



# PBSS5350Z-Q

50 V, 3 A PNP low V<sub>CEsat</sub> transistor

31 August 2022

Product data sheet

## 1. General description

PNP low V<sub>CEsat</sub> transistor in a medium power SOT223 (SC-73) Surface-Mounted Device (SMD) plastic package.

NPN complement: PBSS4350Z-Q

## 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>
- High collector current gain (h<sub>FE</sub>) at high I<sub>C</sub>
- High energy efficiency due to less heat generation
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- DC/DC converters
- Supply line switching
- Battery charger
- LED backlighting
- Linear voltage regulation (LDO)
- Driver in low supply voltage applications, e.g. lamps, LEDs
- Inductive load driver (for example relays, buzzers, motors)

## 4. Quick reference data

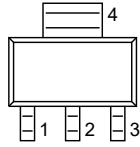
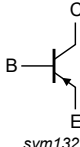
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base	-	-	-50	V
I <sub>C</sub>	collector current		-	-	-3	A
I <sub>CM</sub>	peak collector current	single pulse; t <sub>p</sub> ≤ 1 ms	-	-	-5	A
R <sub>CEsat</sub>	collector-emitter saturation resistance	I <sub>C</sub> = -2 A; I <sub>B</sub> = -200 mA; T <sub>amb</sub> = 25 °C	[1]	120	150	mΩ

[1] Pulsed test: t<sub>p</sub> ≤ 300 μs; δ ≤ 0.02

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 <p>SC-73 (SOT223)</p>	
2	C	collector		
3	E	emitter		
4	C	collector		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PBSS5350Z-Q</a>	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads; 2.3 mm pitch; 6.5 mm x 3.5 mm x 1.65 mm body	<a href="#">SOT223</a>

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PBSS5350Z-Q	PB5350

## 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		-	-60	V
$V_{CEO}$	collector-emitter voltage	open base		-	-50	V
$V_{EBO}$	emitter-base voltage	open collector		-	-6	V
$I_C$	collector current			-	-3	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms		-	-5	A
$I_{BM}$	peak base current			-	-1	A
$P_{tot}$	total power dissipation		[1]	-	0.65	W
			[2]	-	1	W
			[3] [4]	-	1.35	W
			[5]	-	2	W
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-65	150	°C
$T_{stg}$	storage temperature			-65	150	°C

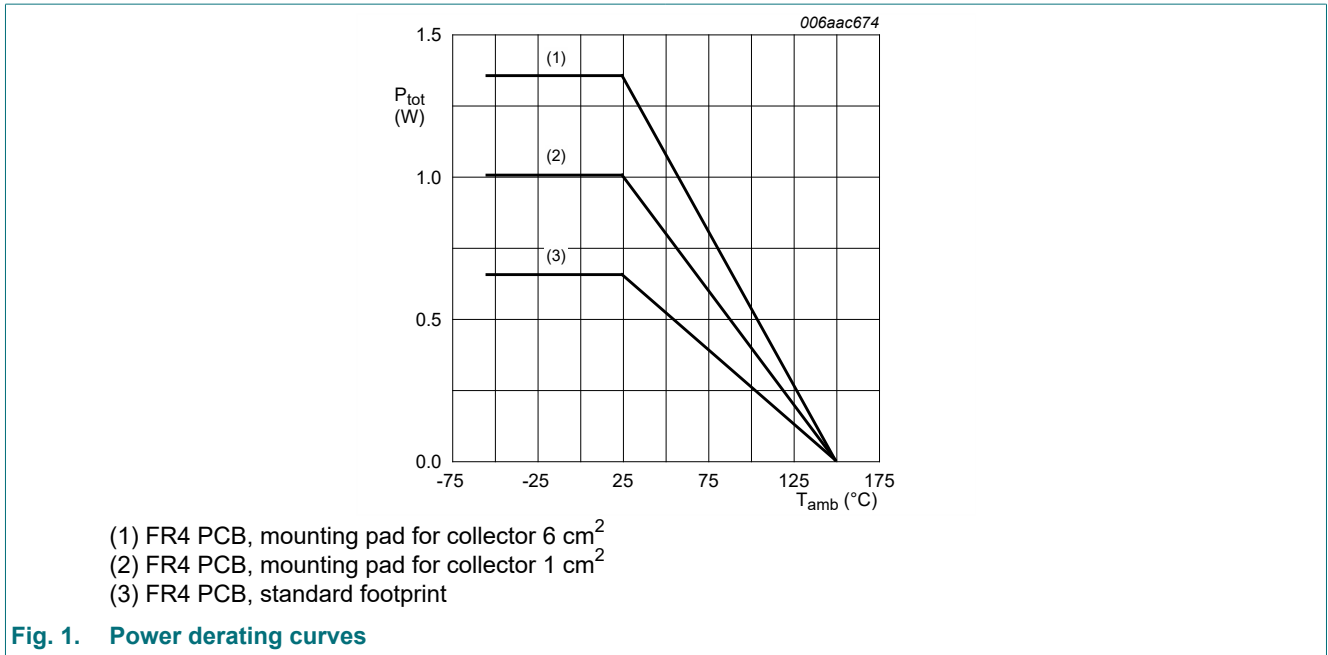
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), 35  $\mu$ m single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, 35  $\mu$ m single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

