



PBSS8110T-Q

100 V, 1 A NPN low V_{CEsat} 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)

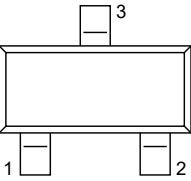
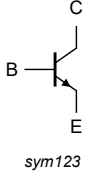
4. Quick reference data

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; $t_p \leq 300$ μ s; $\delta \leq 0.02$; $T_{amb} = 25$ °C	-	165	200	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>	 <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
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

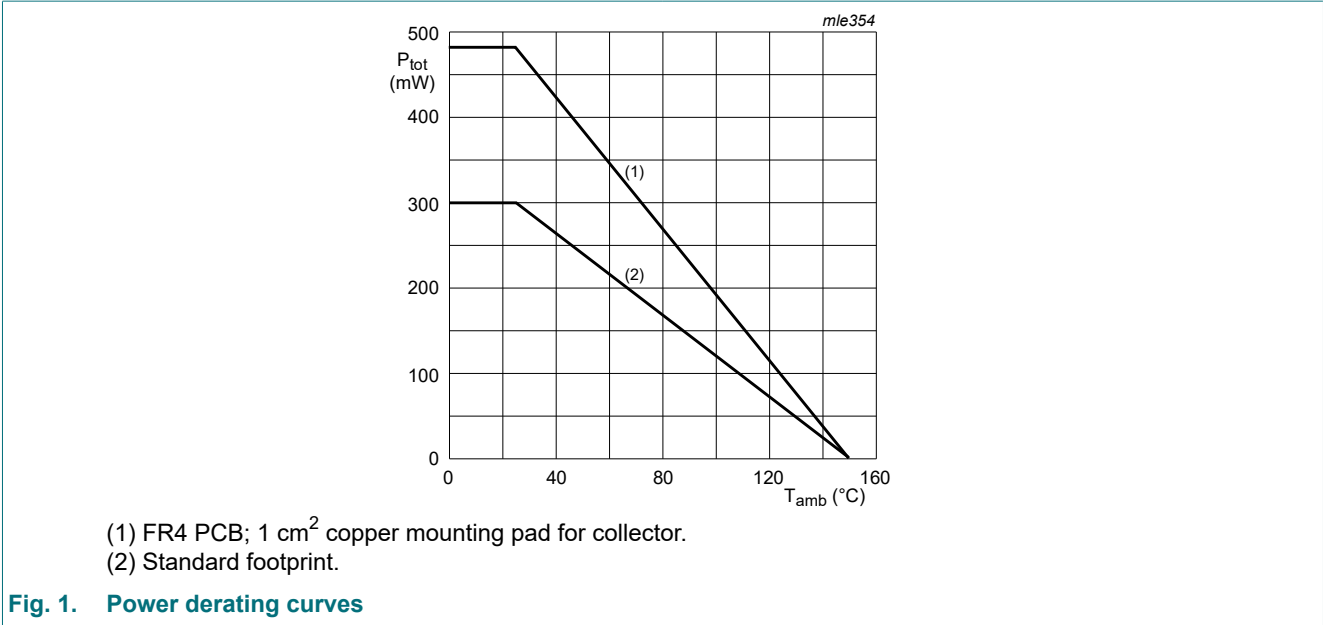
Table 5. Limiting values

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 cm².



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 cm².

