11. Collector current as a function of collector-emitter voltage; typical values

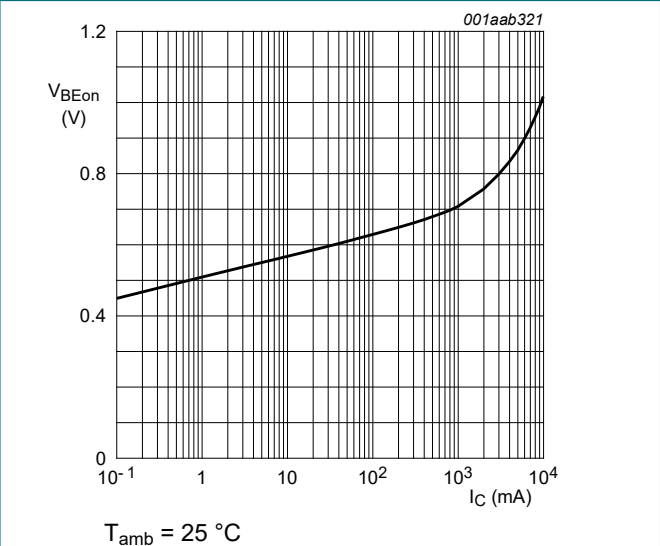


Fig. 12. Base-emitter turn-on voltage as a function of collector current; typical values

