



# PBSS9110T-Q

100 V, 1 A PNP low V<sub>CEsat</sub> transistor

19 May 2022

Product data sheet

## 1. General description

PNP low V<sub>CEsat</sub> transistor in a SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: PBSS8110T

## 2. Features and benefits

- Low collector-emitter saturation voltage V<sub>CEsat</sub> and corresponding low R<sub>CEsat</sub>
- High collector current capability
- High collector current gain
- Improved efficiency due to reduced heat generation
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- Major application segments
  - Automotive 42 V power
  - Telecom infrastructure
  - Industrial
- DC/DC converters
- Peripheral drivers
  - Driver in low supply voltage applications (e.g. lamps and LEDs)
  - Inductive load driver (e.g. relays, buzzers and motors)

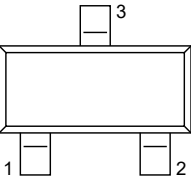
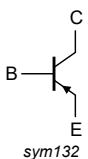
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base	-	-	-100	V
I <sub>C</sub>	collector current		-	-	-1	A
I <sub>CM</sub>	peak collector current	limited by T <sub>j(max)</sub>	-	-	-3	A
R <sub>CEsat</sub>	collector-emitter saturation resistance	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	-	170	320	mΩ

## 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
PBSS9110T-Q	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 <sup>[1]</sup>
PBSS9110T-Q	%U7

[1] % = placeholder for manufacturing site code

## 8. Limiting values

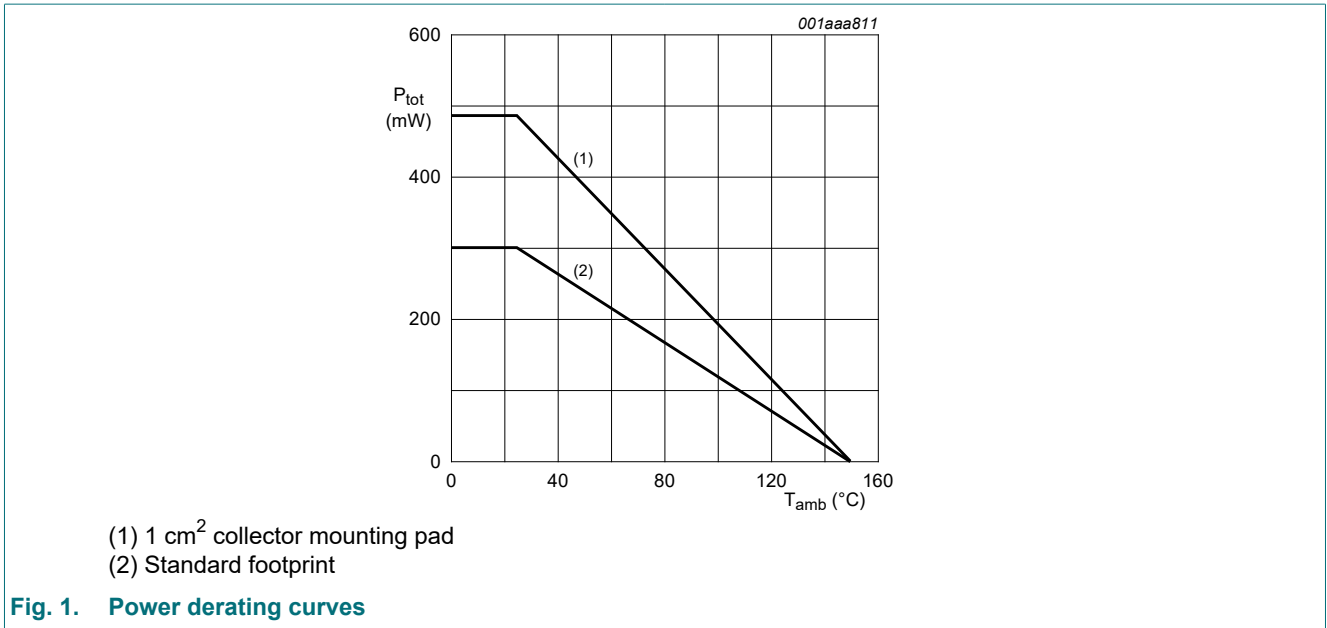
Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter		-	-120	V
$V_{CEO}$	collector-emitter voltage	open base		-	-100	V
$V_{EBO}$	emitter-base voltage	open collector		-	-5	V
$I_C$	collector current			-	-1	A
$I_{CM}$	peak collector current	limited by $T_{j(max)}$		-	-3	A
$I_B$	base current			-	-300	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	-	300	mW
			[2]	-	480	mW
$T_j$	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>.



