PBSS9110T

100 V, 1 A PNP low VCEsat transistor

1 January 2023 Product data sheet

1. General description

PNP low V_{CEsat} 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_{CEsat} and corresponding low RCEsat
- High collector current capability
- High collector current gain
- Improved efficiency due to reduced heat generation

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)

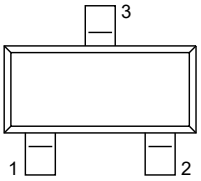
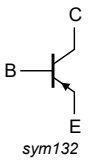
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	-100	V
I_C	collector current			-	-	-1	A
I_{CM}	peak collector current	limited by $T_{j(max)}$		-	-	-3	A
R_{CEsat}	collector-emitter saturation resistance	I_C = -1 A; I_B = -100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	170	320	mΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 SOT23	
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS9110T	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]
PBSS9110T	%U7

[1] % = placeholder for manufacturing site code

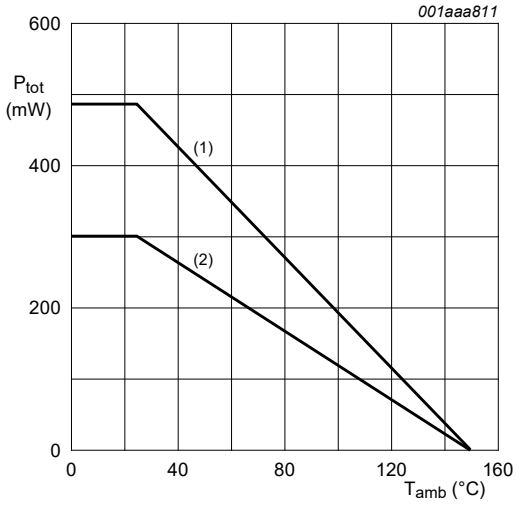
8. Limiting values

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	$T_{amb} \leq 25$ °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^2.