[3] Device mounted on an FR4 PCB, 35  $\mu$ m single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.

[4] Device mounted on an FR4 PCB, 70  $\mu$ m single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

[5] Device mounted on an FR4 PCB, 70  $\mu$ m single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.

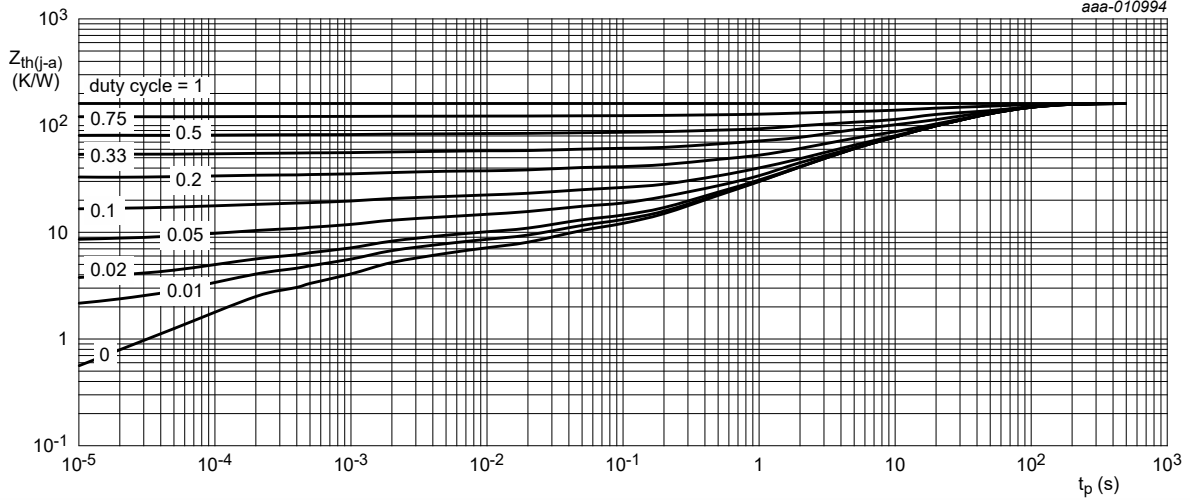


## 9. Thermal characteristics

Table 6. Thermal characteristics

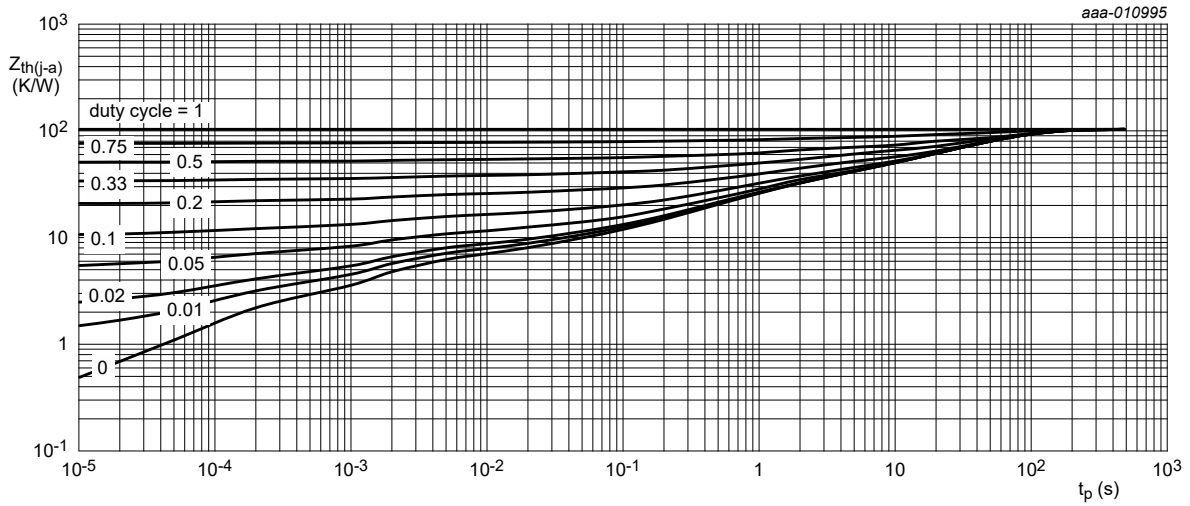
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	-	192	K/W
			[2]	-	-	125	K/W
			[3] [4]	-	-	92	K/W
			[5]	-	-	62.5	K/W
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point		-	-	16	K/W	

