



# PBSS8110T

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

28 September 2023

Product data sheet

## 1. General description

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

PNP complement: PBSS9110T

## 2. Features and benefits

- Low collector-emitter saturation voltage V<sub>CEsat</sub>
- High collector current capability: I<sub>C</sub> and I<sub>CM</sub>

## 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)

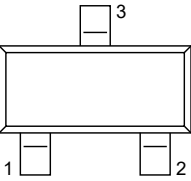
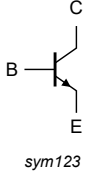
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <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	single pulse; t <sub>p</sub> ≤ 1 ms	-	-	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	-	165	200	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>	 <p style="text-align: center;">sym123</p>
2	E	emitter		
3	C	collector		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PBSS8110T</a>	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	<a href="#">SOT23</a>

## 7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PBSS8110T	%U8

[1] % = placeholder for manufacturing site code

## 8. Limiting values

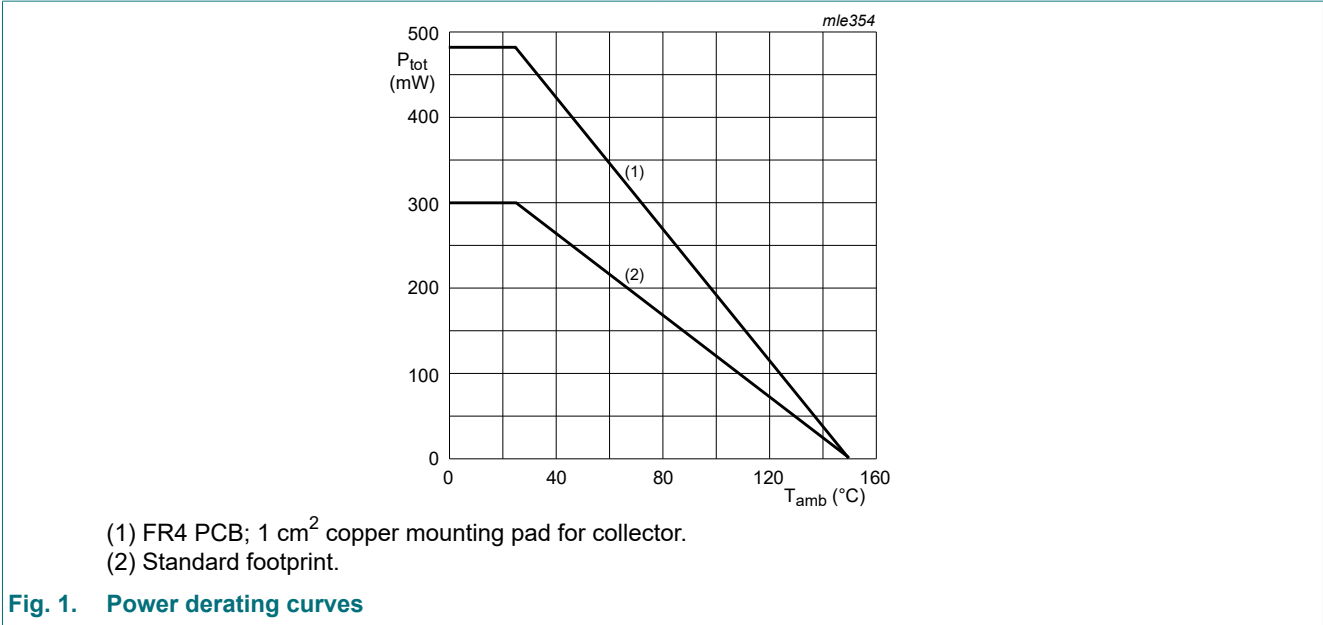
Table 5. Limiting values

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<sup>2</sup>.