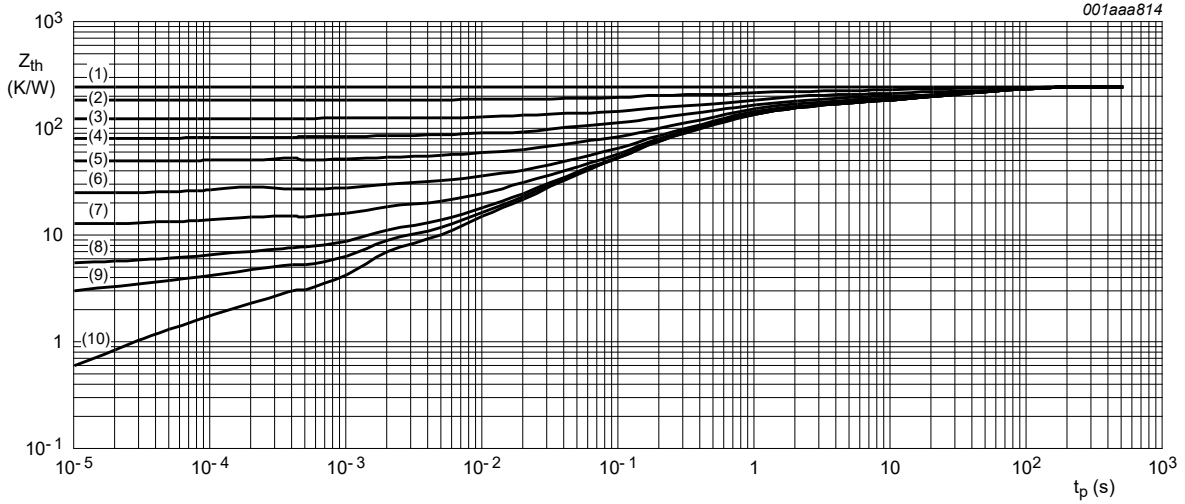
## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	-	417	K/W
			[2]	-	-	260	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

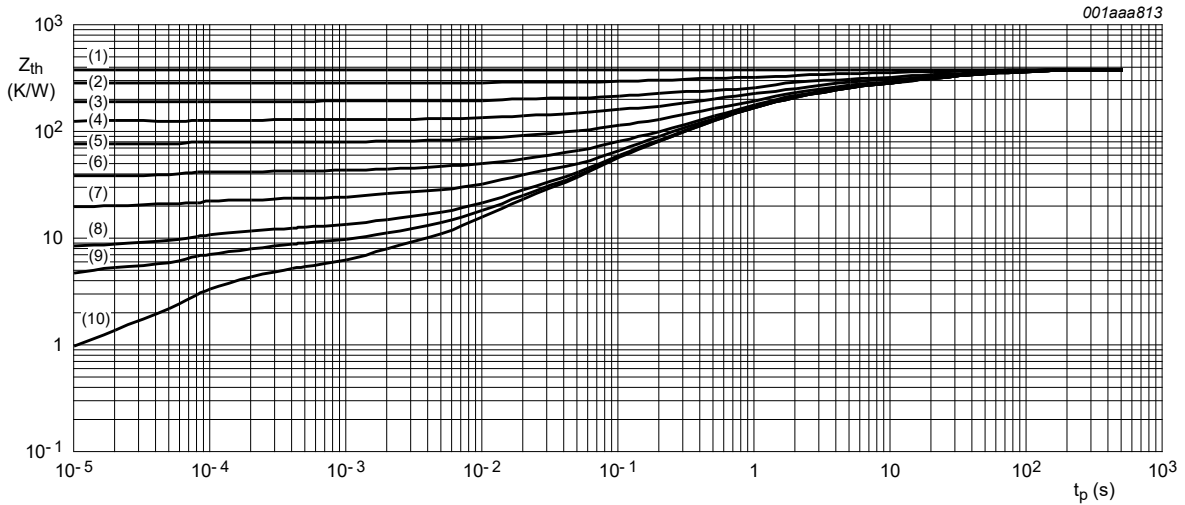
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.