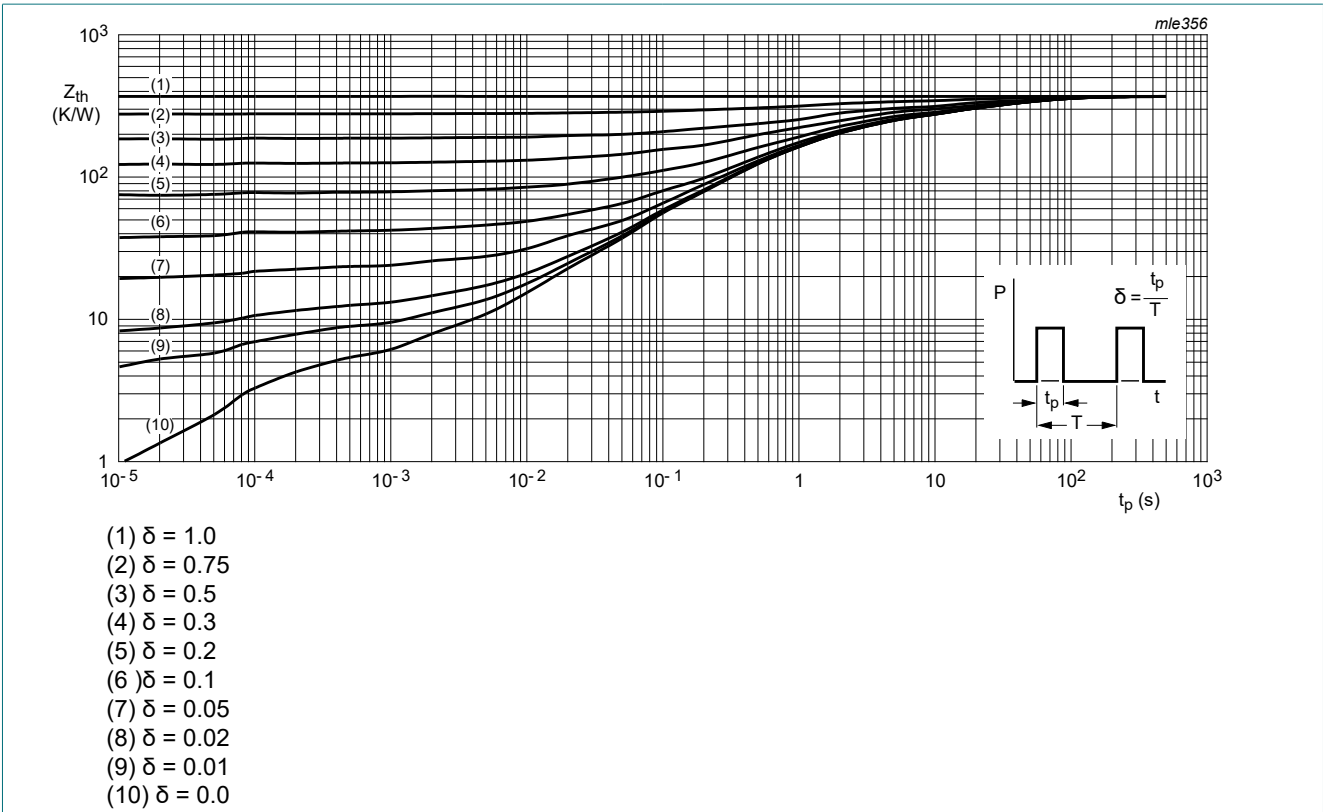


Fig. 2. Transient thermal impedance as a function of pulse time for standard PCB footprint