(1) 1 cm^2 collector mounting pad
(2) Standard footprint

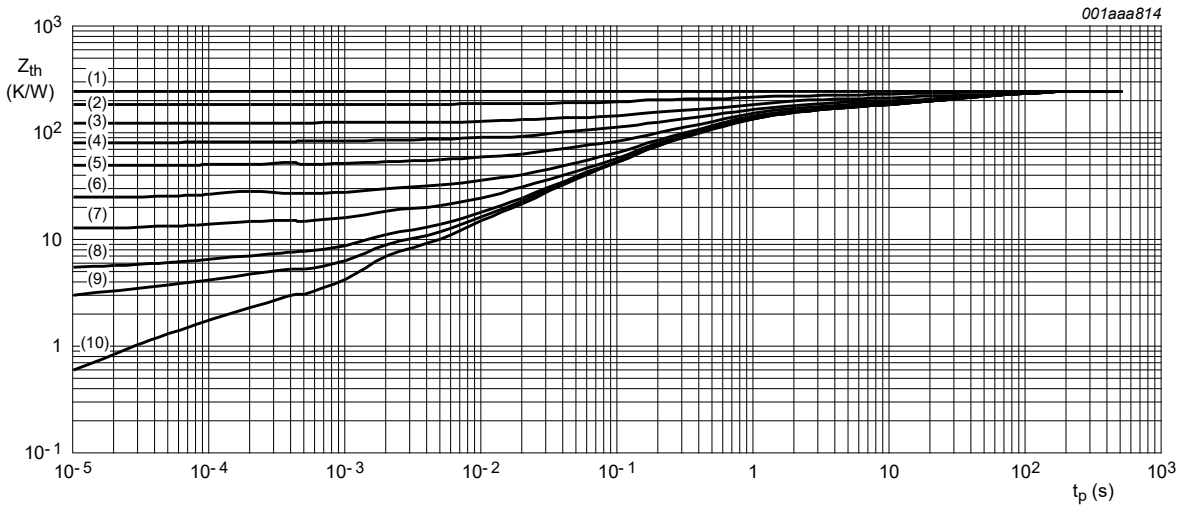
Fig. 1. Power derating curves

9. Thermal characteristics

Table 6. Thermal characteristics

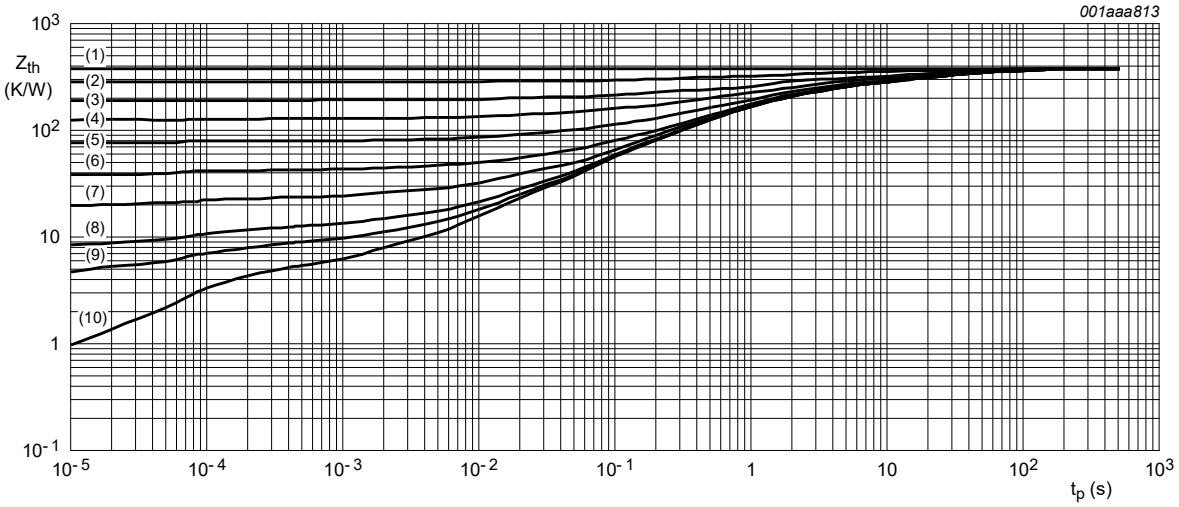
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	417	K/W
			[2]	-	-	260	K/W

[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^2.



Mounted on printed-circuit board; 1 cm^2 collector mounting pad
(1) δ = 1
(2) δ = 0.75
(3) δ = 0.5
(4) δ = 0.33
(5) δ = 0.2
(6) δ = 0.1
(7) δ = 0.05
(8) δ = 0.02
(9) δ = 0.01
(10) δ = 0

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



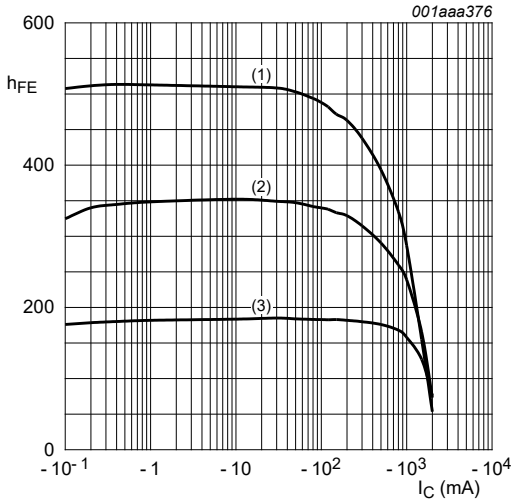
Mounted on printed-circuit board; standard footprint
(1) δ = 1
(2) δ = 0.75
(3) δ = 0.5
(4) δ = 0.33
(5) δ = 0.2
(6) δ = 0.1
(7) δ = 0.05
(8) δ = 0.02
(9) δ = 0.01
(10) δ = 0