Mounted on printed-circuit board; 1 cm<sup>2</sup> collector mounting pad

- (1)  $\delta = 1$
- (2)  $\delta = 0.75$
- (3)  $\delta = 0.5$
- (4)  $\delta = 0.33$
- (5)  $\delta = 0.2$
- (6)  $\delta = 0.1$
- (7)  $\delta = 0.05$
- (8)  $\delta = 0.02$
- (9)  $\delta = 0.01$
- (10)  $\delta = 0$

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



Mounted on printed-circuit board; standard footprint

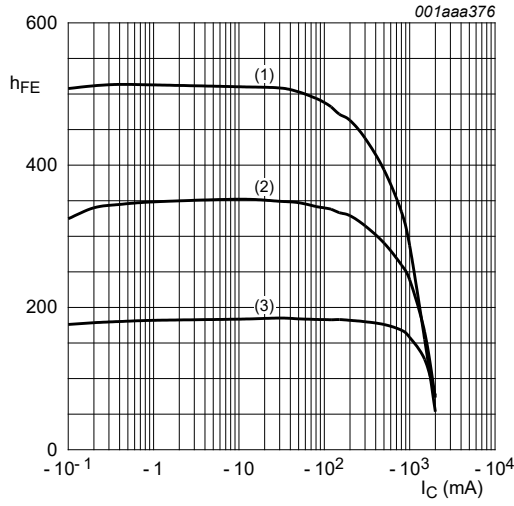
- (1)  $\delta = 1$
- (2)  $\delta = 0.75$
- (3)  $\delta = 0.5$
- (4)  $\delta = 0.33$
- (5)  $\delta = 0.2$
- (6)  $\delta = 0.1$
- (7)  $\delta = 0.05$
- (8)  $\delta = 0.02$
- (9)  $\delta = 0.01$
- (10)  $\delta = 0$

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

## 10. Characteristics

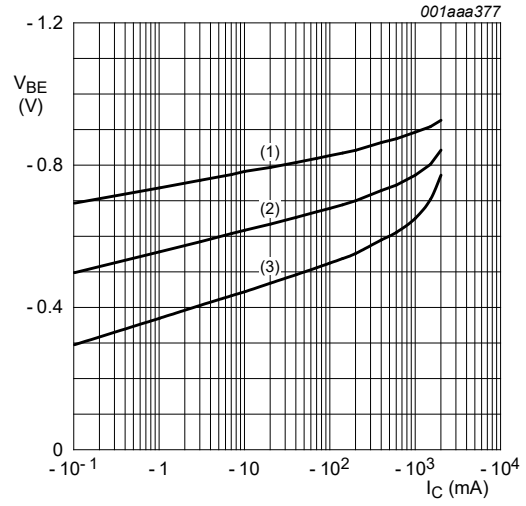
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100 \mu\text{A}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-120	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -10 \text{ mA}; I_B = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-100	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage (collector open)	$I_E = -100 \mu\text{A}; I_C = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-5	-	-	V
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -80 \text{ V}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA
		$V_{CB} = -80 \text{ V}; I_E = 0 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	-	-	-50	$\mu\text{A}$
$I_{CES}$	collector-emitter cut-off current	$V_{CE} = -80 \text{ V}; V_{BE} = 0 \text{ V}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -4 \text{ V}; I_C = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA
$h_{FE}$	DC current gain	$V_{CE} = -5 \text{ V}; I_C = -1 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	150	-	-	
		$V_{CE} = -5 \text{ V}; I_C = -250 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	150	-	-	
		$V_{CE} = -5 \text{ V}; I_C = -500 \text{ mA}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	150	-	450	
		$V_{CE} = -5 \text{ V}; I_C = -1 \text{ A}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	125	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -250 \text{ mA}; I_B = -25 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-120	mV
		$I_C = -500 \text{ mA}; I_B = -50 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-180	mV
		$I_C = -1 \text{ A}; I_B = -100 \text{ mA}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-320	mV
$R_{CEsat}$	collector-emitter saturation resistance	$I_C = -1 \text{ A}; I_B = -100 \text{ mA}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	170	320	m $\Omega$
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -1 \text{ A}; I_B = -100 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-1.1	V
$V_{BEon}$	base-emitter turn-on voltage	$V_{CE} = -5 \text{ V}; I_C = -1 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-1	V
$f_T$	transition frequency	$V_{CE} = -10 \text{ V}; I_C = -50 \text{ mA}; f = 100 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	100	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = -10 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	17	pF



