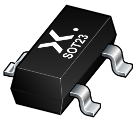


PBSS8110T-Q

100 V, 1 A NPN low VCEsat transistor

28 September 2023 Product data sheet

1. General description

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

PNP complement: PBSS9110T-Q

2. Features and benefits

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability: I_C and I_{CM}
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Major application segments
  - Automotive 42 V power
  - Telecom infrastructure
  - Industrial
- Power management
  - DC/DC converters
  - Supply line switching
  - Battery charger
  - LCD backlighting
- 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

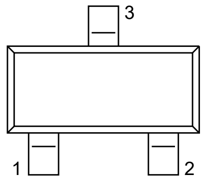
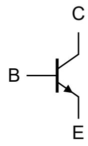
Table 1. Quick reference data

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	single pulse; $t_p \leq$ 1 ms		-	-	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		-	165	200	mΩ

nexperia

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 SOT23	 sym123
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS8110T-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[1]
PBSS8110T-Q	%U8

[1] % = placeholder for manufacturing site code

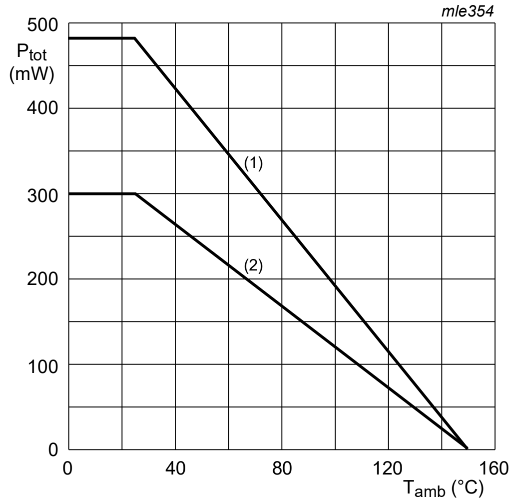
8. Limiting values

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	single pulse; $t_p \leq$ 1 ms		-	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) FR4 PCB; 1 cm^2 copper mounting pad for collector.
(2) Standard footprint.