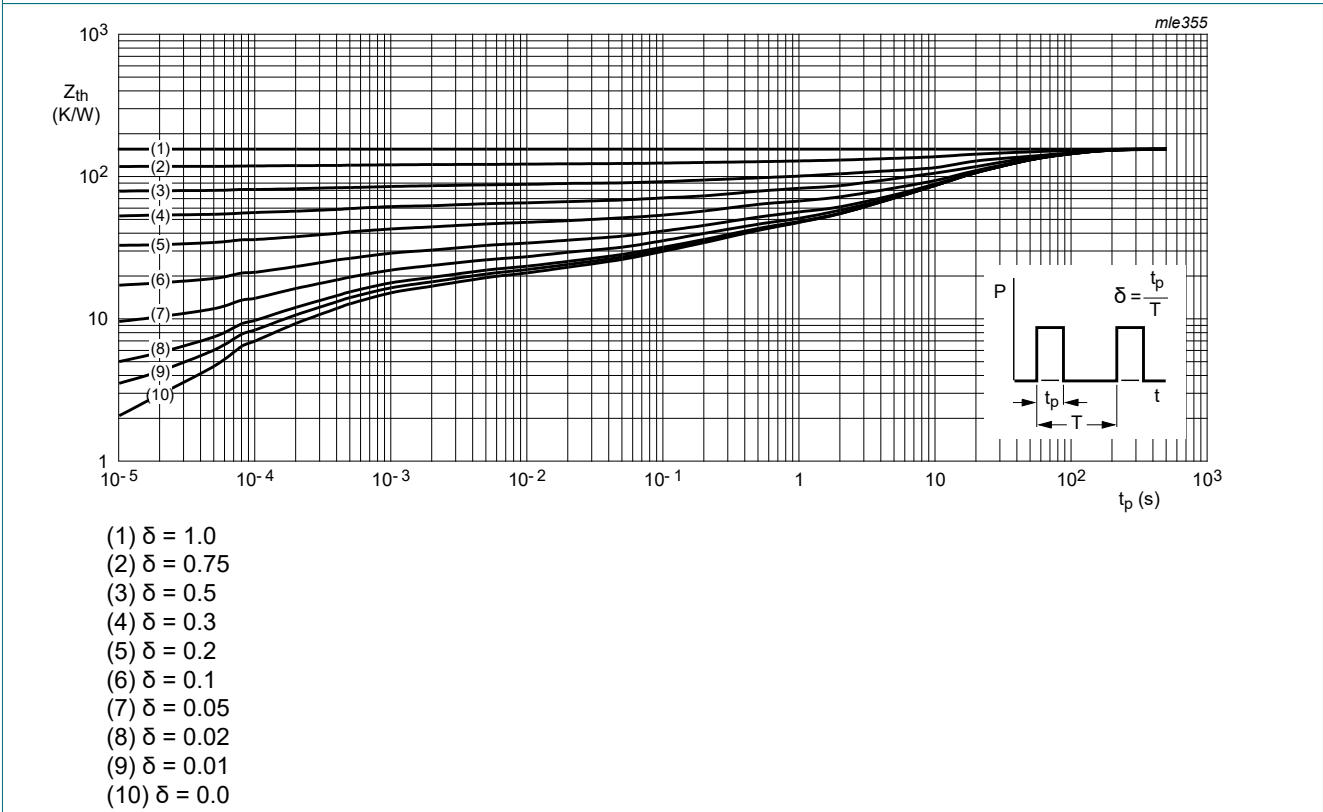
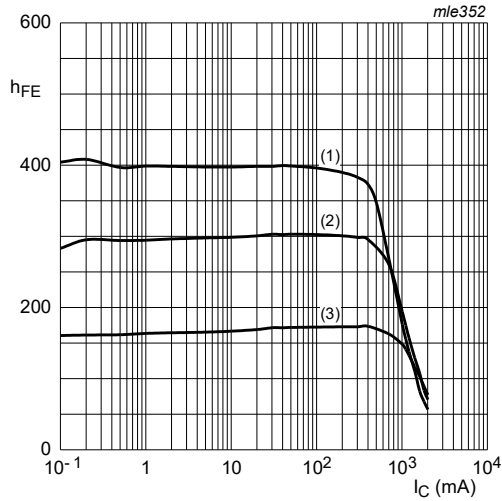


Fig. 3. Transient thermal impedance as a function of pulse time for collector 1 cm² copper mounting pad

10. Characteristics

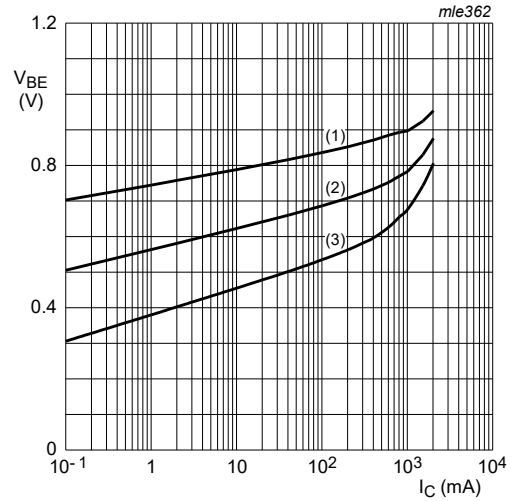
Table 7. Characteristics

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	$I_C = 10 \text{ mA}; I_B = 0 \text{ A}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	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	μA
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	
		$V_{CE} = 10 \text{ V}; I_C = 500 \text{ mA}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	100	-	-	
		$V_{CE} = 10 \text{ V}; I_C = 1 \text{ A}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	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
		$I_C = 1 \text{ A}; I_B = 100 \text{ mA}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	200	mV
R_{CEsat}	collector-emitter saturation resistance	$I_C = 1 \text{ A}; I_B = 100 \text{ mA}; \text{pulsed}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	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