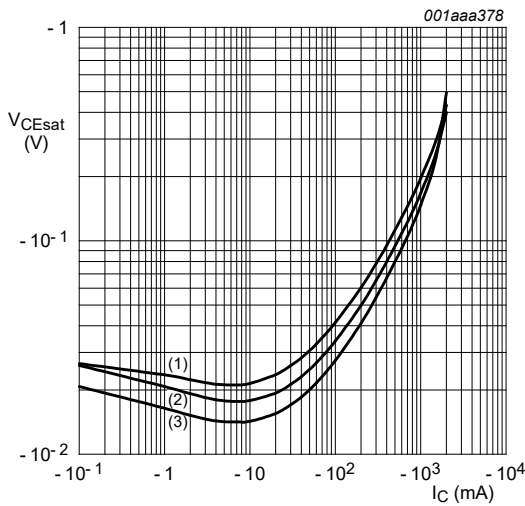
$V_{CE} = -10\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

**Fig. 4. DC current gain as a function of collector current; typical values**



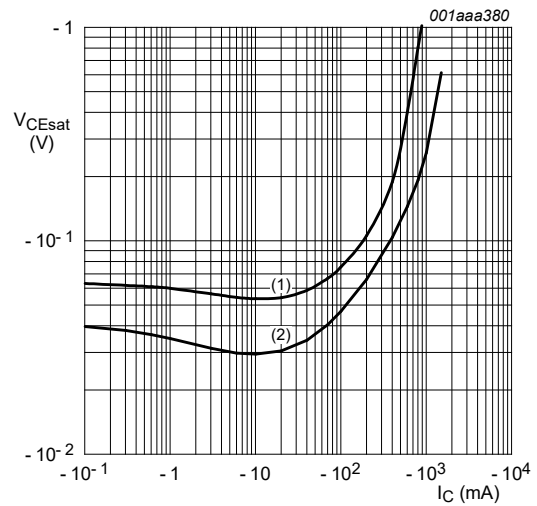
$V_{CE} = -10\text{ V}$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