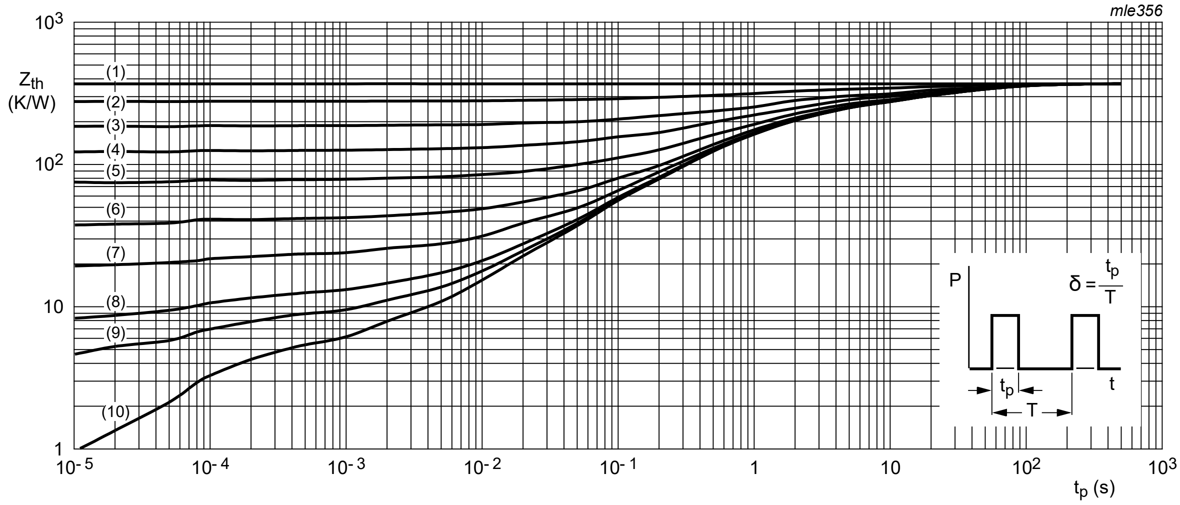
Fig. 1. Power derating curves

9. Thermal characteristics

Table 6. Thermal characteristics

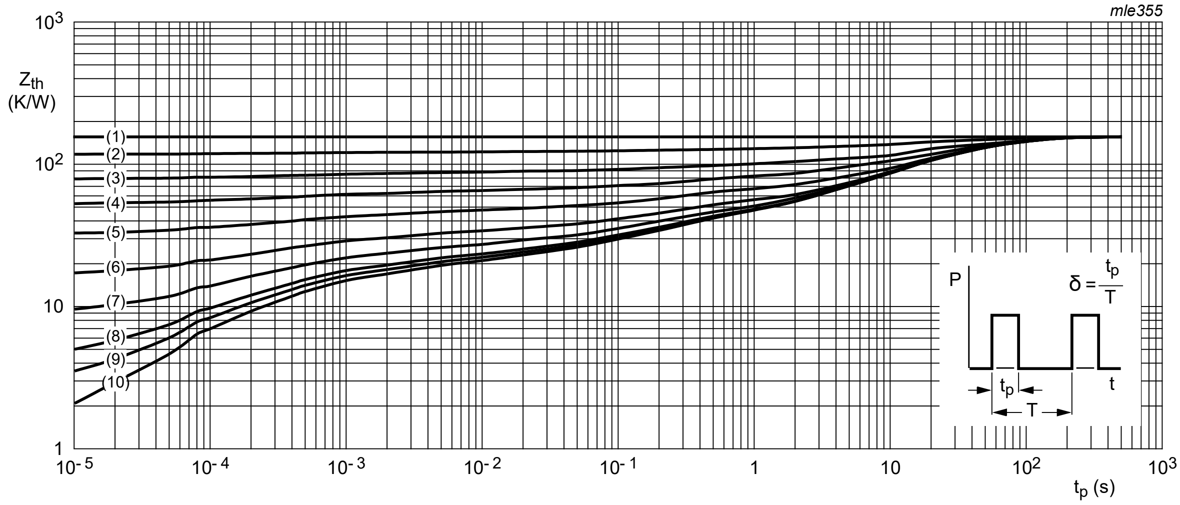
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	417	K/W
			[2]	-	-	260	K/W

[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.



(1) δ = 1.0
(2) δ = 0.75
(3) δ = 0.5
(4) δ = 0.3
(5) δ = 0.2
(6)δ = 0.1
(7) δ = 0.05
(8) δ = 0.02
(9) δ = 0.01
(10) δ = 0.0

Fig. 2. Transient thermal impedance as a function of pulse time for standard PCB footprint



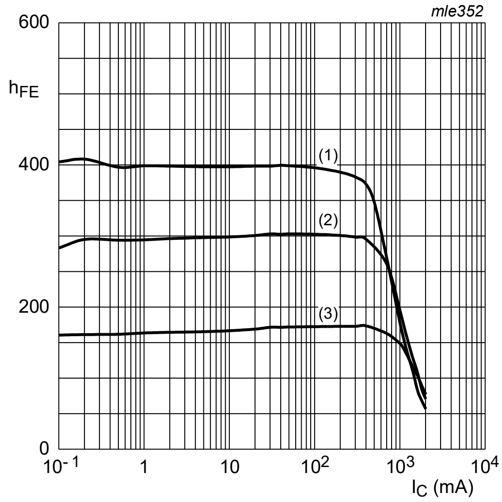
(1) δ = 1.0
(2) δ = 0.75
(3) δ = 0.5
(4) δ = 0.3
(5) δ = 0.2
(6) δ = 0.1
(7) δ = 0.05
(8) δ = 0.02
(9) δ = 0.01
(10) δ = 0.0

Fig. 3. Transient thermal impedance as a function of pulse time for collector 1 cm^2 copper mounting pad