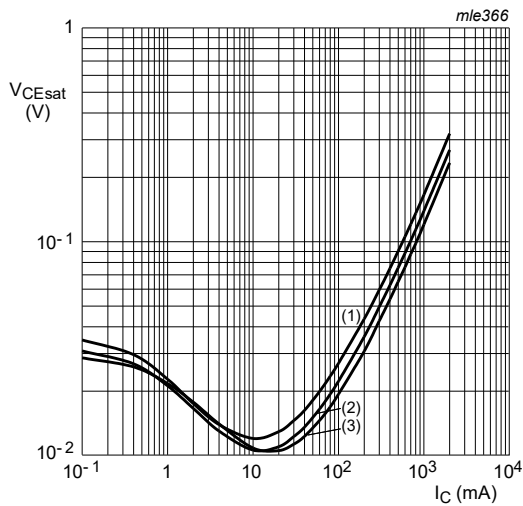
$V_{CE} = 10 \text{ V}$
 (1) $T_{amb} = 100 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = -55 \text{ }^\circ\text{C}$

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



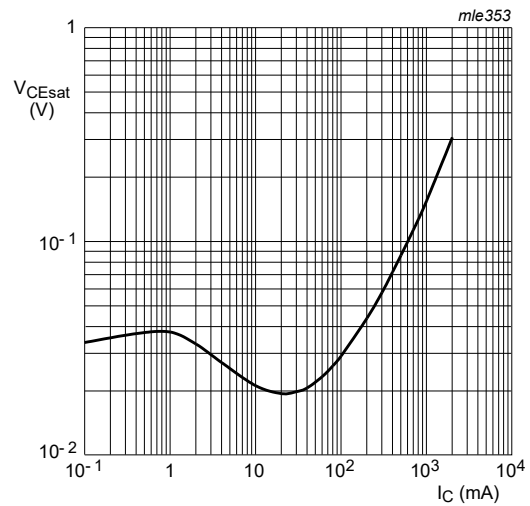
$V_{CE} = 10 \text{ V}$
 (1) $T_{amb} = -55 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = 100 \text{ }^\circ\text{C}$

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



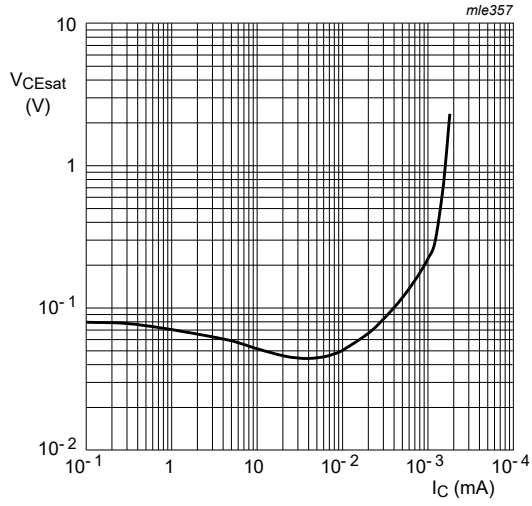
$I_C/I_B = 10$
 (1) $T_{amb} = 100 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = -55 \text{ }^\circ\text{C}$

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



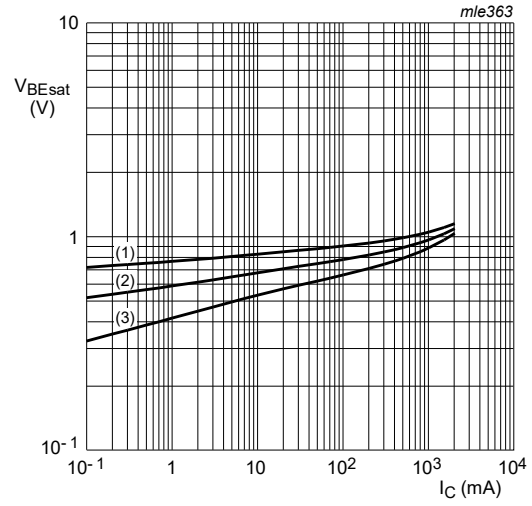
$I_C/I_B = 20$
 $T_{amb} = 25 \text{ }^\circ\text{C}$

