



PBSS4540X

40 V, 5 A NPN low V_{CEsat} transistor

1 October 2025

Product data sheet

1. General description

NPN low V_{CEsat} transistor in a SOT89 (SC-62/TO-243) small and flat lead Surface-Mounted Device (SMD) plastic package.

PNP complement: PBSS5540X

2. Features and benefits

- High h_{FE} and low V_{CEsat} at high current operation
- High collector current capability: I_C maximum 4 A
- High efficiency leading to less heat generation

3. Applications

- Medium power peripheral drivers (e.g. fan and 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

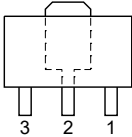
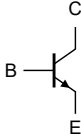
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	40	V
I_C	collector current		-	-	4	A
I_{CM}	peak collector current	single pulse; $t_p \leq 10$ ms	-	-	10	A
R_{CEsat}	collector-emitter saturation resistance	$I_C = 5$ A; $I_B = 500$ mA; pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_{amb} = 25$ °C	-	40	71	m Ω

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
PBSS4540X	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[1]
PBSS4540X	%1B

[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		-	40	V
V _{CEO}	collector-emitter voltage	open base		-	40	V
V _{EBO}	emitter-base voltage	open collector		-	6	V
I _C	collector current			-	4	A
I _{CRM}	repetitive peak collector current	δ ≤ 0.02; t _p ≤ 10 ms	[1]	-	5	A
I _{CM}	peak collector current	single pulse; t _p ≤ 10 ms		-	10	A
I _B	base current			-	1	A
I _{BM}	peak base current	single pulse; t _p ≤ 1 ms		-	2	A
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1] [2]	-	2.5	W
			[1]	-	0.55	W
			[3]	-	1	W
			[4]	-	1.4	W
			[5]	-	1.6	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] Operated under pulsed conditions; t_p ≤ 10 ms; δ ≤ 0.2.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².
- [5] Device mounted on a 7 cm² ceramic PCB, 1 cm² single-sided copper and tin-plated.