## 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<sup>2</sup>.

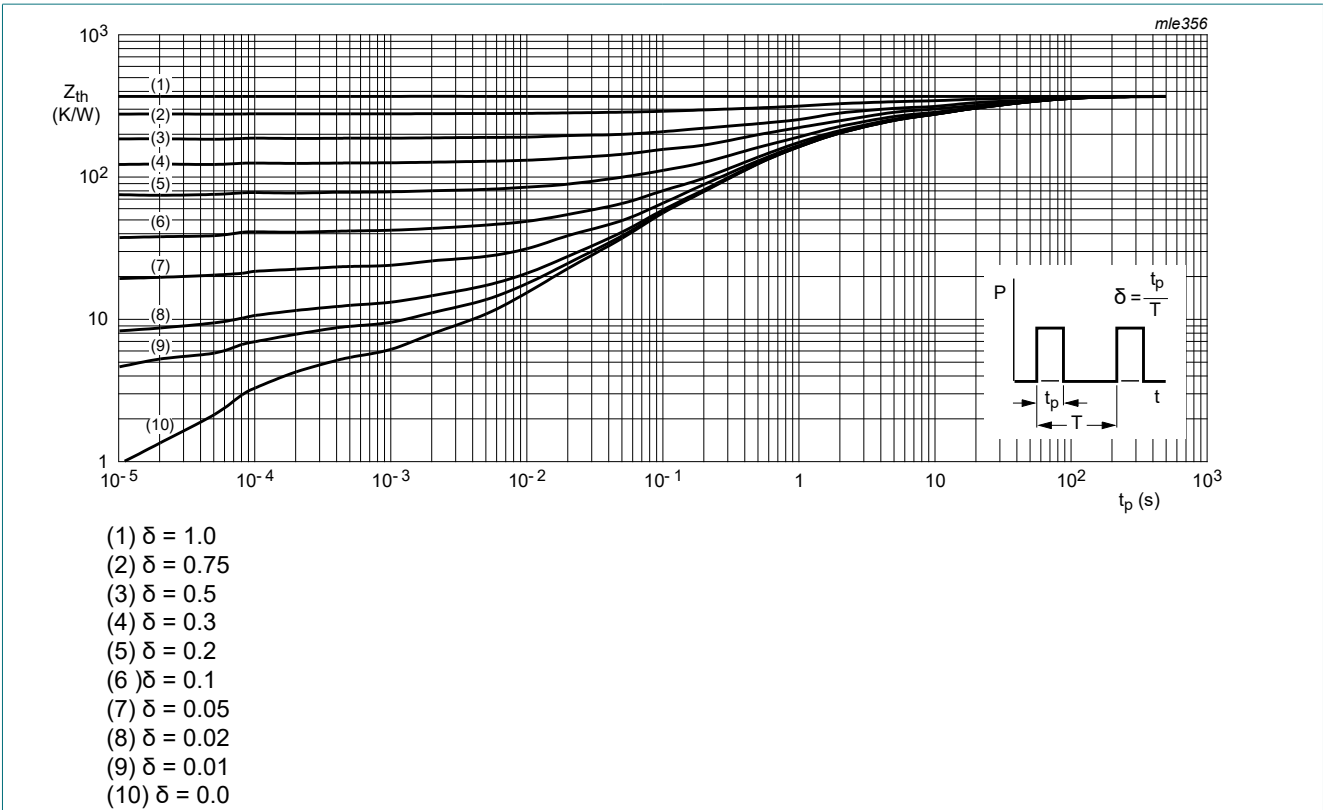


Fig. 2. Transient thermal impedance as a function of pulse time for standard PCB footprint