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



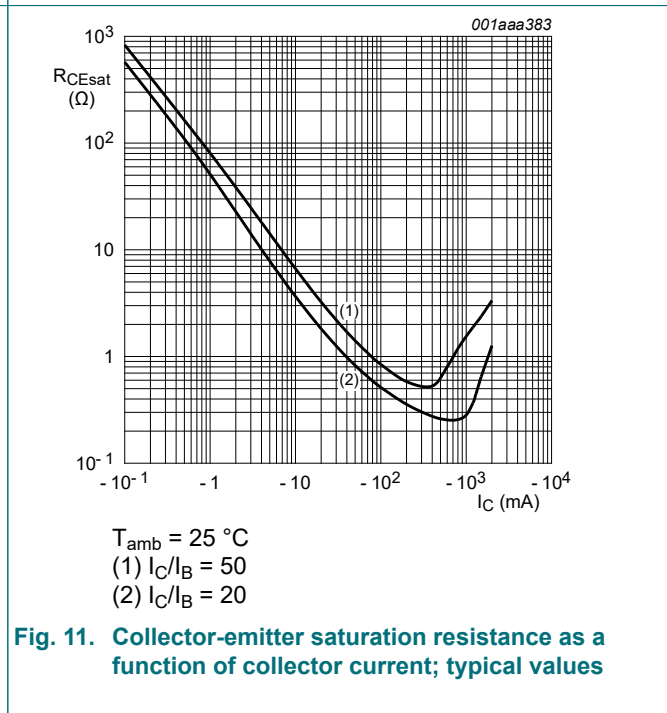
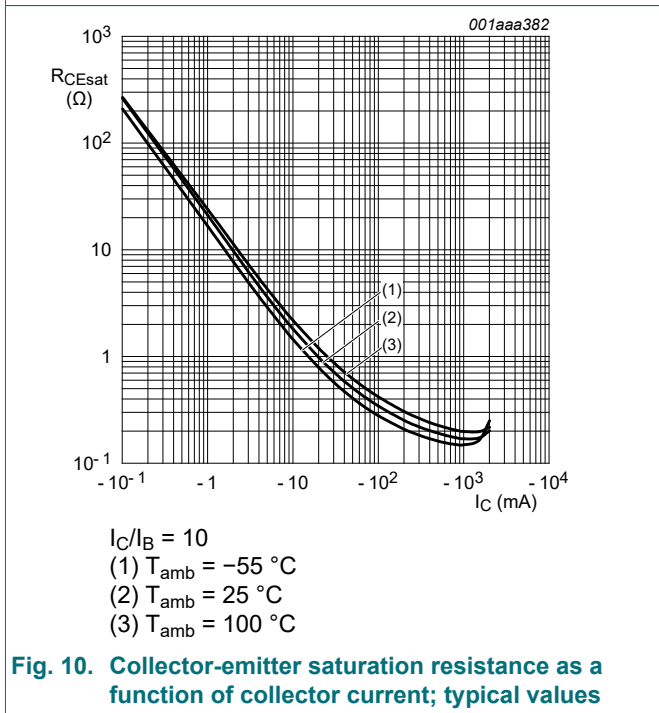
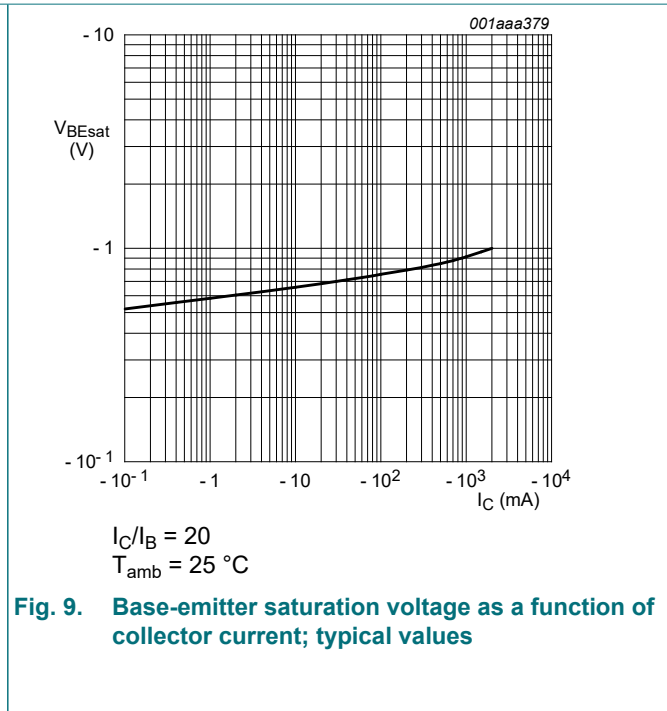
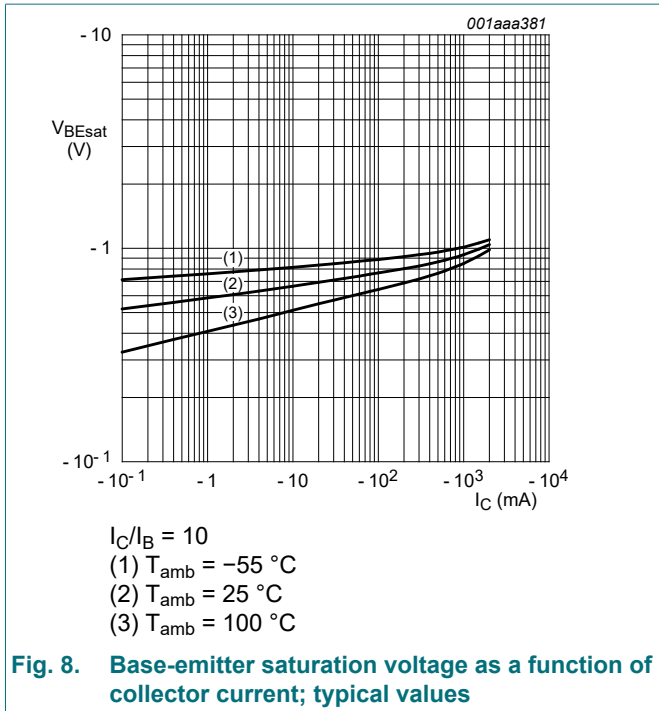
$I_C/I_B = 10$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



