



PBSS5320T

20 V, 3 A PNP low V_{CEsat} transistor

1 January 2023

Product data sheet

1. General description

PNP low V_{CEsat} transistor in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: PBSS4320T

2. Features and benefits

- Low collector-emitter saturation voltage V_{CEsat} and corresponding low R_{CEsat}
- High collector current capability
- High collector current gain
- Improved efficiency due to reduced heat generation

3. Applications

- Power management applications
- Low and medium power DC/DC convertors
- Supply line switching
- Battery chargers
- Linear voltage regulation with low voltage drop-out (LDO)

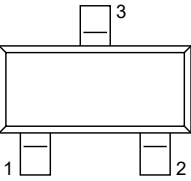
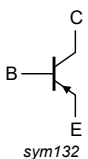
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CEO}	collector-emitter voltage	open base	-	-	-20	V
I _C	collector current		-	-	-2	A
I _{CRM}	repetitive peak collector current	$\delta \leq 0.25$; Operated under pulsed conditions; $t_p \leq 100$ ms	-	-	-3	A
R _{CEsat}	collector-emitter saturation resistance	I _C = -2 A; I _B = -200 mA; pulsed; $t_p \leq 300$ μ s; $\delta \leq 0.02$; T _{amb} = 25 °C	-	75	105	m Ω

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 <p style="text-align: center;">SOT23</p>	
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS5320T	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PBSS5320T	ZH%

[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		-	-20	V
V_{CEO}	collector-emitter voltage	open base		-	-20	V
V_{EBO}	emitter-base voltage	open collector		-	-5	V
I_C	collector current			-	-2	A
I_{CRM}	repetitive peak collector current	$\delta \leq 0.25$; Operated under pulsed conditions; $t_p \leq 100$ ms		-	-3	A
I_{CM}	peak collector current	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]	-	300	mW
			[2]	-	480	mW
			[3]	-	540	mW
			[1] [4]	-	1.2	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 cm².

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

[4] Operated under pulsed conditions: pulse width $t_p \leq 100$ ms; duty cycle $\delta \leq 0.25$.

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]	-	-	417	K/W
			[2]	-	-	260	K/W
			[3]	-	-	230	K/W
			[1] [4]	-	-	104	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 cm².

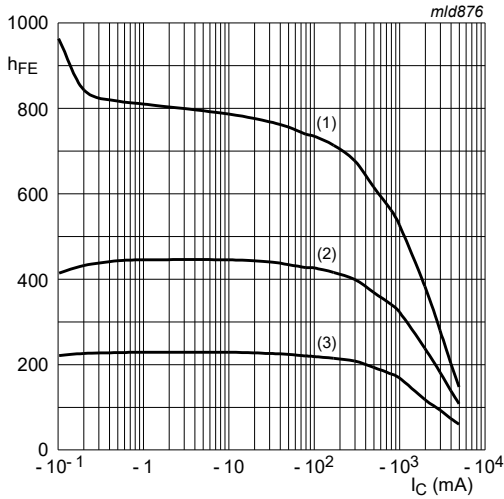
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

[4] Operated under pulsed conditions: pulse width $t_p \leq 100$ ms; duty cycle $\delta \leq 0.25$.