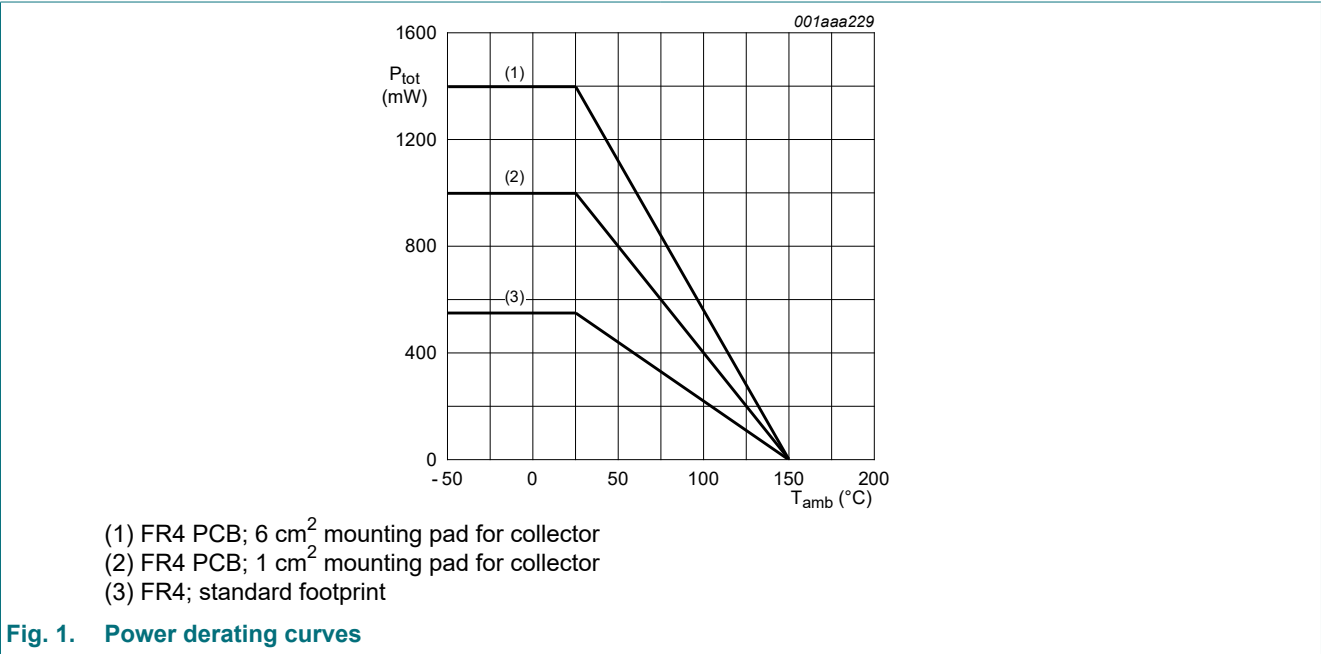


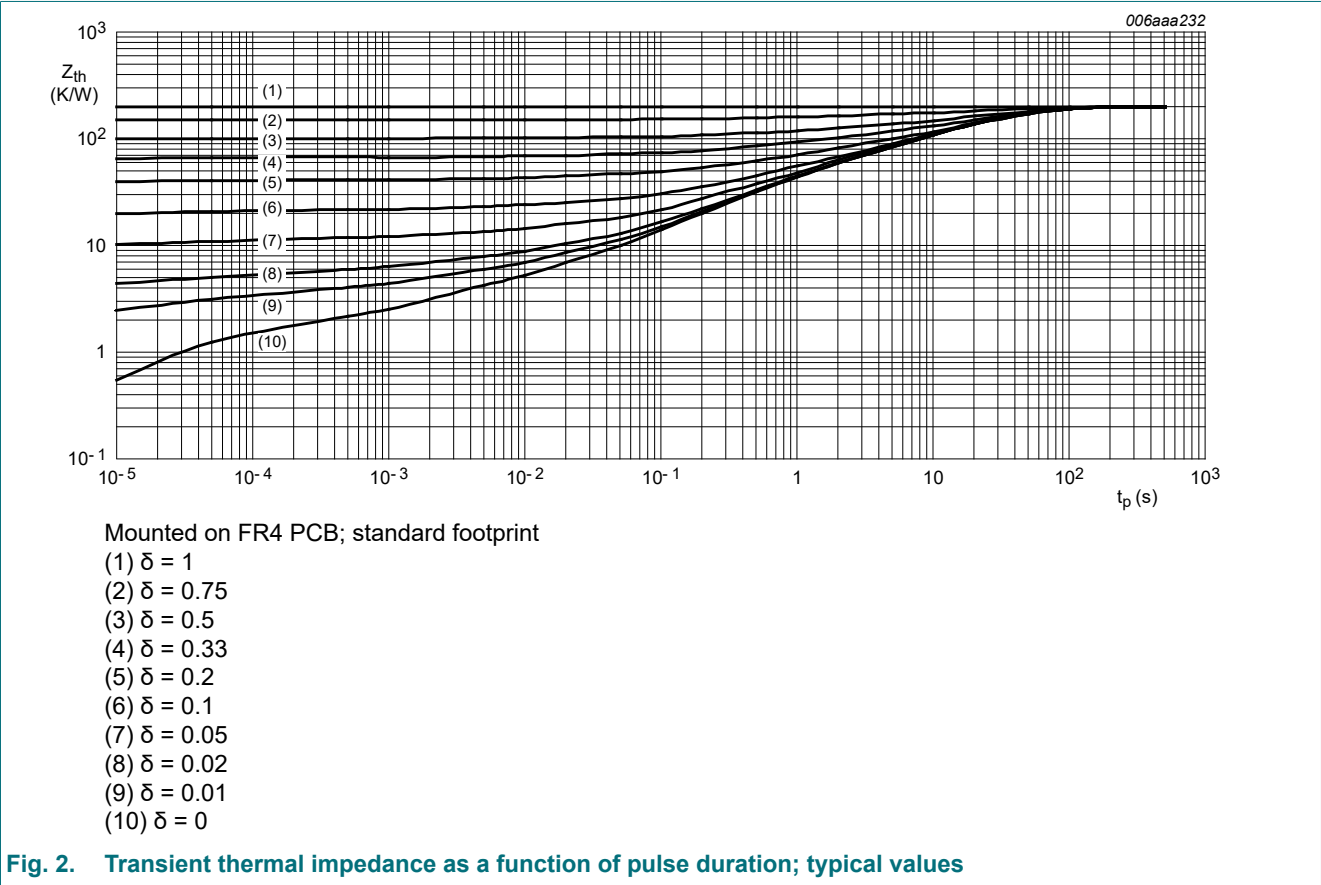
Fig. 1. Power derating curves

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 ≤ 10 ms; δ ≤ 0.2.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².
- [4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².
- [5] Device mounted on a 7 cm² ceramic PCB, 1 cm² single-sided copper and tin-plated.