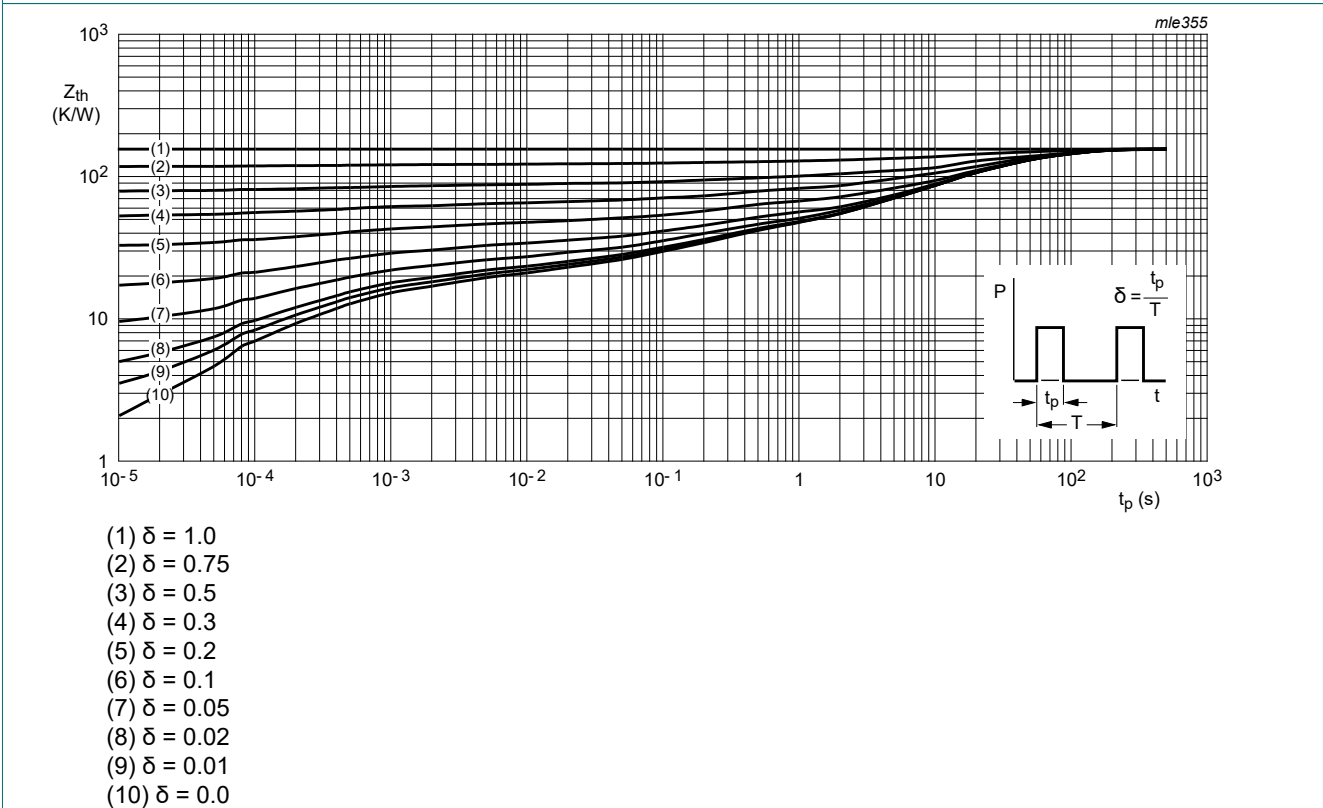
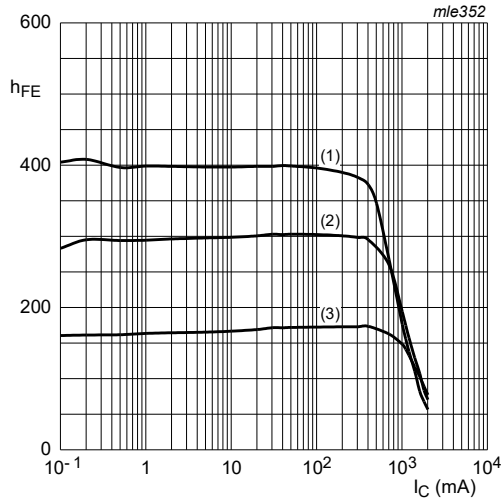


Fig. 3. Transient thermal impedance as a function of pulse time for collector 1 cm<sup>2</sup> copper mounting pad