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

10. Characteristics

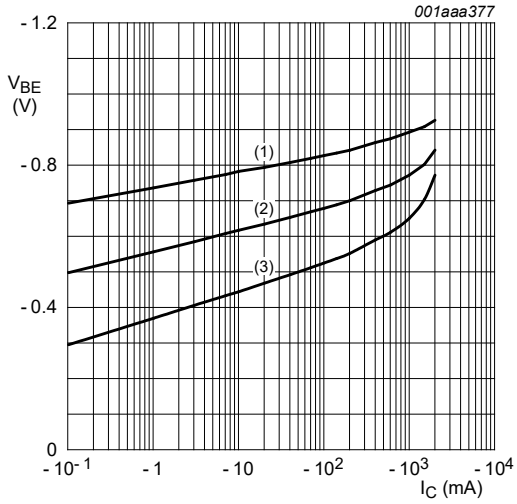
Table 7. Characteristics

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



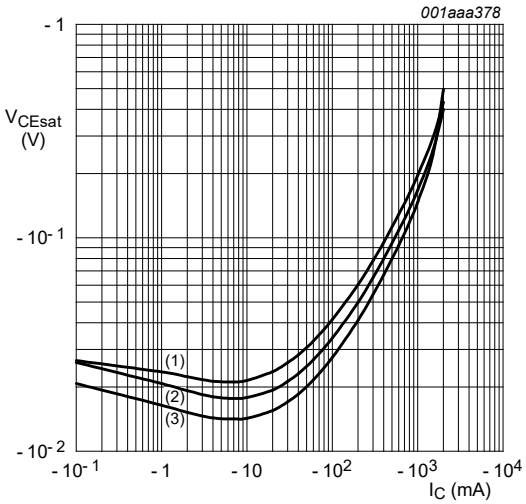
V_{CE} = −10 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



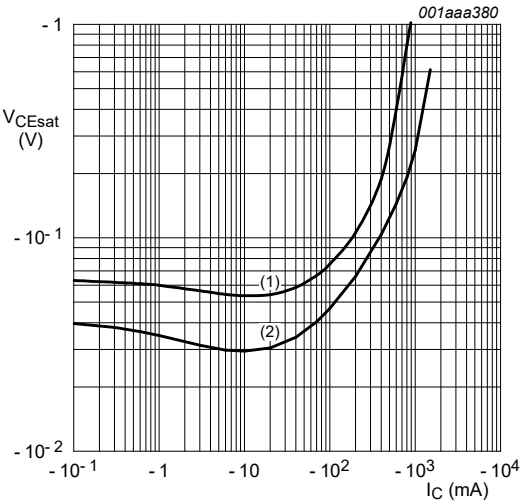
V_{CE} = −10 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



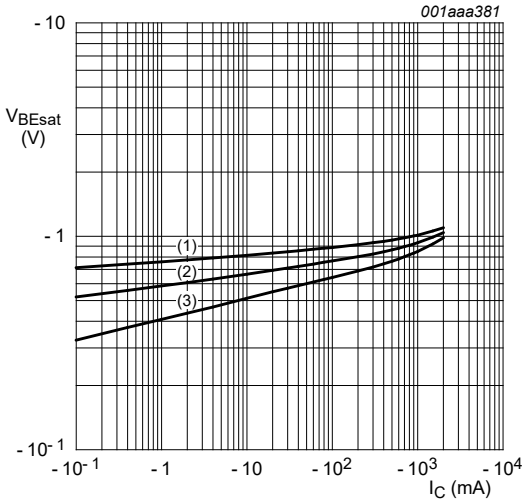
I_C/I_B = 10
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



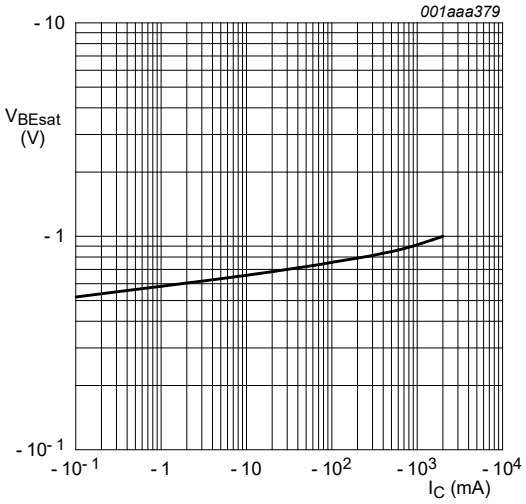
T_{amb} = 25 °C
(1) I_C/I_B = 50
(2) I_C/I_B = 20