10. Characteristics

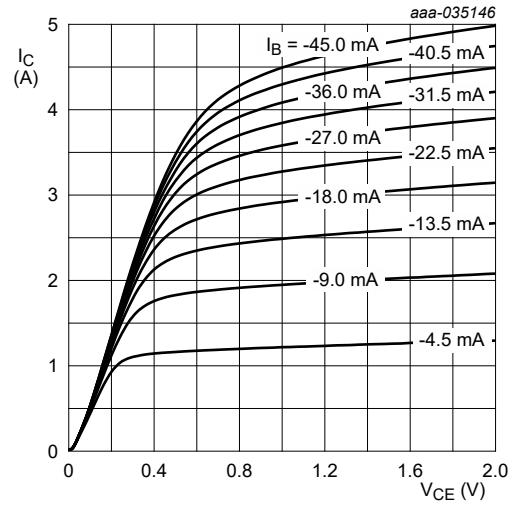
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -20\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	-100	nA
		$V_{CB} = -20\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^\circ\text{C}$	-	-	-50	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -2\text{ V}; I_C = -100\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	220	-	-	
		$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	220	-	-	
		$V_{CE} = -2\text{ V}; I_C = -1\text{ A}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$	200	-	-	
		$V_{CE} = -2\text{ V}; I_C = -2\text{ A}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$	150	-	-	
		$V_{CE} = -2\text{ V}; I_C = -3\text{ A}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$	100	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -500\text{ mA}; I_B = -50\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	-70	mV
		$I_C = -1\text{ A}; I_B = -50\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	-130	mV
		$I_C = -2\text{ A}; I_B = -100\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	-230	mV
		$I_C = -2\text{ A}; I_B = -200\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	-210	mV
		$I_C = -3\text{ A}; I_B = -300\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	-300	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = -2\text{ A}; I_B = -200\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$	-	75	105	m Ω
V_{BEsat}	base-emitter saturation voltage	$I_C = -2\text{ A}; I_B = -100\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	-1.1	V
		$I_C = -3\text{ A}; I_B = -300\text{ mA}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	-1.2	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = -2\text{ V}; I_C = -1\text{ A}; \text{pulsed}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^\circ\text{C}$	-1.2	-	-	V
f_T	transition frequency	$V_{CE} = -5\text{ V}; I_C = -100\text{ mA}; f = 100\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$	100	-	-	MHz
C_c	collector capacitance	$V_{CB} = -10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$	-	-	50	pF



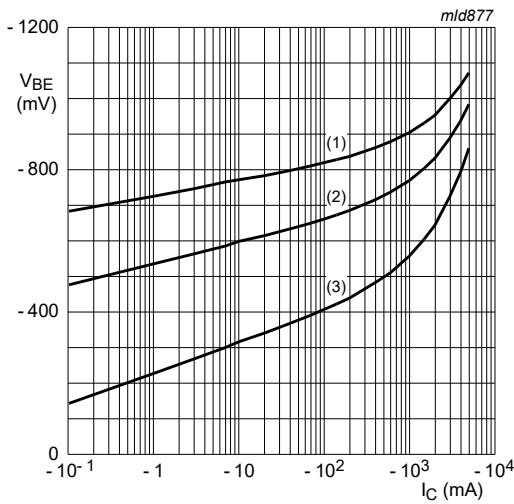
$V_{CE} = -2\text{ V}$
 (1) $T_{amb} = 150^\circ\text{C}$
 (2) $T_{amb} = 25^\circ\text{C}$
 (3) $T_{amb} = -55^\circ\text{C}$

Fig. 1. DC current gain as a function of collector current; typical values



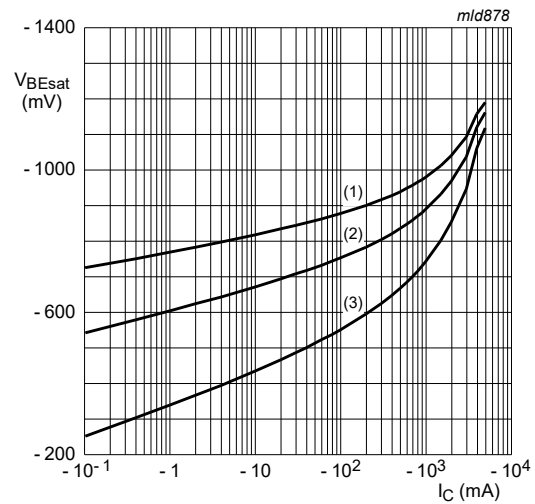
$T_{amb} = 25^\circ\text{C}$

Fig. 2. Collector current as a function of collector-emitter voltage; typical values