- [1] Device mounted on an FR4 PCB, 35 μm single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, 35 μm single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.
- [3] Device mounted on an FR4 PCB, 35 μm single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.
- [4] Device mounted on an FR4 PCB, 70 μm single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.
- [5] Device mounted on an FR4 PCB, 70 μm single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.



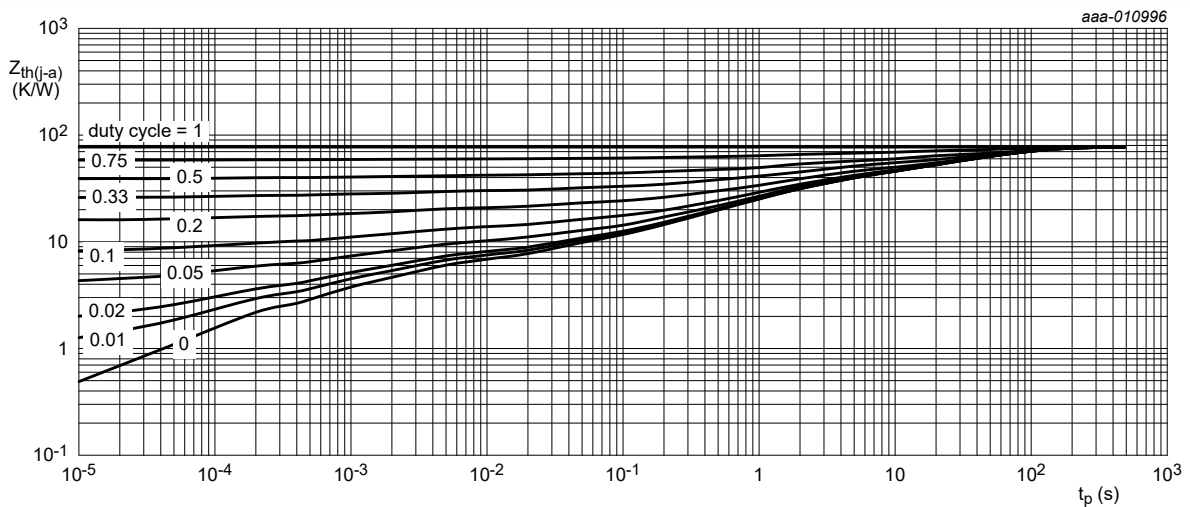
FR4 PCB, 35  $\mu$ m single-sided copper, tin-plated and standard footprint.

Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, 35  $\mu$ m single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, 35  $\mu$ m single-sided copper, tin-plated, mounting pad for collector 6 cm<sup>2</sup>.

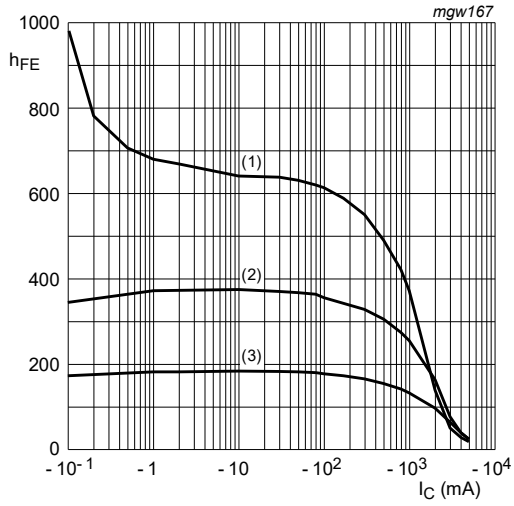
Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