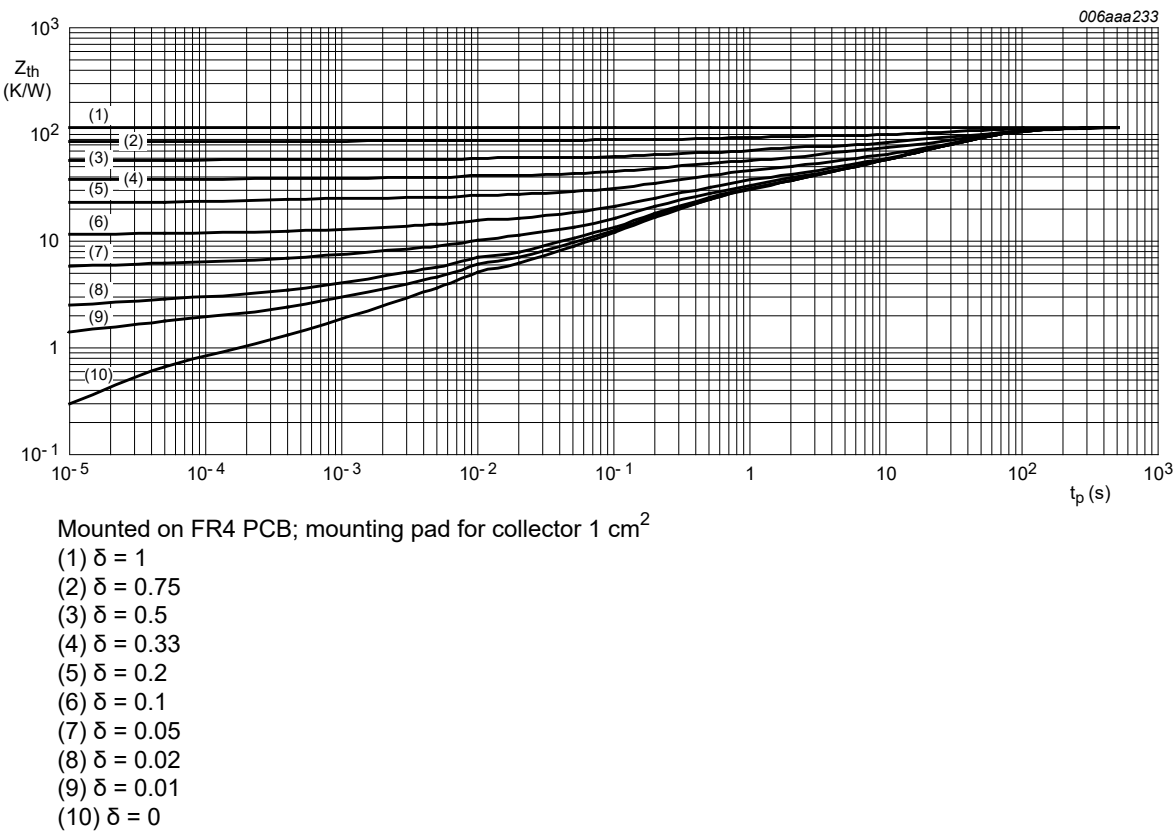


Fig. 3. Transient thermal impedance as a function of pulse duration; typical values