## 10. Characteristics

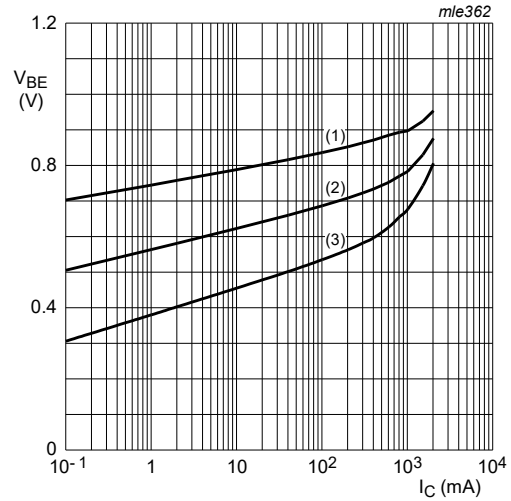
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100 \mu\text{A}$ ; $I_E = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	120	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 10 \text{ mA}$ ; $I_B = 0 \text{ A}$ ; pulsed; $t_p \leq 300 \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	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	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5 \text{ V}$ ; $I_C = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	100	nA
$I_{CES}$	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
$h_{FE}$	DC current gain	$V_{CE} = 10 \text{ V}$ ; $I_C = 1 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	150	-	-	
		$V_{CE} = 10 \text{ V}$ ; $I_C = 250 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	150	-	500	
		$V_{CE} = 10 \text{ V}$ ; $I_C = 500 \text{ mA}$ ; pulsed; $t_p \leq 300 \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	100	-	-	
		$V_{CE} = 10 \text{ V}$ ; $I_C = 1 \text{ A}$ ; pulsed; $t_p \leq 300 \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	80	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 100 \text{ mA}$ ; $I_B = 10 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	40	mV
		$I_C = 500 \text{ mA}$ ; $I_B = 50 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	120	mV
		$I_C = 1 \text{ A}$ ; $I_B = 100 \text{ mA}$ ; pulsed; $t_p \leq 300 \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	200	mV
$R_{CEsat}$	collector-emitter saturation resistance	$I_C = 1 \text{ A}$ ; $I_B = 100 \text{ mA}$ ; pulsed; $t_p \leq 300 \mu\text{s}$ ; $\delta \leq 0.02$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	165	200	$\text{m}\Omega$
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 1 \text{ A}$ ; $I_B = 100 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	1.05	V
$V_{BEon}$	base-emitter turn-on voltage	$V_{CE} = 10 \text{ V}$ ; $I_C = 1 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	0.9	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	$V_{CB} = 10 \text{ V}$ ; $I_E = 0 \text{ A}$ ; $i_e = 0 \text{ A}$ ; $f = 1 \text{ MHz}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	7.5	pF



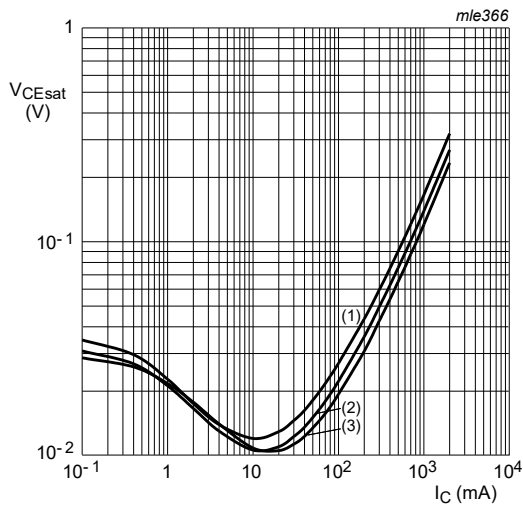
$V_{CE} = 10\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