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



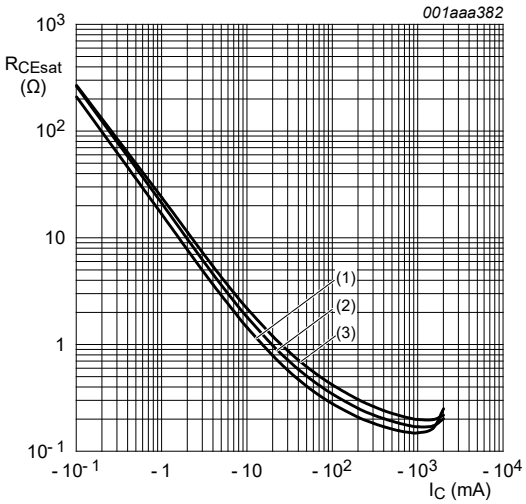
I_C/I_B = 10
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



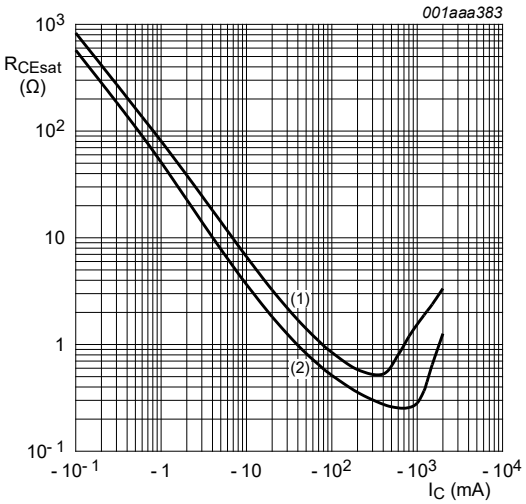
I_C/I_B = 20
T_{amb} = 25 °C

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



I_C/I_B = 10
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

Fig. 10. Collector-emitter saturation resistance as a function of collector current; typical values