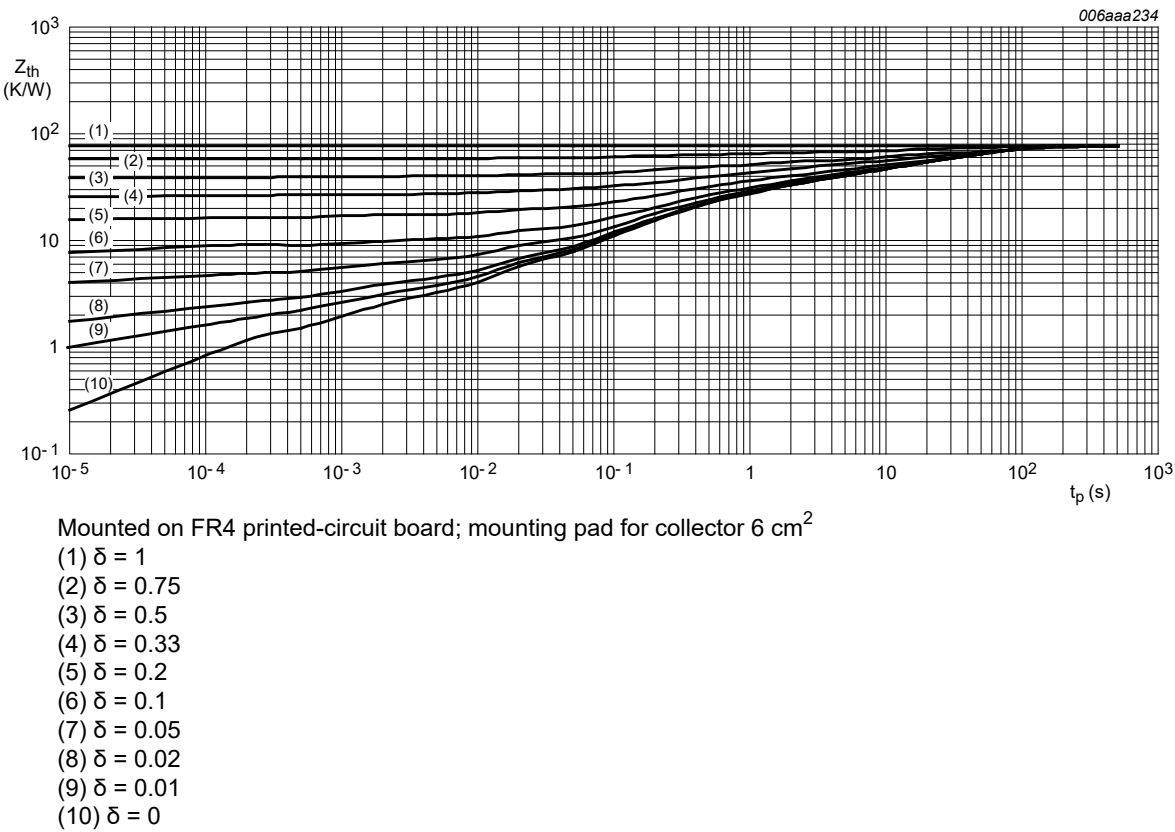


Fig. 4. Transient thermal impedance as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I _{CBO}	collector-base cut-off current	V _{CB} = 30 V; I _E = 0 A; T _{amb} = 25 °C		-	-	100	nA
		V _{CB} = 30 V; I _E = 0 A; T _j = 150 °C		-	-	50	µA
I _{CES}	collector-emitter cut-off current	V _{CE} = 30 V; V _{BE} = 0 V; T _{amb} = 25 °C		-	-	100	nA
I _{EBO}	emitter-base cut-off current	V _{EB} = 5 V; I _C = 0 A; T _{amb} = 25 °C		-	-	100	nA
h _{FE}	DC current gain	V _{CE} = 2 V; I _C = 0.5 A; T _{amb} = 25 °C		300	-	-	
		V _{CE} = 2 V; I _C = 1 A; pulsed; t _p ≤ 300 µs; δ ≤ 0.02; T _{amb} = 25 °C		300	-	-	
		V _{CE} = 2 V; I _C = 2 A; pulsed; t _p ≤ 300 µs; δ ≤ 0.02; T _{amb} = 25 °C		250	-	-	
		V _{CE} = 2 V; I _C = 5 A; pulsed; t _p ≤ 300 µs; δ ≤ 0.02; T _{amb} = 25 °C		100	-	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = 0.5 A; I _B = 5 mA; T _{amb} = 25 °C		-	-	90	mV
		I _C = 1 A; I _B = 10 mA; T _{amb} = 25 °C		-	-	120	mV
		I _C = 2 A; I _B = 200 mA; pulsed; t _p ≤ 300 µs; δ ≤ 0.02; T _{amb} = 25 °C		-	-	150	mV
		I _C = 4 A; I _B = 200 mA; pulsed; t _p ≤ 300 µs; δ ≤ 0.02; T _{amb} = 25 °C		-	-	290	mV
		I _C = 5 A; I _B = 500 mA; pulsed; t _p ≤ 300 µs; δ ≤ 0.02; T _{amb} = 25 °C		-	-	355	mV
R _{CEsat}	collector-emitter saturation resistance			-	40	71	mΩ
V _{BEsat}	base-emitter saturation voltage	I _C = 4 A; I _B = 200 mA; pulsed; t _p ≤ 300 µs; δ ≤ 0.02; T _{amb} = 25 °C		-	-	1.1	V
		I _C = 5 A; I _B = 500 mA; pulsed; t _p ≤ 300 µs; δ ≤ 0.02; T _{amb} = 25 °C		-	-	1.2	V
V _{BEon}	base-emitter turn-on voltage	V _{CE} = 2 V; I _C = 2 A; pulsed; t _p ≤ 300 µs; δ ≤ 0.02; T _{amb} = 25 °C		-	-	1.1	V
f _T	transition frequency	V _{CE} = 10 V; I _C = 0.1 A; f = 100 MHz; T _{amb} = 25 °C		70	-	-	MHz
C _c	collector capacitance	V _{CB} = 10 V; I _E = 0 A; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C		-	-	75	pF