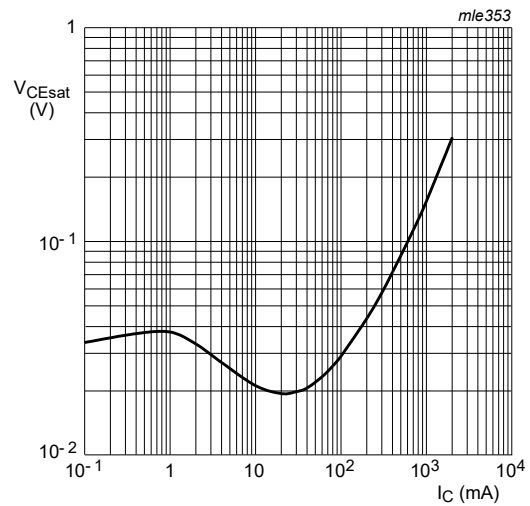
$V_{CE} = 10\text{ V}$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

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



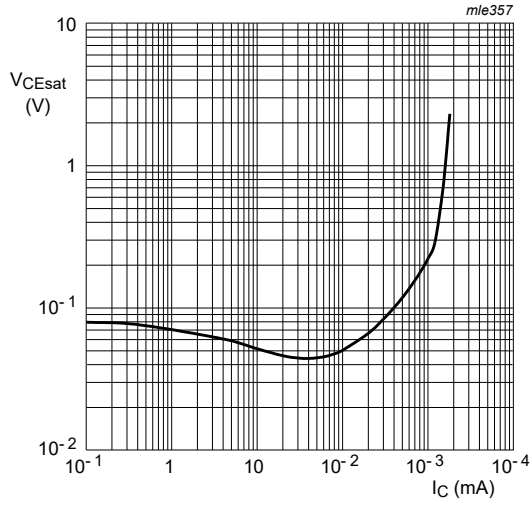
$I_C/I_B = 10$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



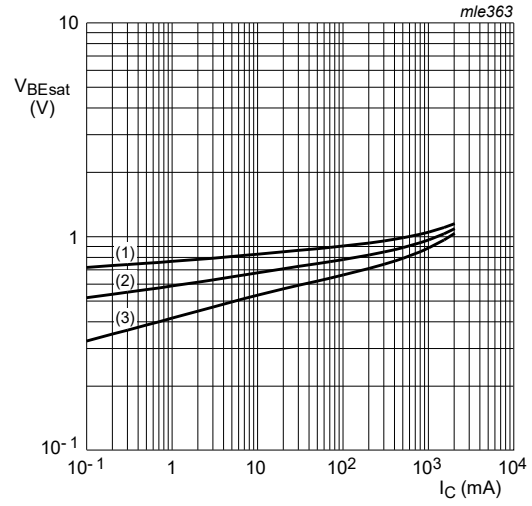
$I_C/I_B = 20$   
 $T_{amb} = 25\text{ °C}$

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



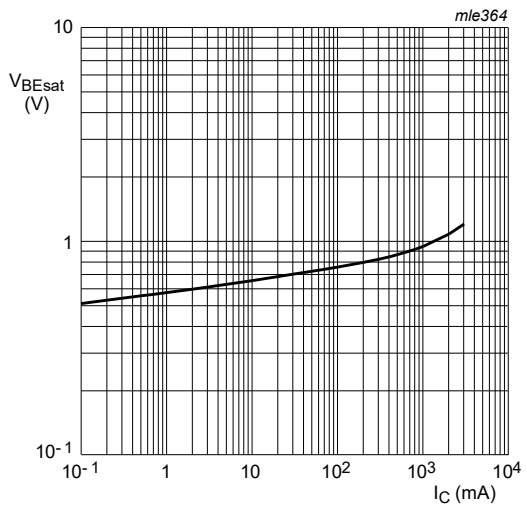
$I_C/I_B = 50$   
 $T_{amb} = 25\text{ }^\circ\text{C}$