$T_{amb} = 25\text{ °C}$   
 (1)  $I_C/I_B = 50$   
 (2)  $I_C/I_B = 20$

**Fig. 7. Collector-emitter saturation 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

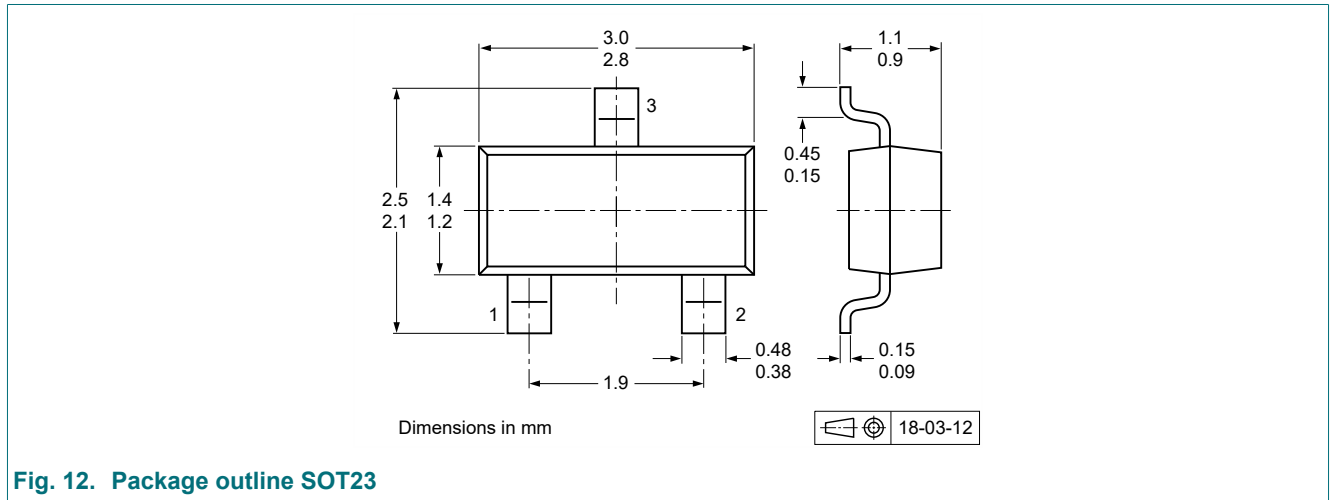


Fig. 12. Package outline SOT23

## 13. Soldering

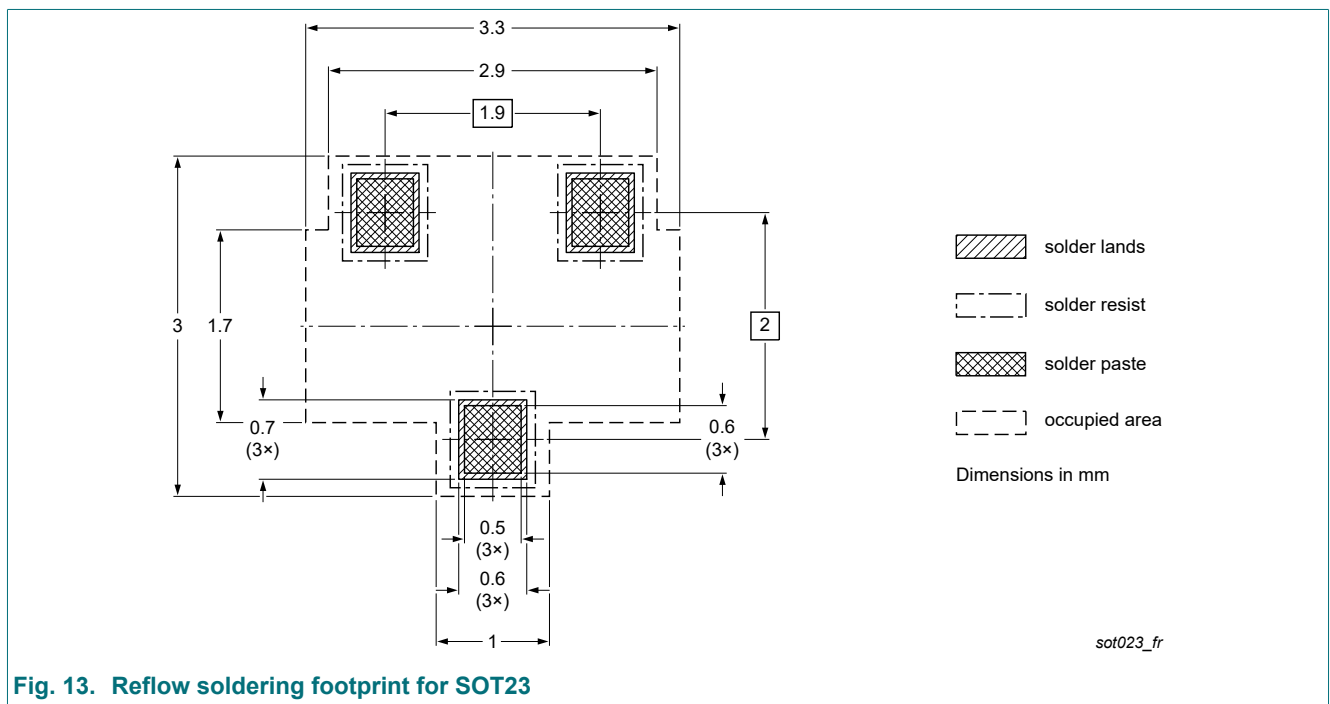