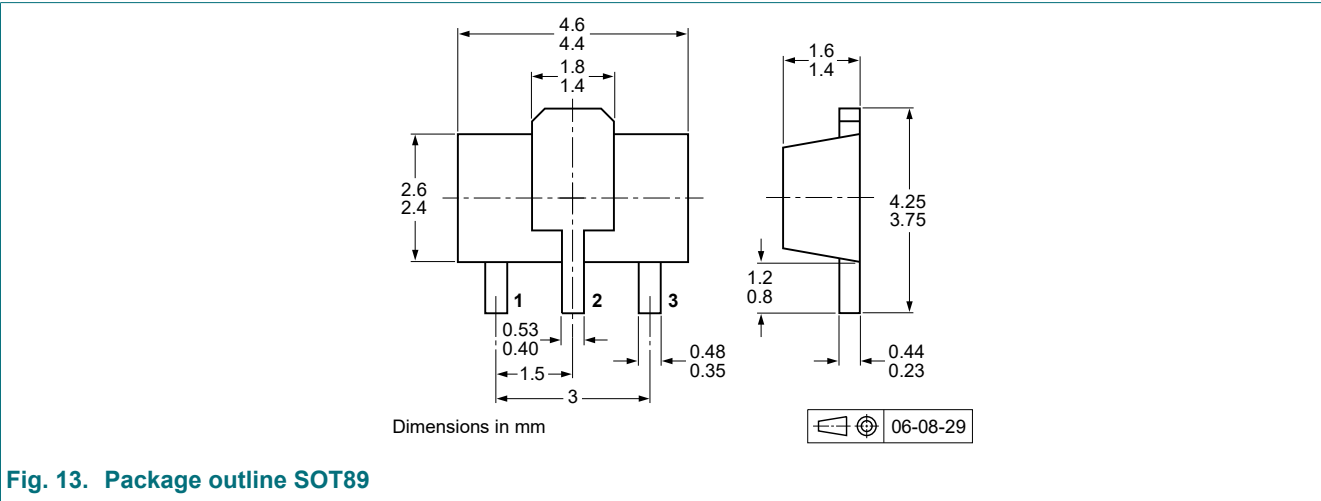


11. Test information

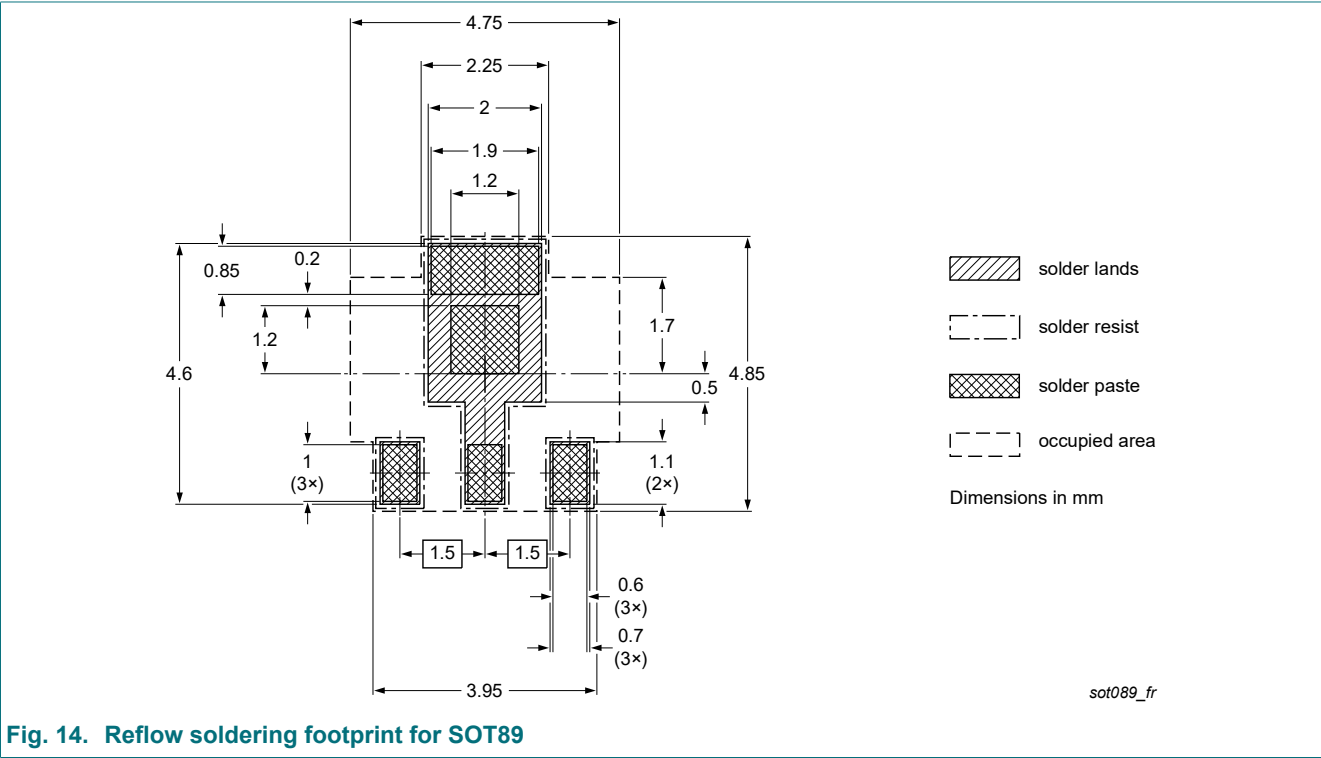
Quality information

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



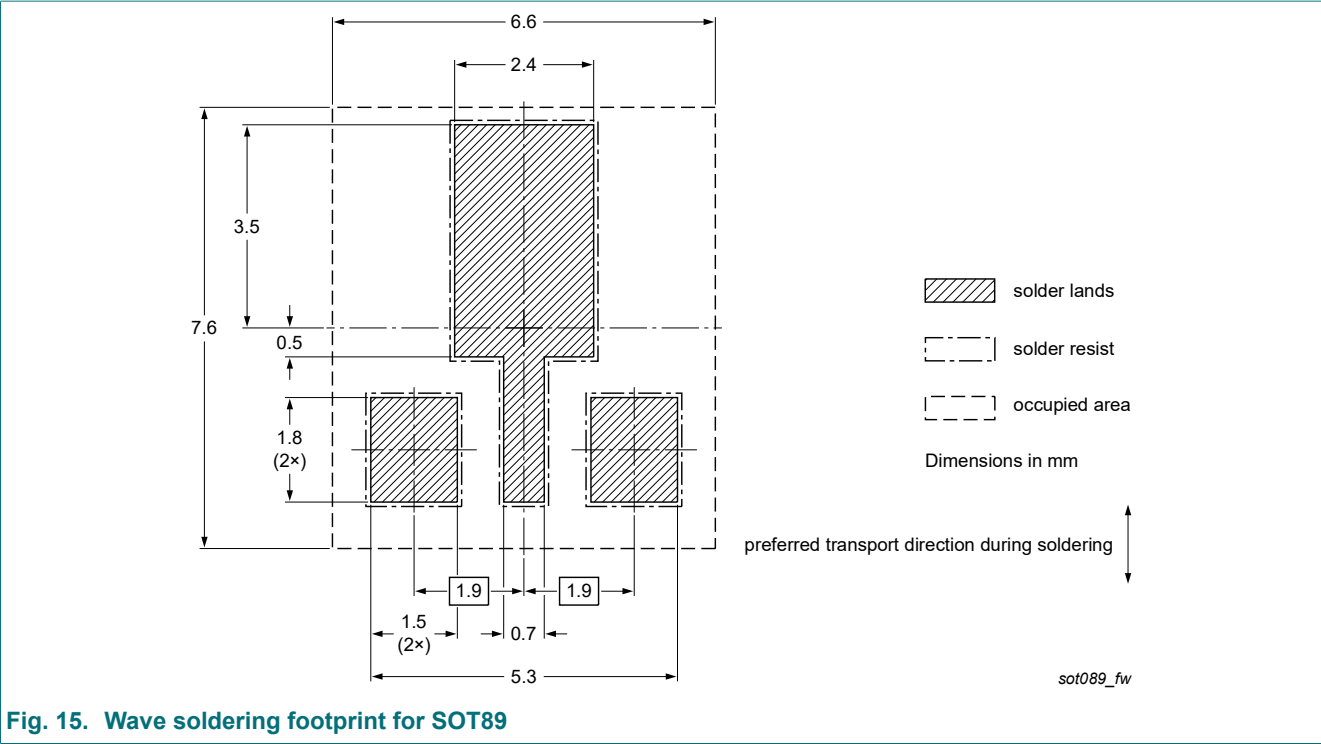


Fig. 15. Wave soldering footprint for SOT89

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS4480X v.3	20240605	Product data sheet	-	PBSS4480X 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>Section "Packing information" removed.</li></ul>			
PBSS4480X v.2	20041025	Product data sheet	-	PBSS4480X v.1
PBSS4480X v.1	20040805	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.

- [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".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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Contents

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information.....2

6. Ordering information.....2

7. Marking.....2

8. Limiting values..... 3

9. Thermal characteristics..... 4

10. Characteristics..... 6

11. Test information..... 9

12. Package outline..... 9

13. Soldering..... 9

14. Revision history..... 11

15. Legal information.....12

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