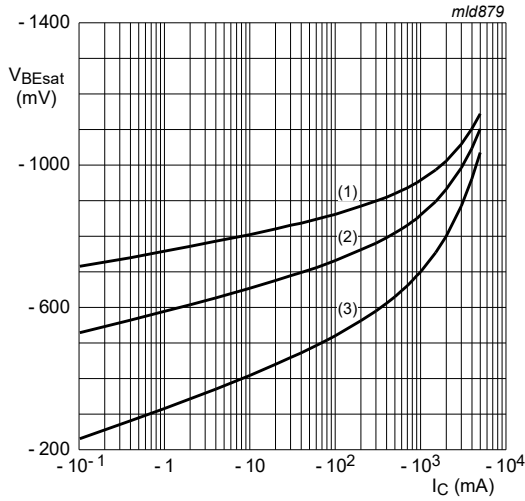
$V_{CE} = -2\text{ V}$
 (1) $T_{amb} = -55^\circ\text{C}$
 (2) $T_{amb} = 25^\circ\text{C}$
 (3) $T_{amb} = 150^\circ\text{C}$

Fig. 3. Base-emitter voltage as a function of collector current; typical values



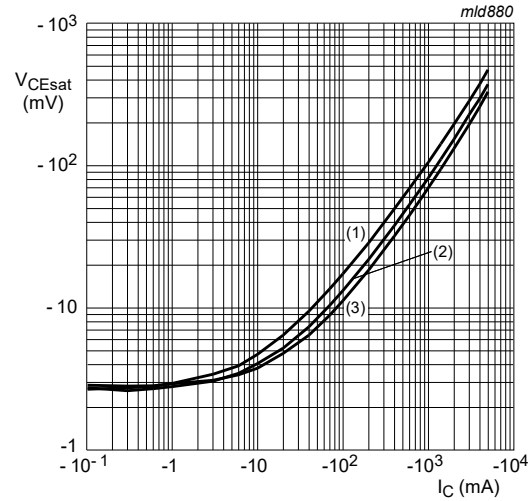
$I_C/I_B = 10$
 (1) $T_{amb} = -55^\circ\text{C}$
 (2) $T_{amb} = 25^\circ\text{C}$
 (3) $T_{amb} = 150^\circ\text{C}$

Fig. 4. Base-emitter saturation voltage as a function of collector current; typical values



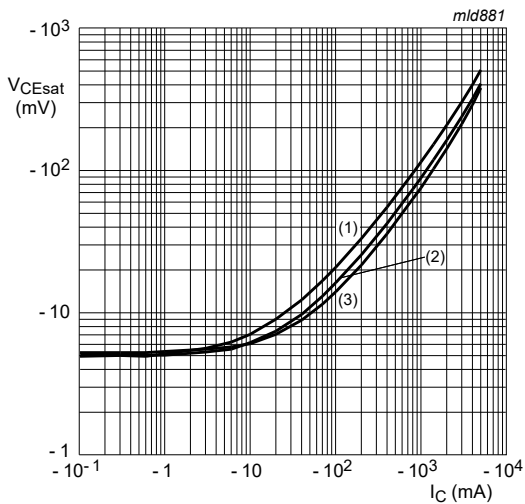
$I_C/I_B = 20$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig. 5. Base-emitter saturation voltage as a function of collector current; typical values



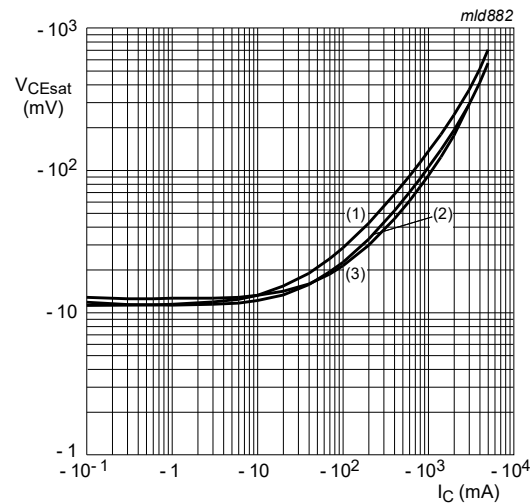
$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