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



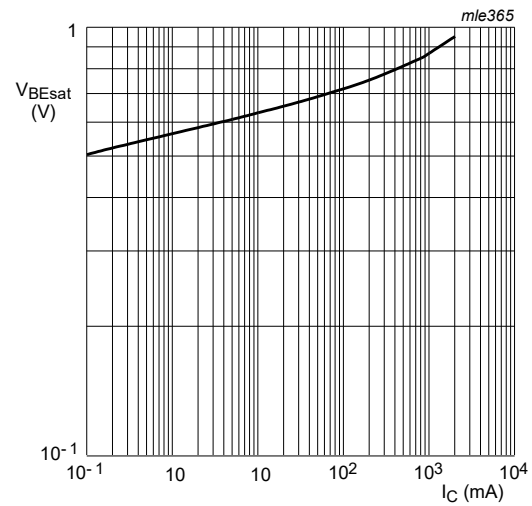
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100\text{ }^\circ\text{C}$

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



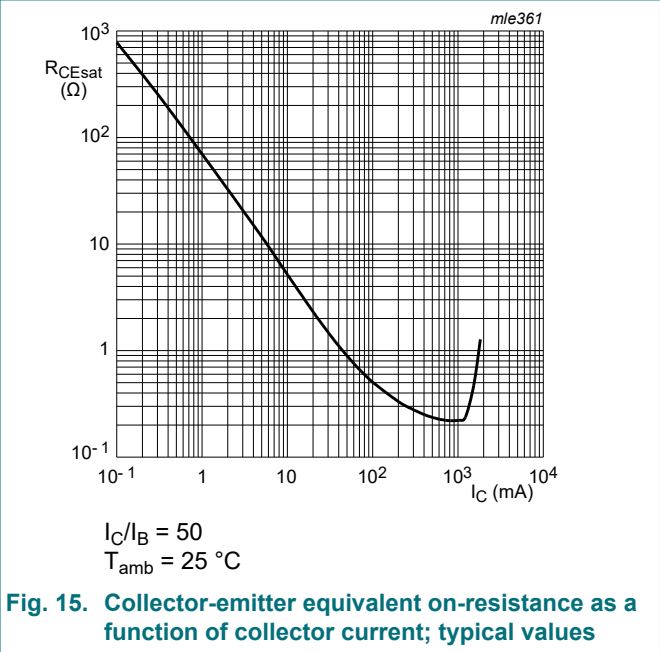
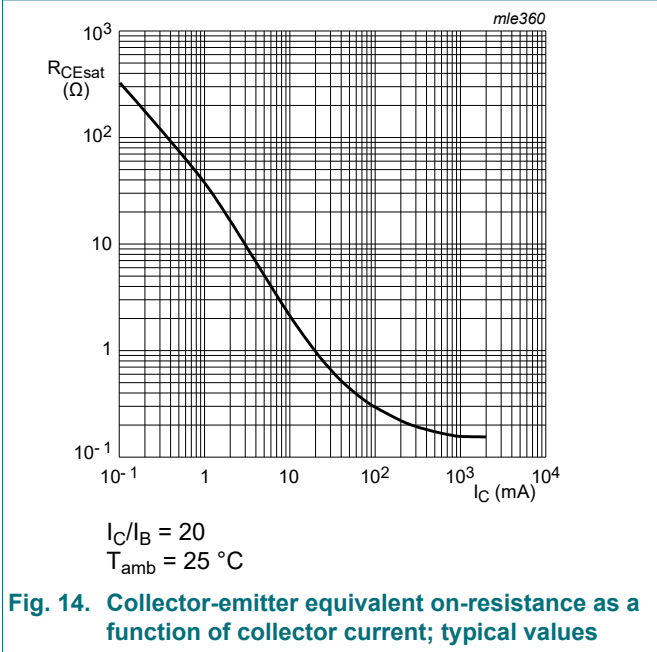
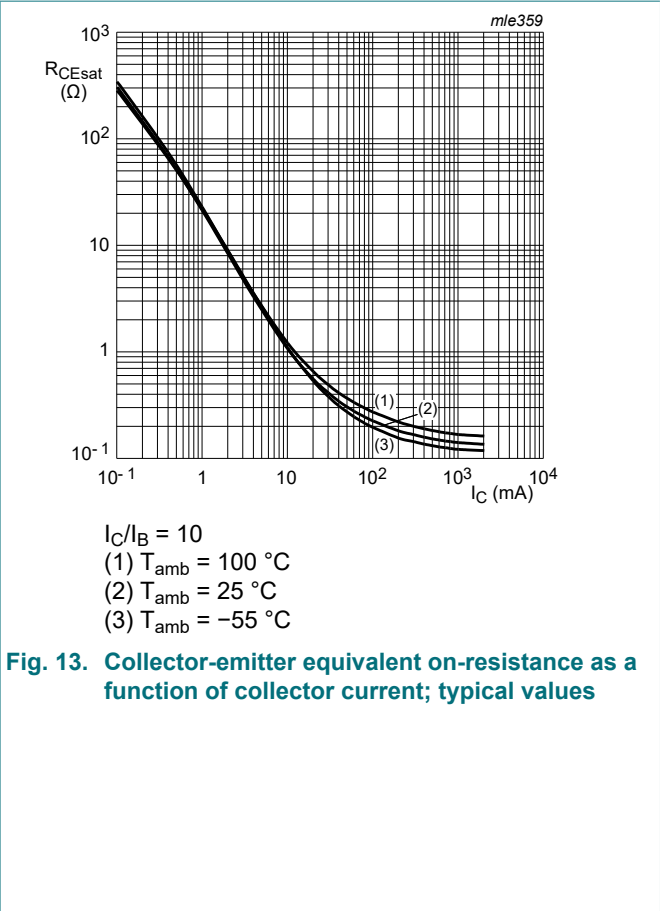
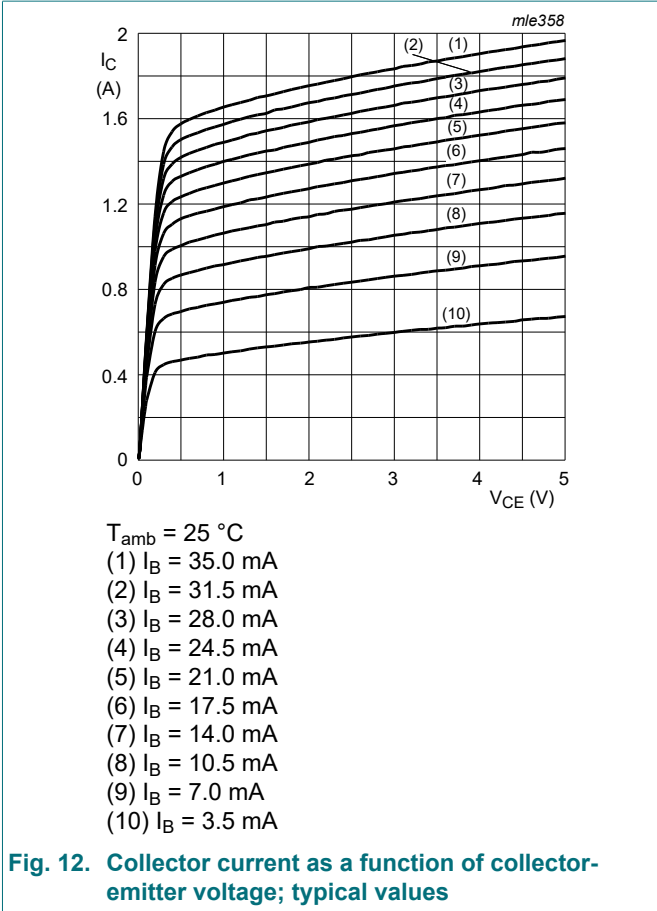
$I_C/I_B = 20$   
 $T_{amb} = 25\text{ }^\circ\text{C}$