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

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

11. Package outline

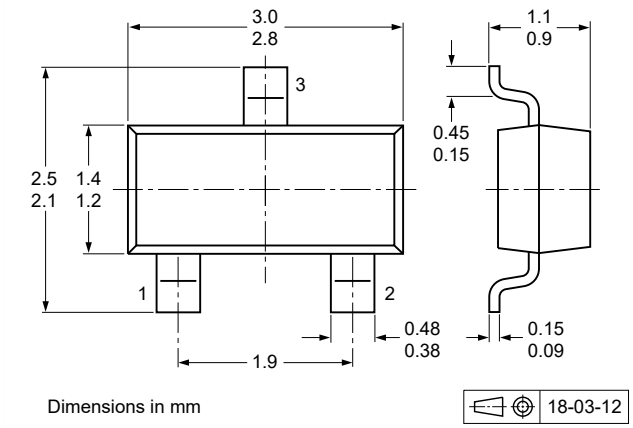


Fig. 12. Package outline SOT23

12. Soldering

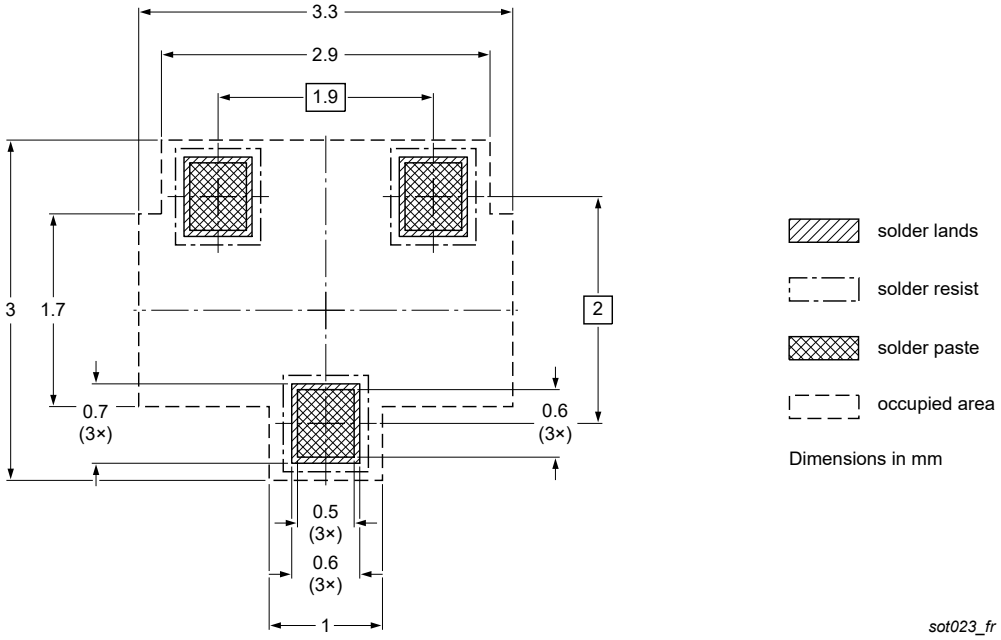


Fig. 13. Reflow soldering footprint for SOT23

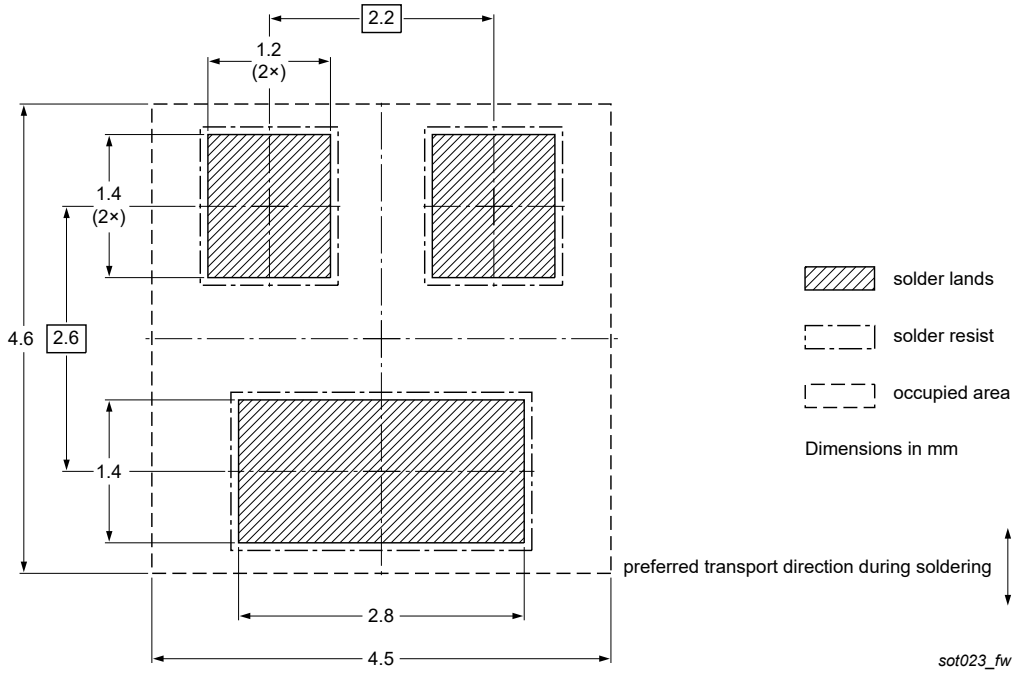


Fig. 14. Wave soldering footprint for SOT23

13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS9110T v.4	20230101	Product data sheet	-	PBSS9110T v.3
Modifications:	• Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
PBSS9110T v.3	20220523	Product data sheet	-	PBSS9110T v.2
PBSS9110T v.2	20040513	Product data sheet	-	PBSS9110T v.1
PBSS9110T v.1	20040506	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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