Fig. 13. Reflow soldering footprint for SOT23



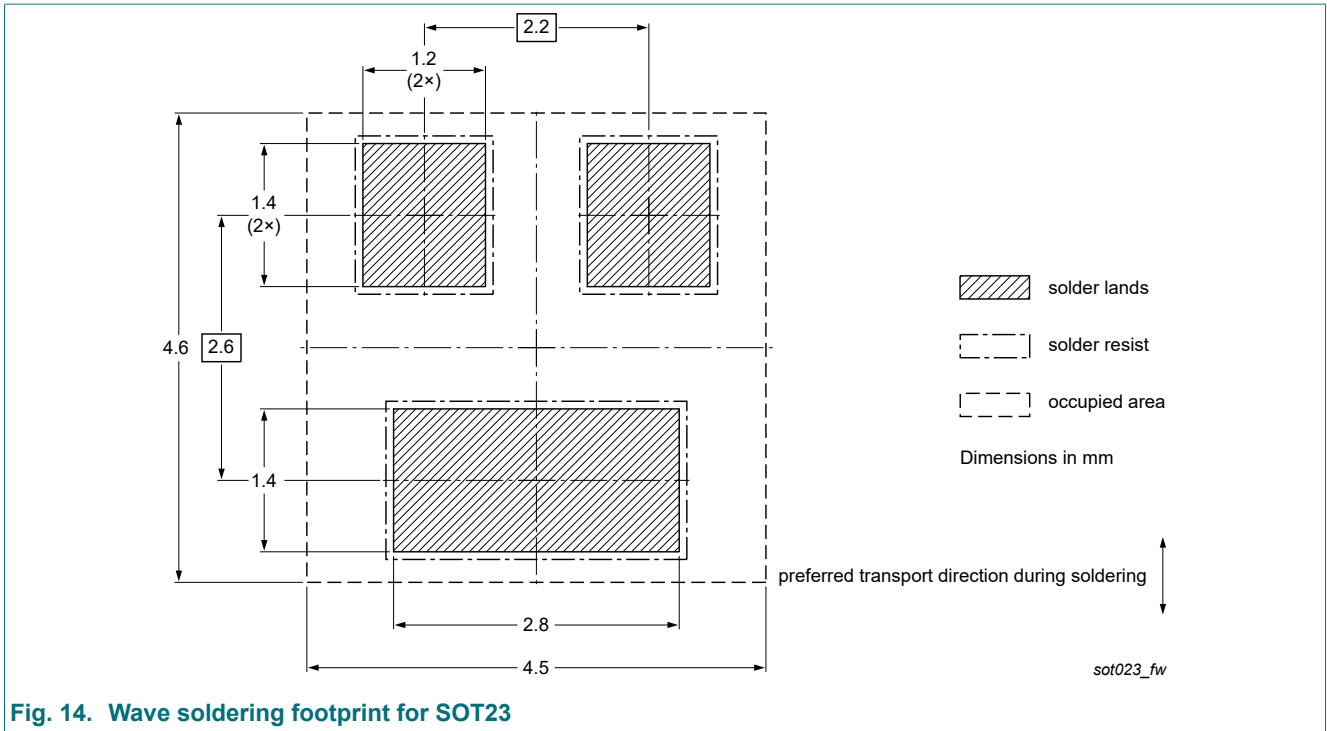


Fig. 14. Wave soldering footprint for SOT23

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS9110T-Q v.1	20220519	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".
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