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



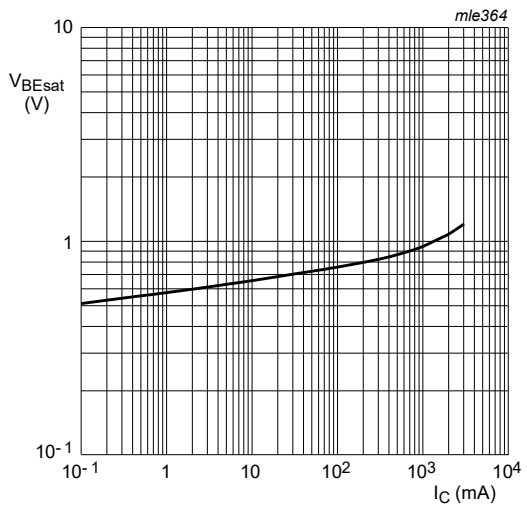
$I_C/I_B = 50$
 $T_{amb} = 25\text{ }^\circ\text{C}$

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



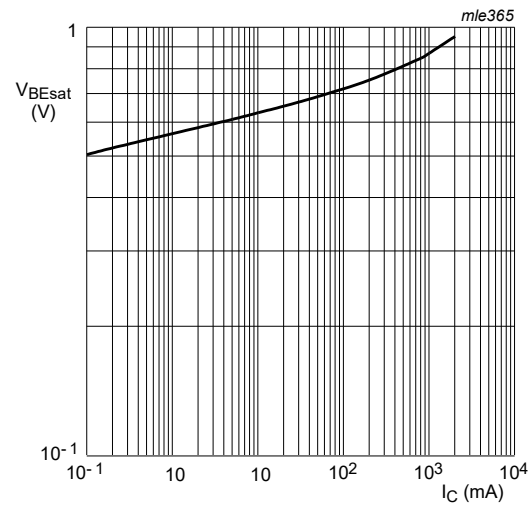
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ }^\circ\text{C}$
 (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 (3) $T_{amb} = 100\text{ }^\circ\text{C}$