10. Characteristics

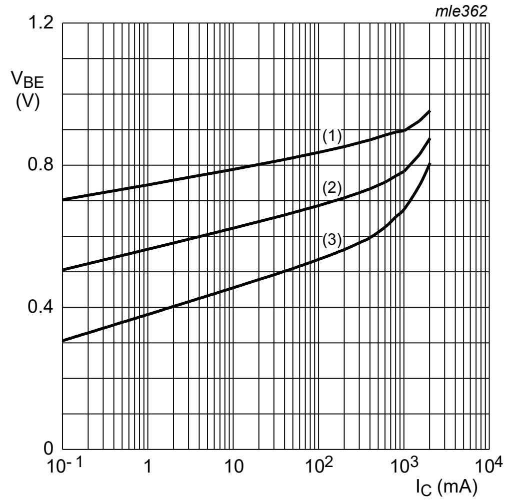
Table 7. Characteristics

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; pulsed; t_p ≤ 300 µs; δ ≤ 0.02;; T_{amb} = 25 °C		100	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage (collector open)	I_E = 100 µA; 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} = 5 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} = 10 V; I_C = 1 mA; T_{amb} = 25 °C		150	-	-	
		V_{CE} = 10 V; I_C = 250 mA; T_{amb} = 25 °C		150	-	500	
		V_{CE} = 10 V; I_C = 500 mA; pulsed; t_p ≤ 300 µs; δ ≤ 0.02; T_{amb} = 25 °C		100	-	-	
		V_{CE} = 10 V; I_C = 1 A; pulsed; t_p ≤ 300 µs; δ ≤ 0.02; T_{amb} = 25 °C		80	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 100 mA; I_B = 10 mA; T_{amb} = 25 °C		-	-	40	mV
		I_C = 500 mA; I_B = 50 mA; T_{amb} = 25 °C		-	-	120	mV
		I_C = 1 A; I_B = 100 mA; pulsed; t_p ≤ 300 µs; δ ≤ 0.02; T_{amb} = 25 °C		-	-	200	mV
R_{CEsat}	collector-emitter saturation resistance			-	165	200	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = 1 A; I_B = 100 mA; T_{amb} = 25 °C		-	-	1.05	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = 10 V; I_C = 1 A; T_{amb} = 25 °C		-	-	0.9	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		-	-	7.5	pF



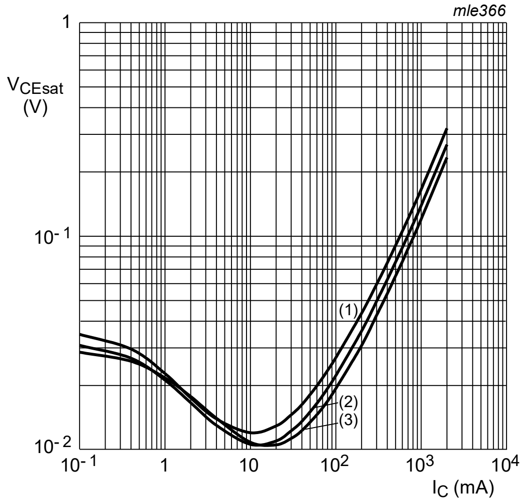
V_{CE} = 10 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



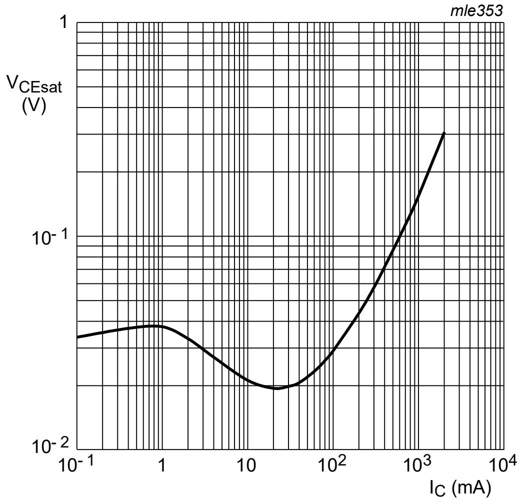
V_{CE} = 10 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



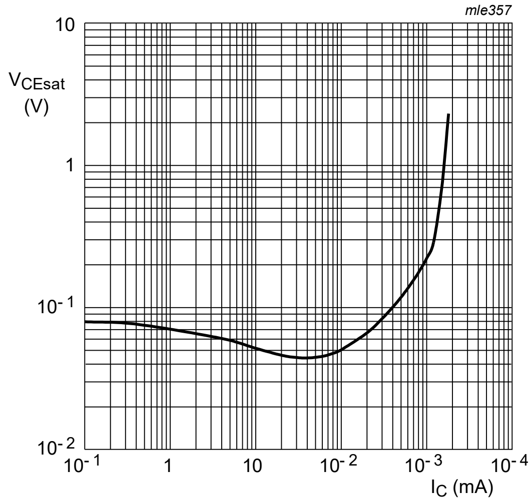
I_C/I_B = 10
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