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



$I_C/I_B = 50$   
 $T_{amb} = 25\text{ }^\circ\text{C}$

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







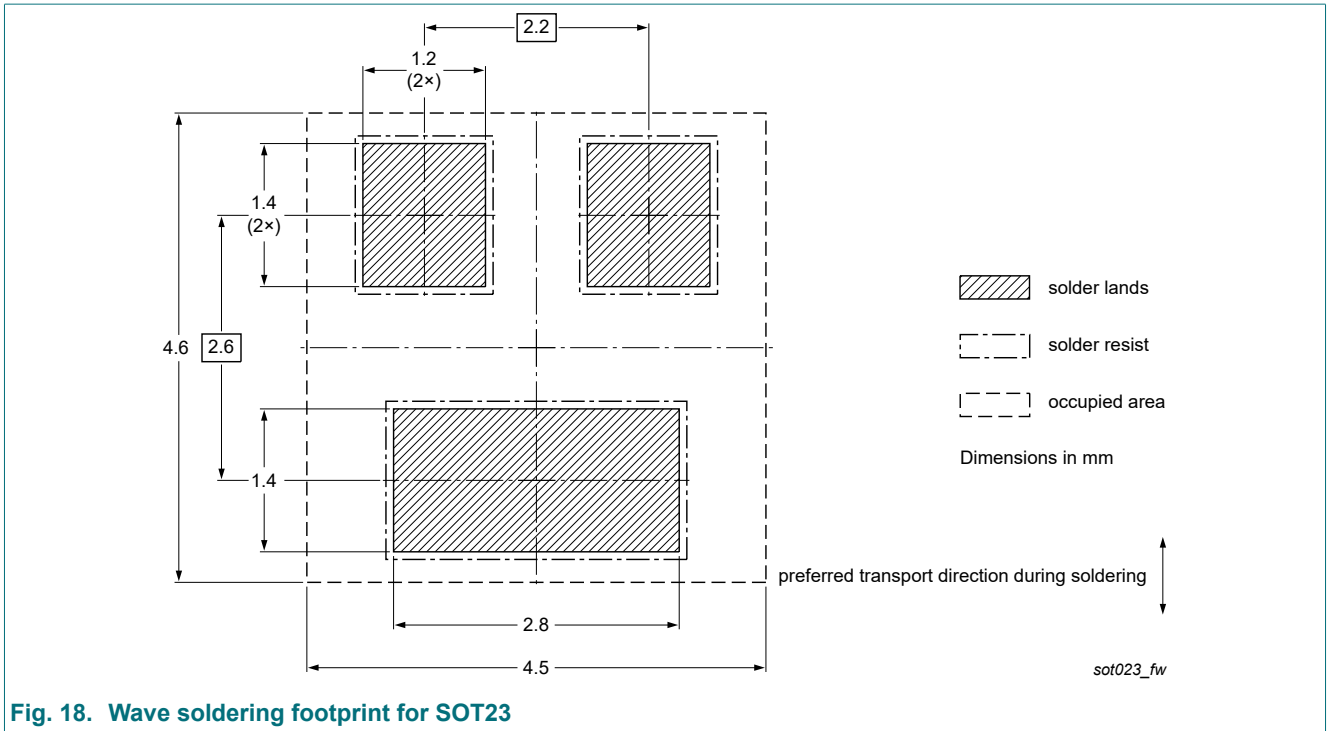


Fig. 18. Wave soldering footprint for SOT23

## 13. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS8110T v.5	20230928	Product data sheet	-	PBSS8110T v.4
Modifications:	• Characteristics, Fig. 12: Values of curves are corrected			
PBSS8110T v.4	20230101	Product data sheet	-	PBSS8110T v.3
PBSS8110T v.3	20220513	Product data sheet	-	PBSS8110T v.2
PBSS8110T v.2	20031222	Product data sheet	-	PBSS8110T v.1
PBSS8110T v.1	20030728	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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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