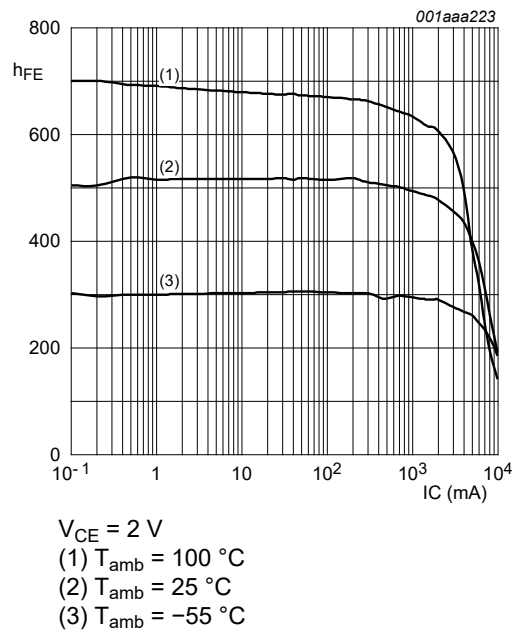


Fig. 5. DC current gain as a function of collector current; typical values

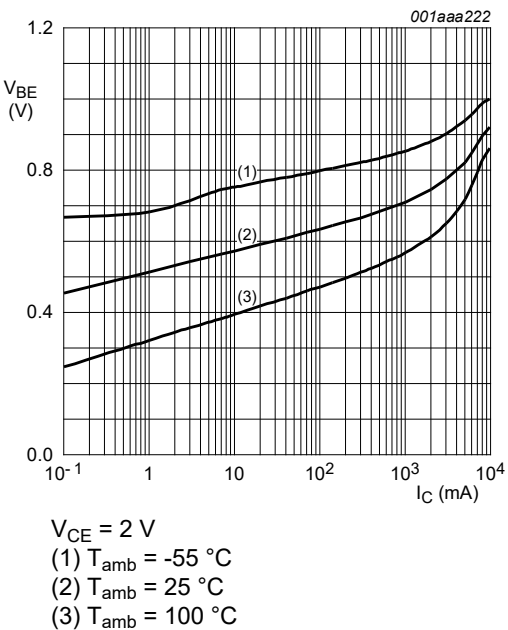


Fig. 6. Base-emitter voltage as a function of collector current; typical values

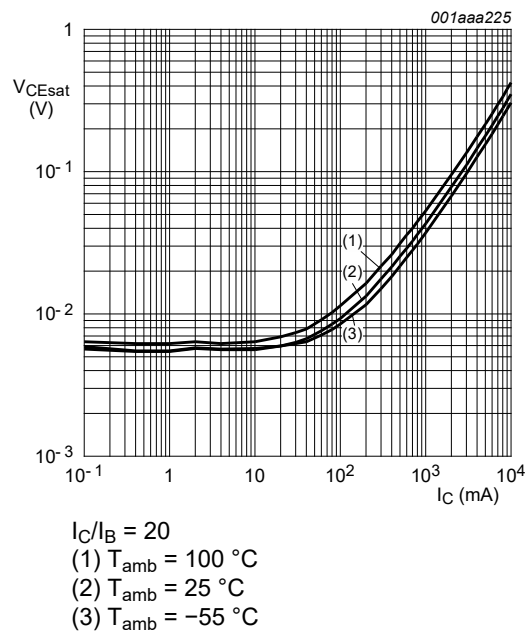


Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values

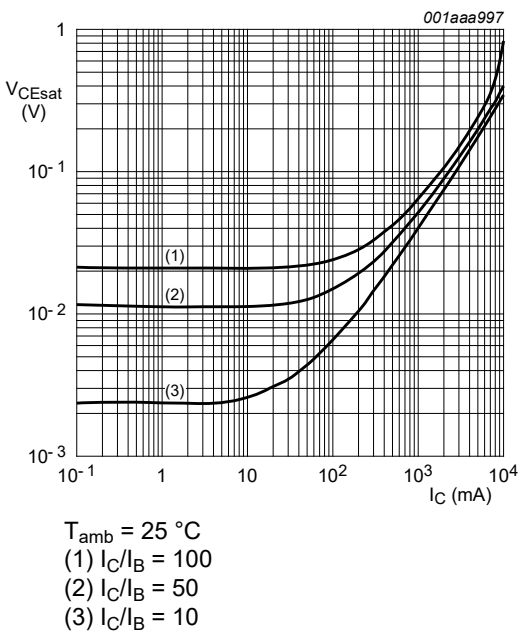


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

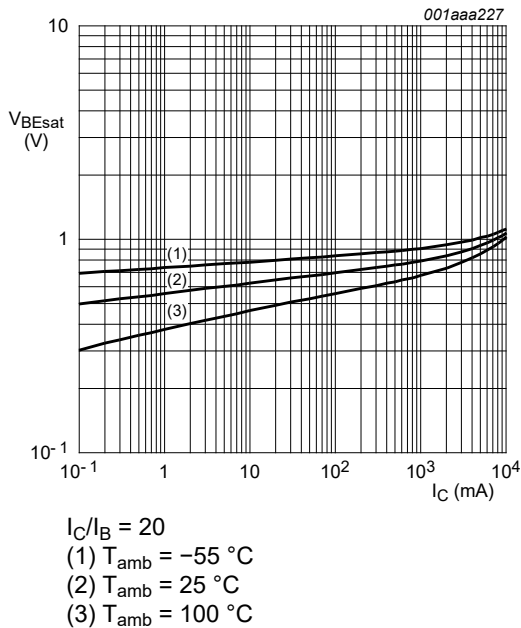


Fig. 9. Base-emitter saturation voltage as a function of collector current; typical values

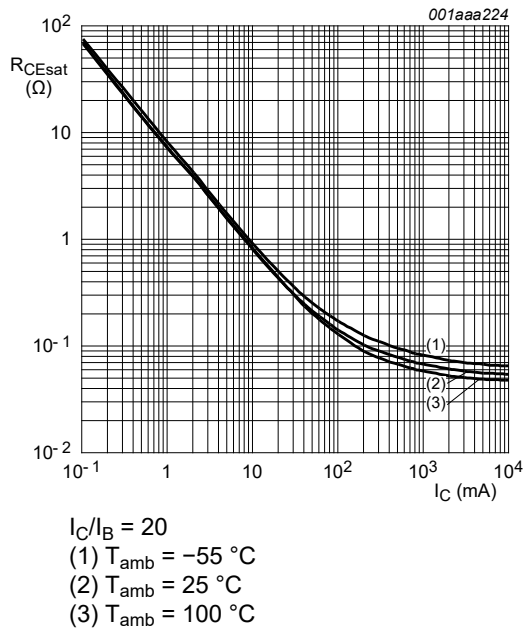


Fig. 10. Equivalent on-resistance as a function of collector current; typical values