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



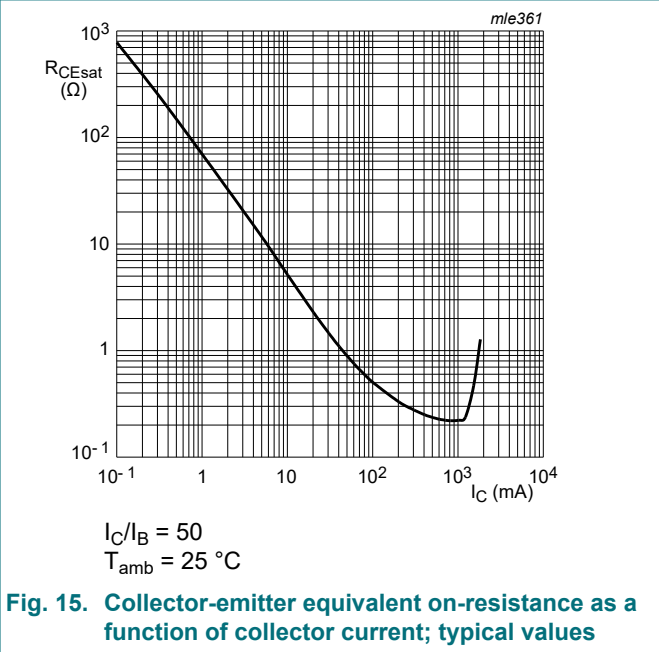
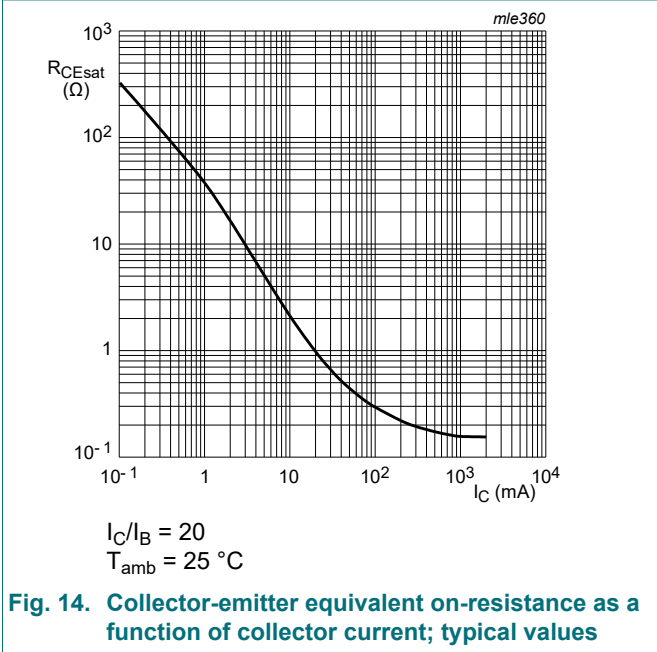
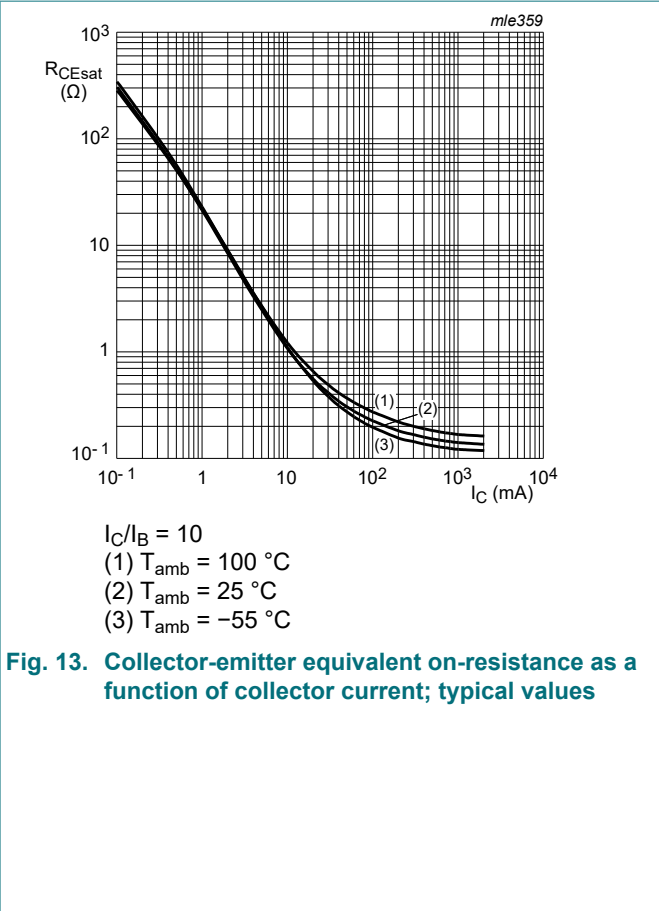
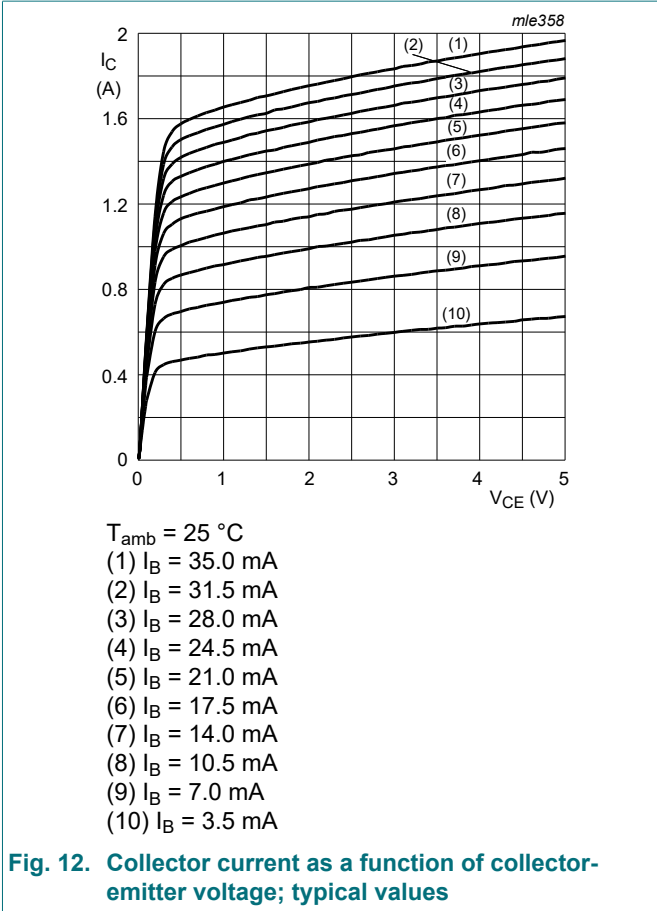
$I_C/I_B = 20$
 $T_{amb} = 25\text{ }^\circ\text{C}$