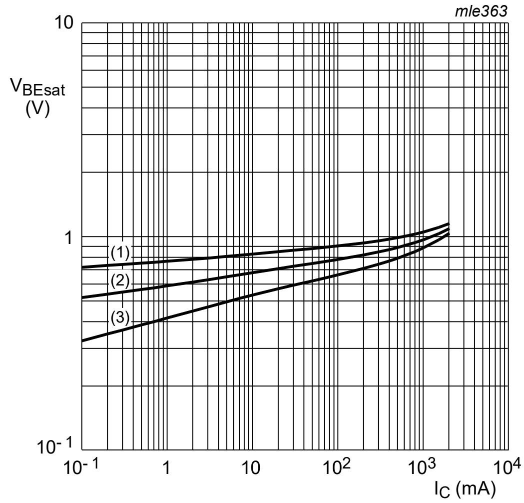
I_C/I_B = 20
T_{amb} = 25 °C

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



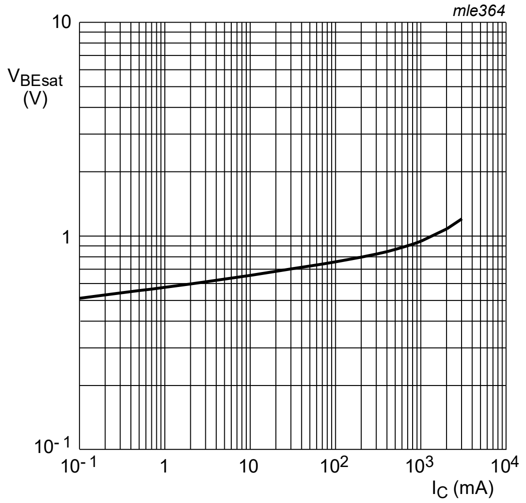
I_C/I_B = 50
T_{amb} = 25 °C

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



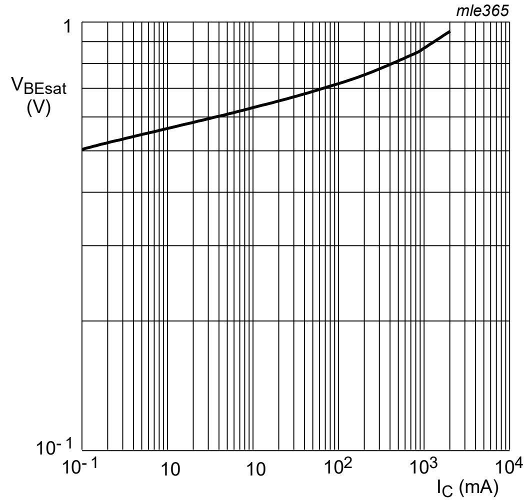
I_C/I_B = 10
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



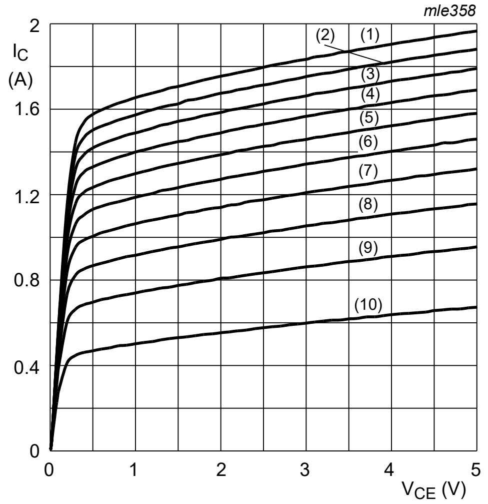
I_C/I_B = 20
T_{amb} = 25 °C

Fig. 10. Base-emitter saturation voltage as a function of collector current; typical values