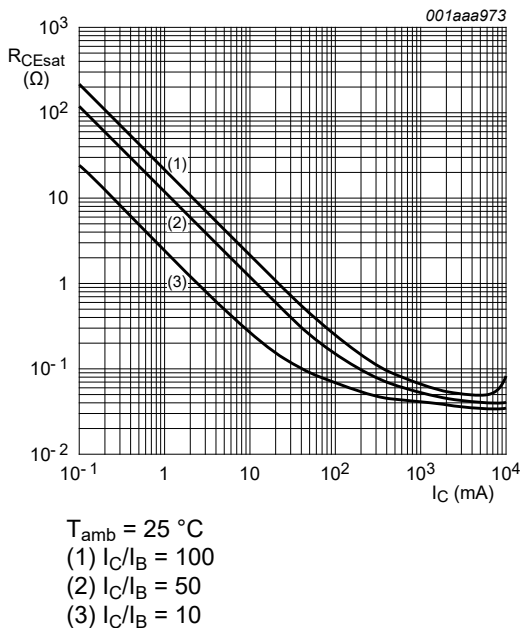


Fig. 11. Equivalent on-resistance as a function of collector current; typical values

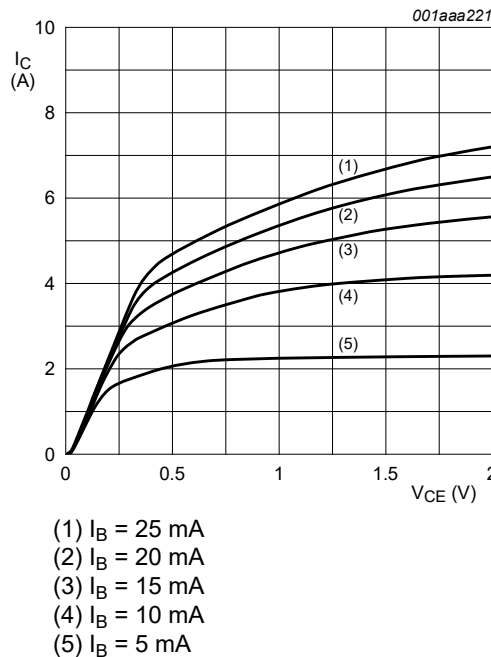


Fig. 12. Collector current as a function of collector-emitter voltage; typical values