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



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

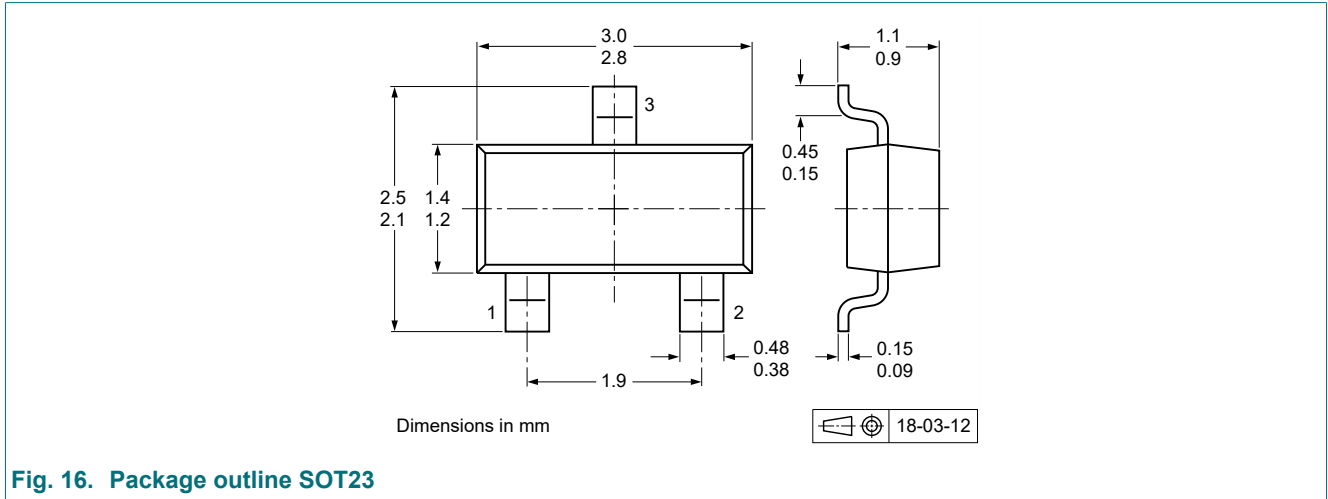


Fig. 16. Package outline SOT23

13. Soldering

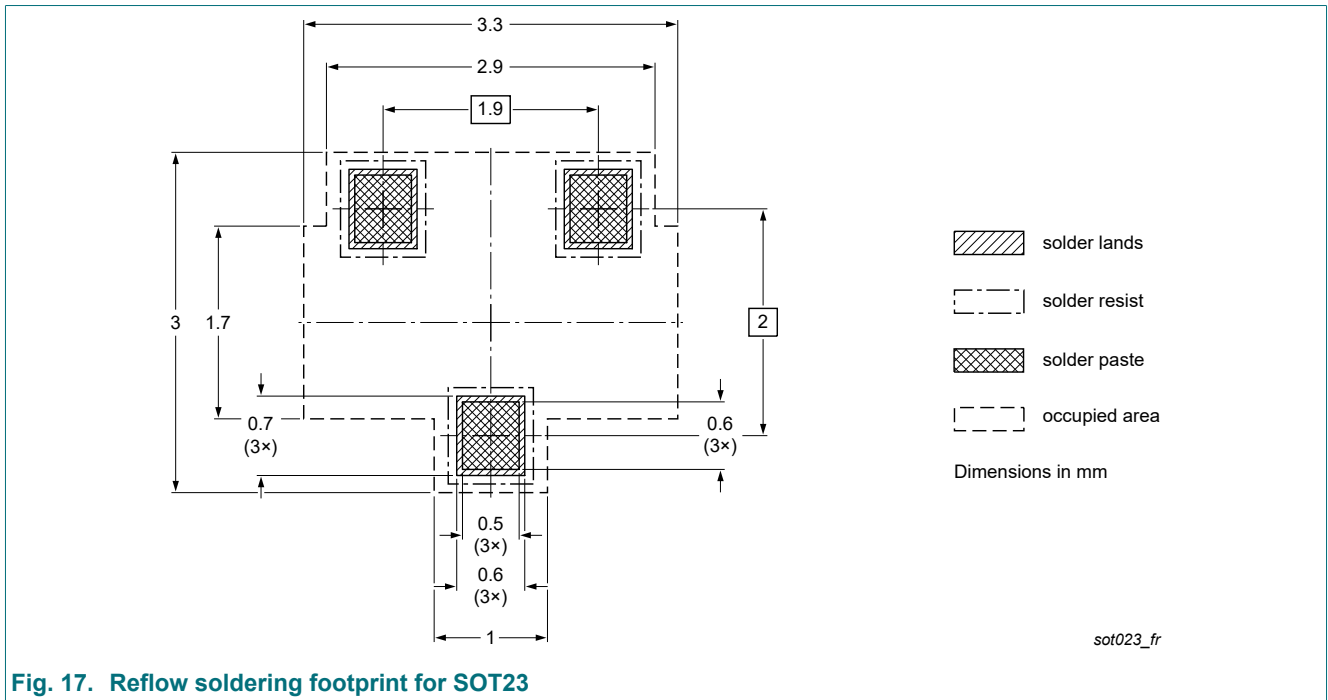