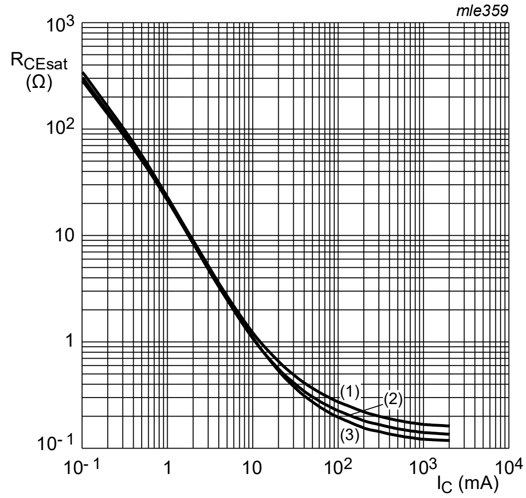
I_C/I_B = 50
T_{amb} = 25 °C

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



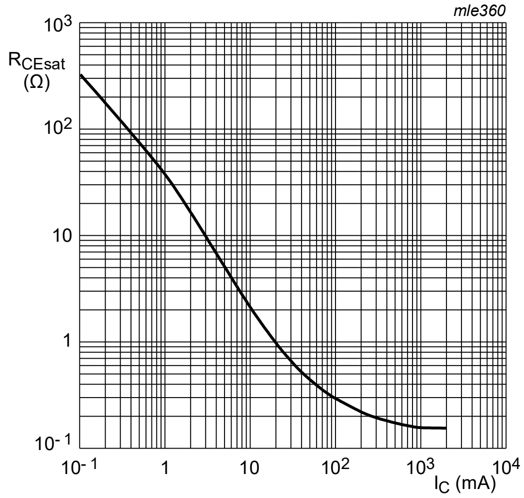
T_{amb} = 25 °C
(1) I_B = 35.0 mA
(2) I_B = 31.5 mA
(3) I_B = 28.0 mA
(4) I_B = 24.5 mA
(5) I_B = 21.0 mA
(6) I_B = 17.5 mA
(7) I_B = 14.0 mA
(8) I_B = 10.5 mA
(9) I_B = 7.0 mA
(10) I_B = 3.5 mA

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



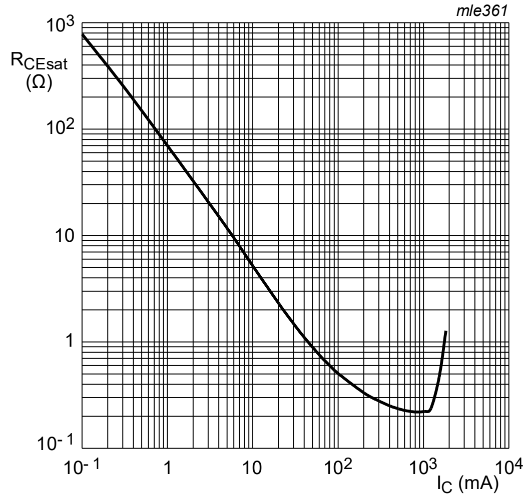
I_C/I_B = 10
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 13. Collector-emitter equivalent on-resistance as a function of collector current; typical values



I_C/I_B = 20
T_{amb} = 25 °C

Fig. 14. Collector-emitter equivalent on-resistance as a function of collector current; typical values



I_C/I_B = 50
T_{amb} = 25 °C

Fig. 15. Collector-emitter equivalent on-resistance 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