11. Soldering

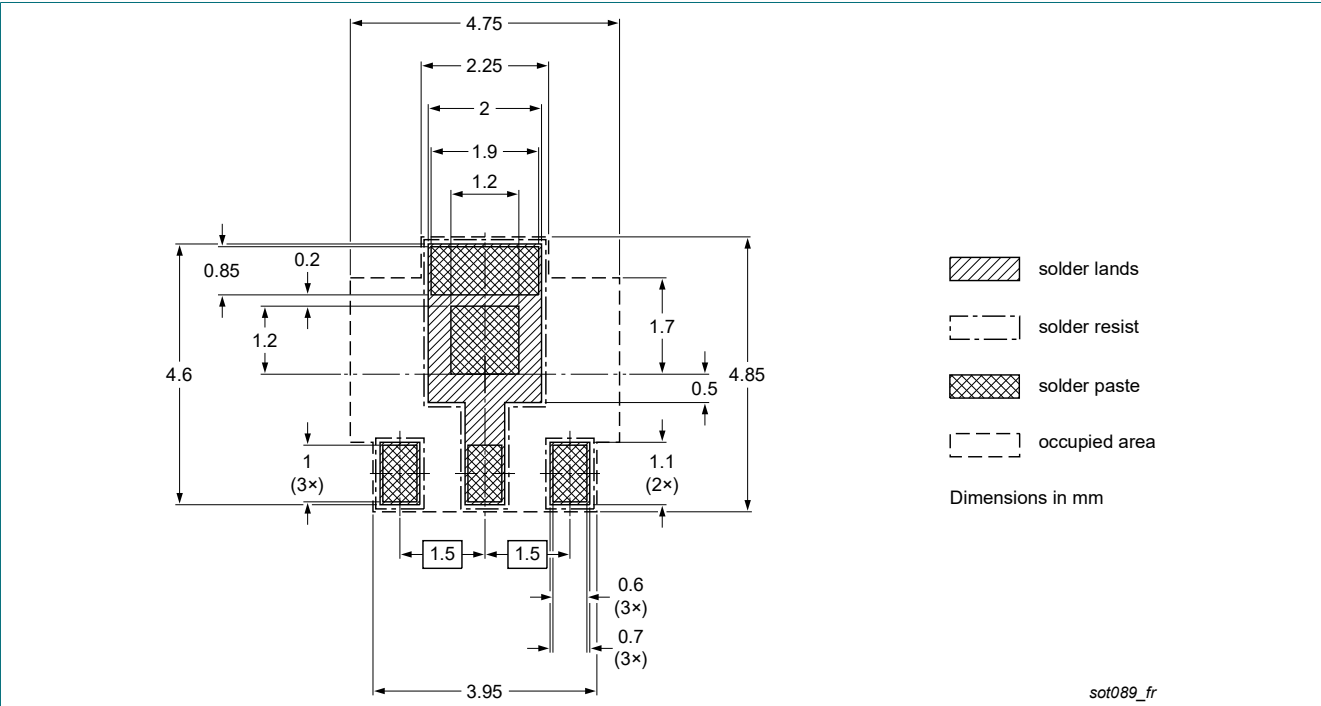


Fig. 13. Reflow soldering footprint for SOT89

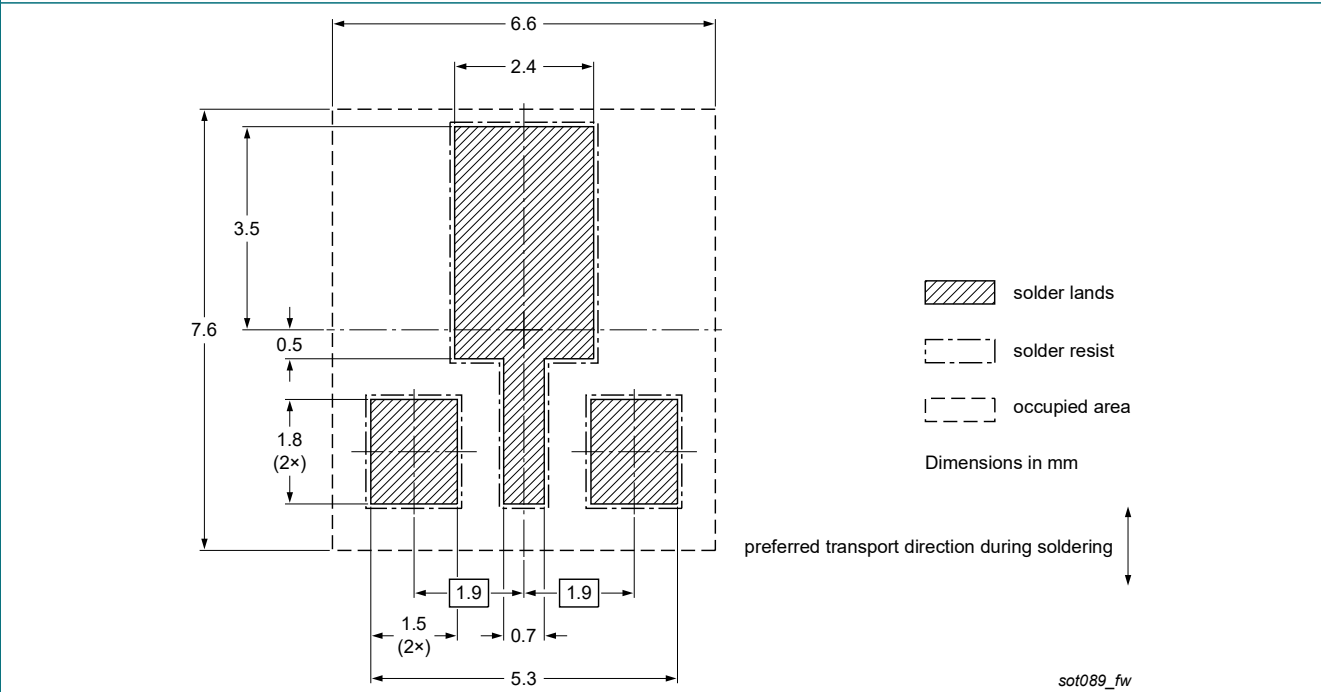


Fig. 14. Wave soldering footprint for SOT89

12. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS4540X v.4	20251001	Product data sheet	-	PBSS4540X v.3
Modifications:	<ul style="list-style-type: none">Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
PBSS4540X v.3	20200415	Product data sheet	-	PBSS4540X v.2
PBSS4540X v.2	20041104	Product data sheet	-	PBSS4540X v.1
PBSS4540X v.1	20040611	Product data sheet	-	-

13. 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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