Fig. 17. Reflow soldering footprint for SOT23

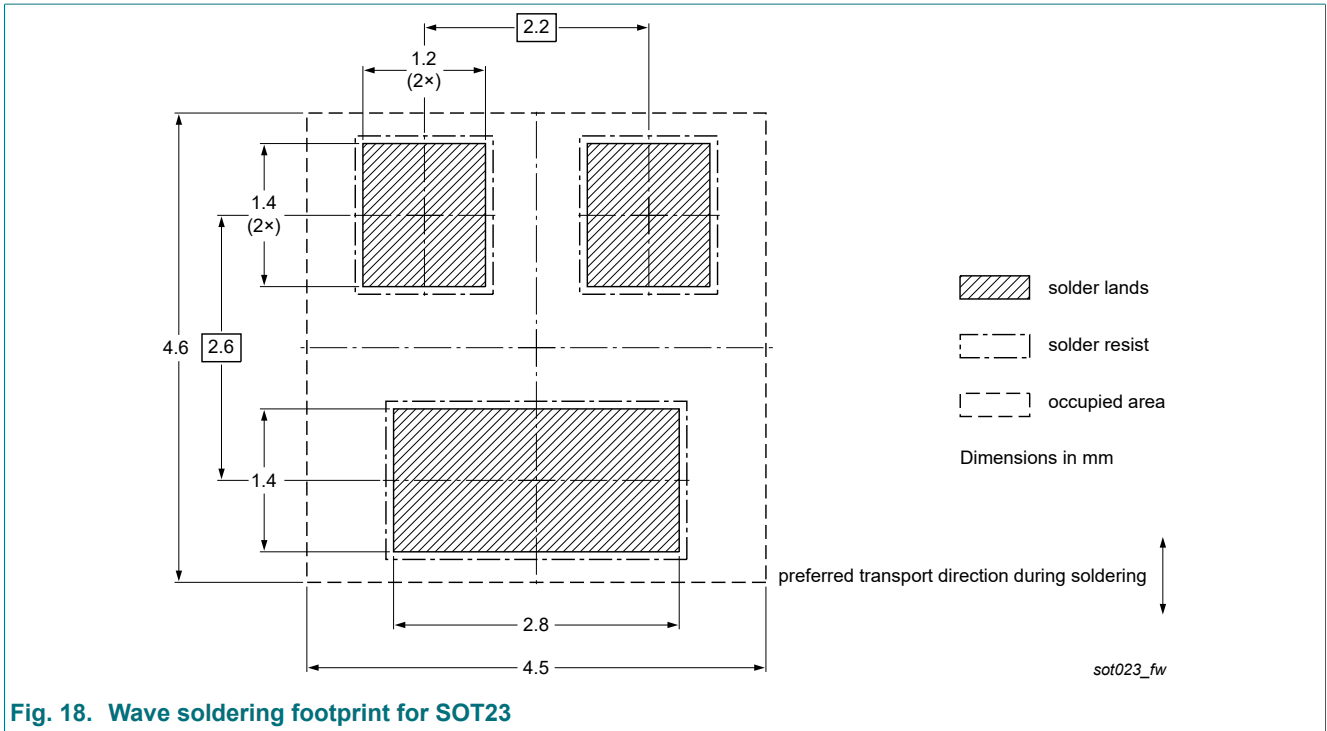


Fig. 18. Wave soldering footprint for SOT23

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".
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