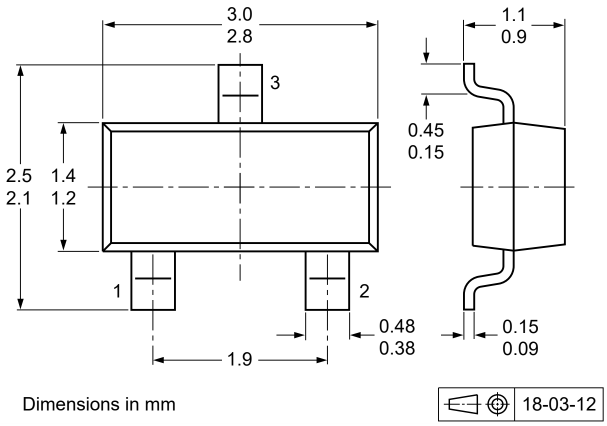


Fig. 16. Package outline SOT23

13. Soldering

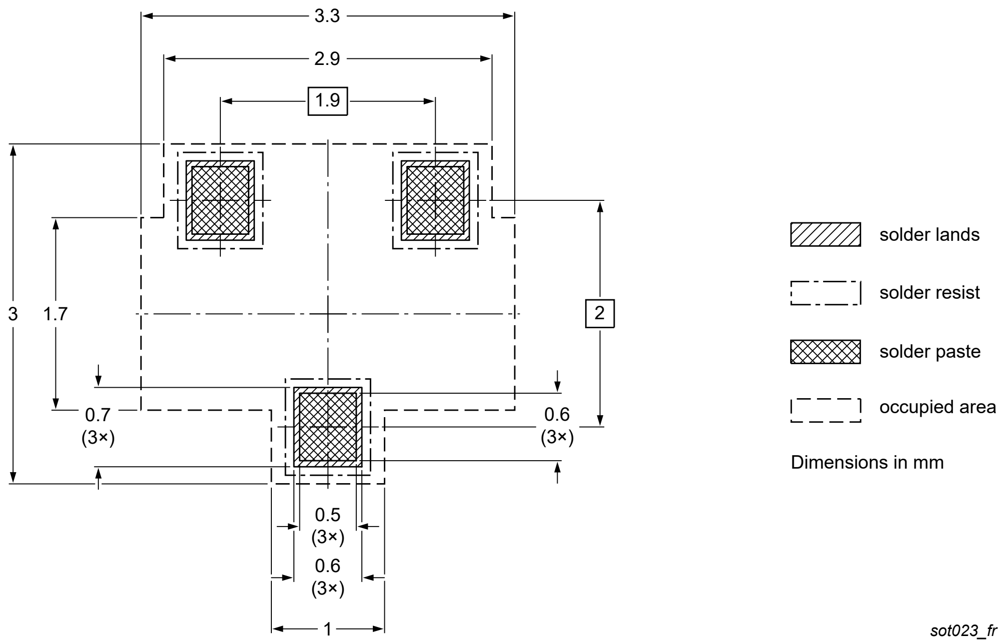


Fig. 17. Reflow soldering footprint for SOT23

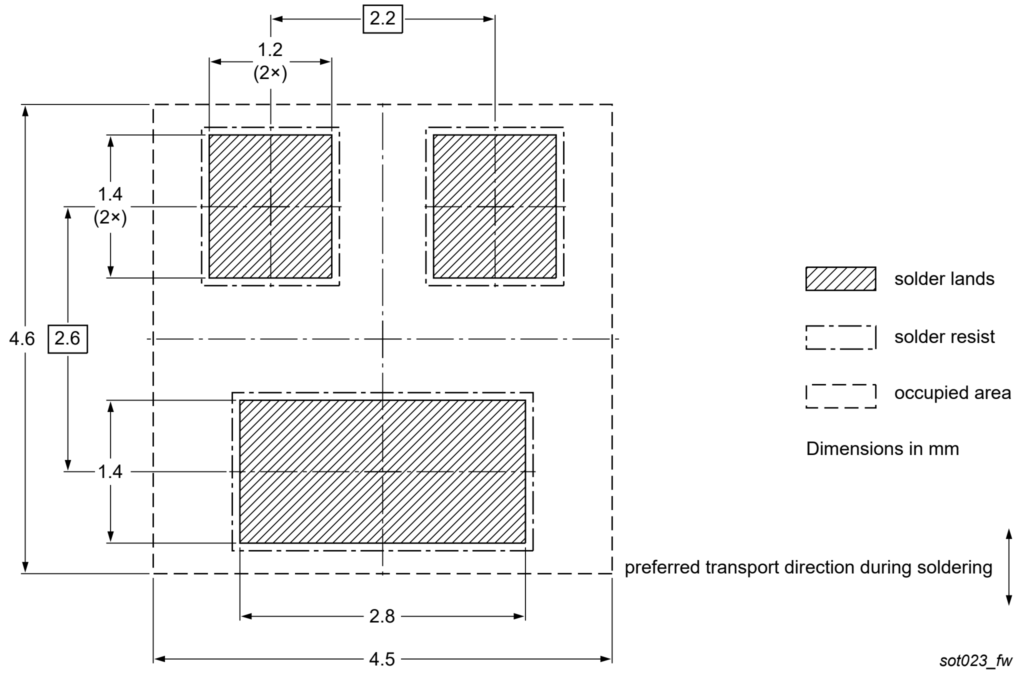


Fig. 18. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS8110T-Q v.2	20230928	Product data sheet	-	PBSS8110T-Q v.1
Modifications:	• Characteristics, Fig. 12: Values of curves are corrected			
PBSS8110T-Q v.1	20220513	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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Date of release: 28 September 2023

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