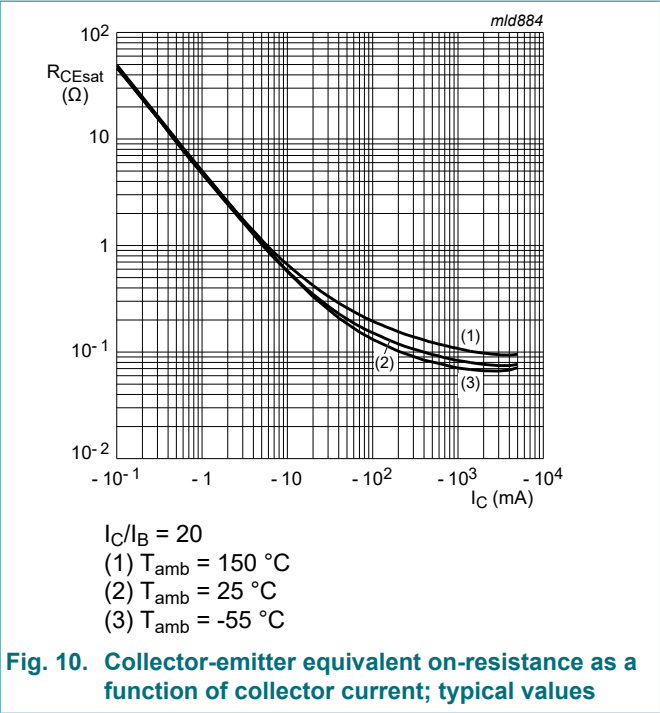
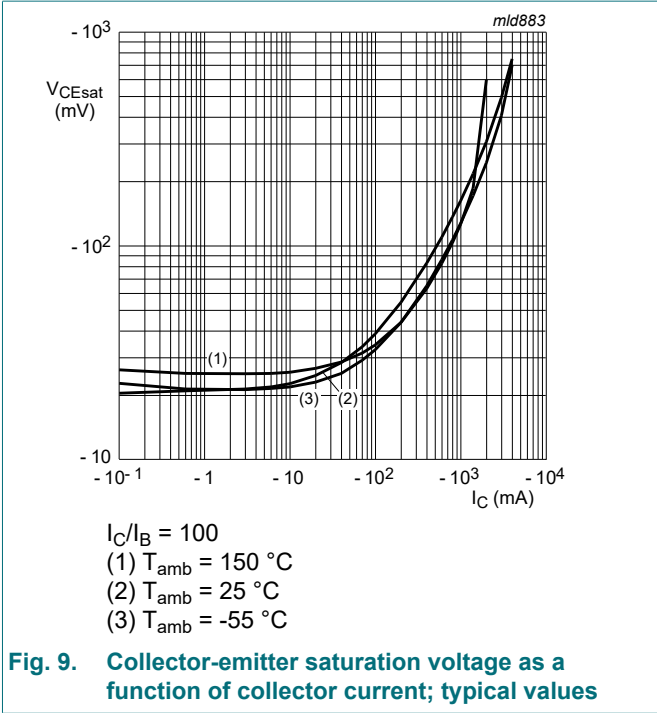
$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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

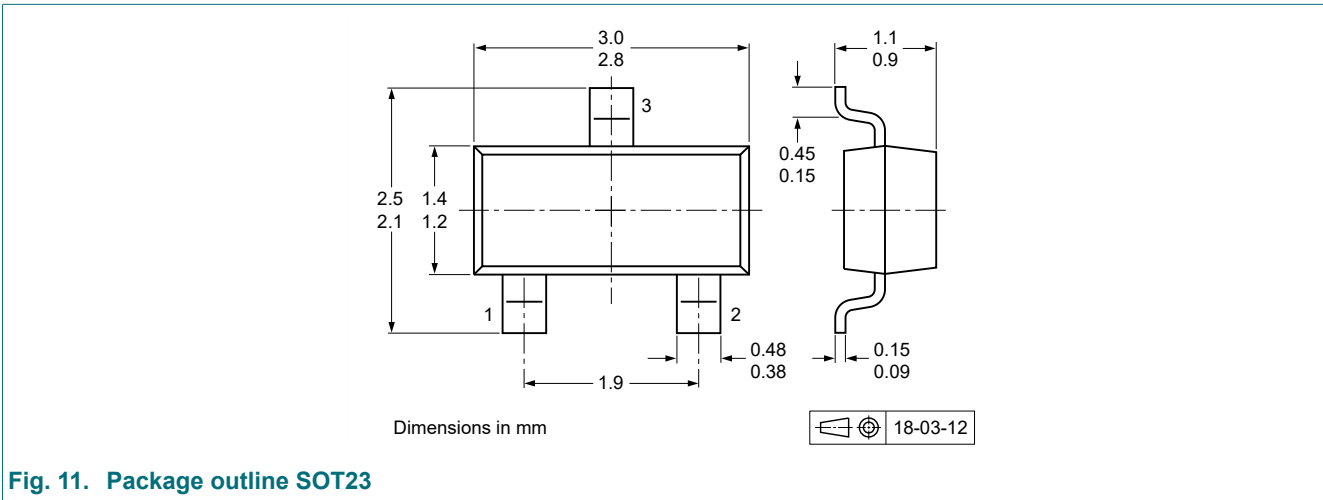


$I_C/I_B = 50$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



11. Package outline



12. Soldering

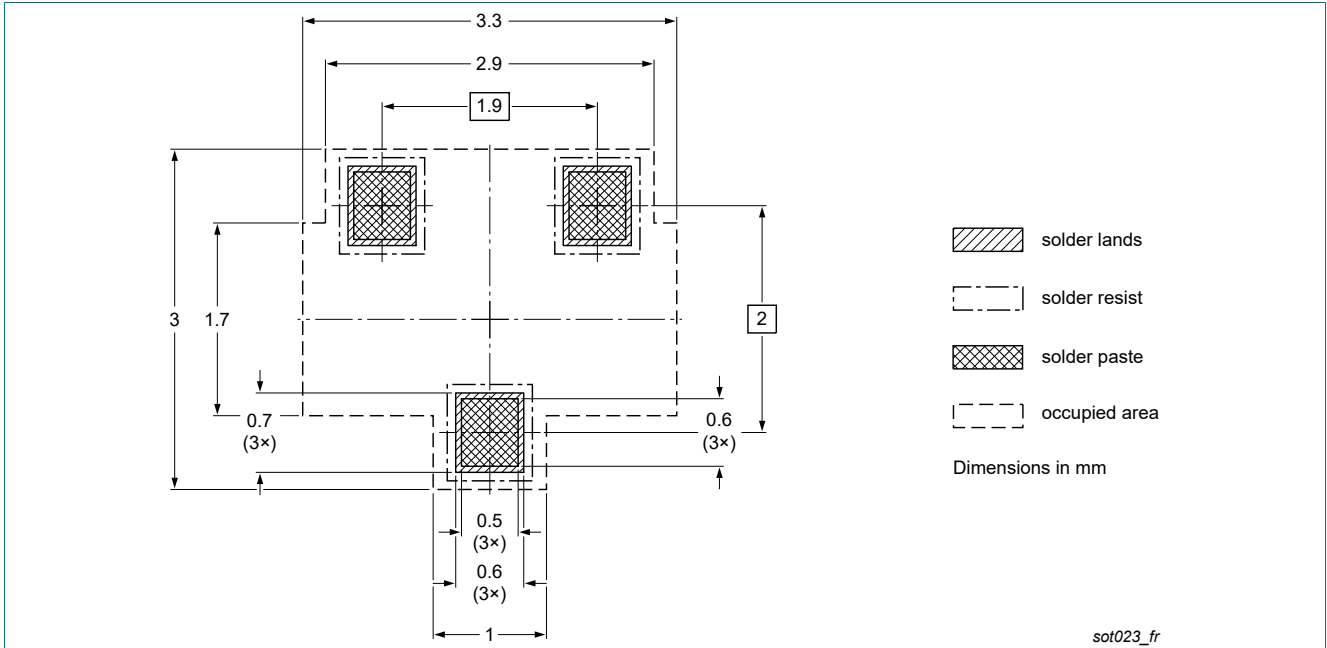


Fig. 12. Reflow soldering footprint for SOT23

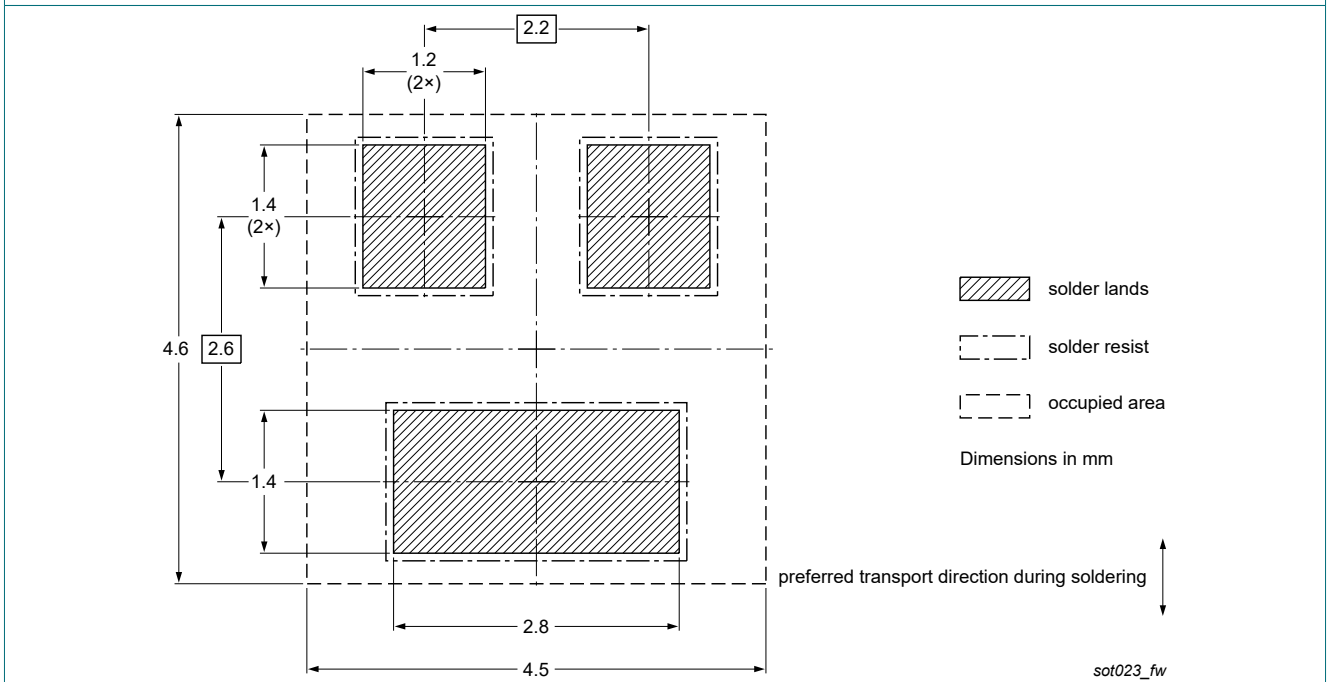


Fig. 13. Wave soldering footprint for SOT23

13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5320T v.4	20230101	Product data sheet	-	PBSS5320T v.3
Modifications:	<ul style="list-style-type: none">Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).Characteristics: Figure 2 added			
PBSS5320T v.3	20220505	Product data sheet	-	PBSS5320T v.2
PBSS5320T v.2	20040115			PBSS5320T v.1
PBSS5320T v.1	20020808	Product data sheet	-	-

14. 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.....	3
10. Characteristics.....	4
11. Package outline.....	7
12. Soldering.....	8
13. Revision history.....	9
14. Legal information.....	10

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