**Table 7. Characteristics**
 $T_{amb} = 25\text{ °C}$  unless otherwise specified.

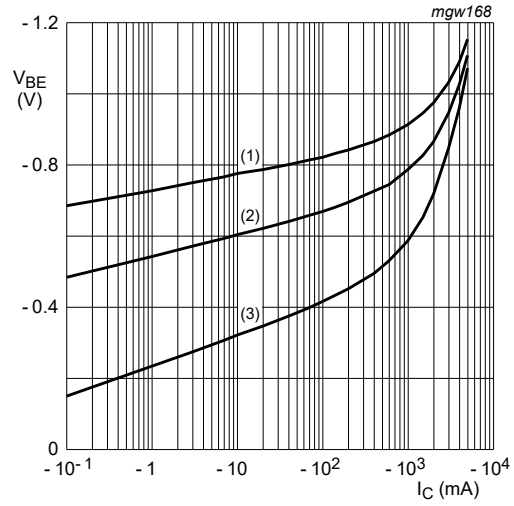
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100\ \mu\text{A}; I_E = 0\ \text{A}$	-60	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -10\ \text{mA}; I_B = 0\ \text{A}$	-50	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage (collector open)	$I_E = -100\ \mu\text{A}; I_C = 0\ \text{A}$	-6	-	-	V
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -50\ \text{V}; I_E = 0\ \text{A}$	-	-	-100	nA
		$V_{CB} = -50\ \text{V}; I_E = 0\ \text{A}; T_j = 150\text{ °C}$	-	-	-50	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\ \text{V}; I_C = 0\ \text{A}$	-	-	-100	nA
$h_{FE}$	DC current gain	$V_{CE} = -2\ \text{V}; I_C = -500\ \text{mA}$	200	-	-	
		$V_{CE} = -2\ \text{V}; I_C = -1\ \text{A}$	[1]	200	-	
		$V_{CE} = -2\ \text{V}; I_C = -2\ \text{A}$	[1]	100	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -500\ \text{mA}; I_B = -50\ \text{mA}$	-	-	-100	mV
		$I_C = -1\ \text{A}; I_B = -50\ \text{mA}$	-	-	-180	mV
		$I_C = -2\ \text{A}; I_B = -200\ \text{mA}$	[1]	-	-	-300
$R_{CEsat}$	collector-emitter saturation resistance	$I_C = -2\ \text{A}; I_B = -200\ \text{mA}; T_{amb} = 25\text{ °C}$	[1]	120	150	m $\Omega$
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -2\ \text{A}; I_B = -200\ \text{mA}$	[1]	-	-1.2	V
$V_{BEon}$	base-emitter turn-on voltage	$V_{CE} = -2\ \text{V}; I_C = -1\ \text{A}; T_{amb} = 25\text{ °C}$	[1]	-	-1.1	V
$f_T$	transition frequency	$V_{CE} = -5\ \text{V}; I_C = -100\ \text{mA}; f = 100\ \text{MHz}$	100	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = -10\ \text{V}; I_E = 0\ \text{A}; i_e = 0\ \text{A}; f = 1\ \text{MHz}$	-	-	40	pF

[1] Pulsed test:  $t_p \leq 300\ \mu\text{s}; \delta \leq 0.02$



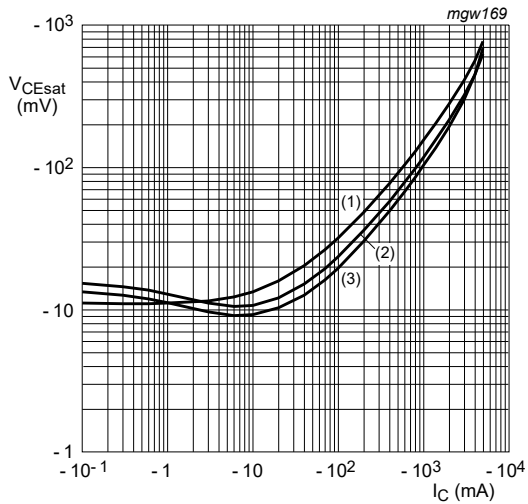
$V_{CE} = -2\text{ V}$   
 (1)  $T_{amb} = 150^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = -55^\circ\text{C}$

**Fig. 5. DC current gain as a function of collector current; typical values**



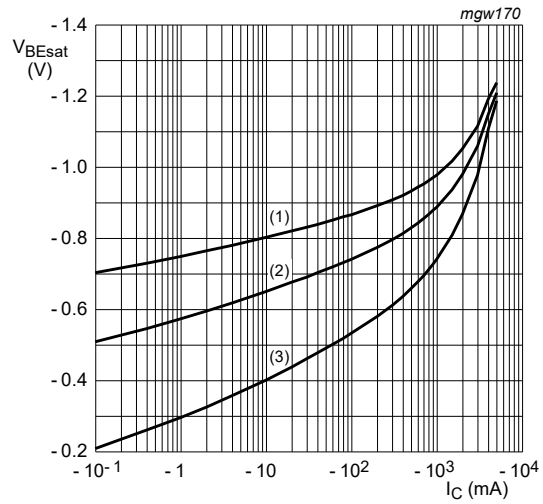
$V_{CE} = -2\text{ V}$   
 (1)  $T_{amb} = -55^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = 150^\circ\text{C}$

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



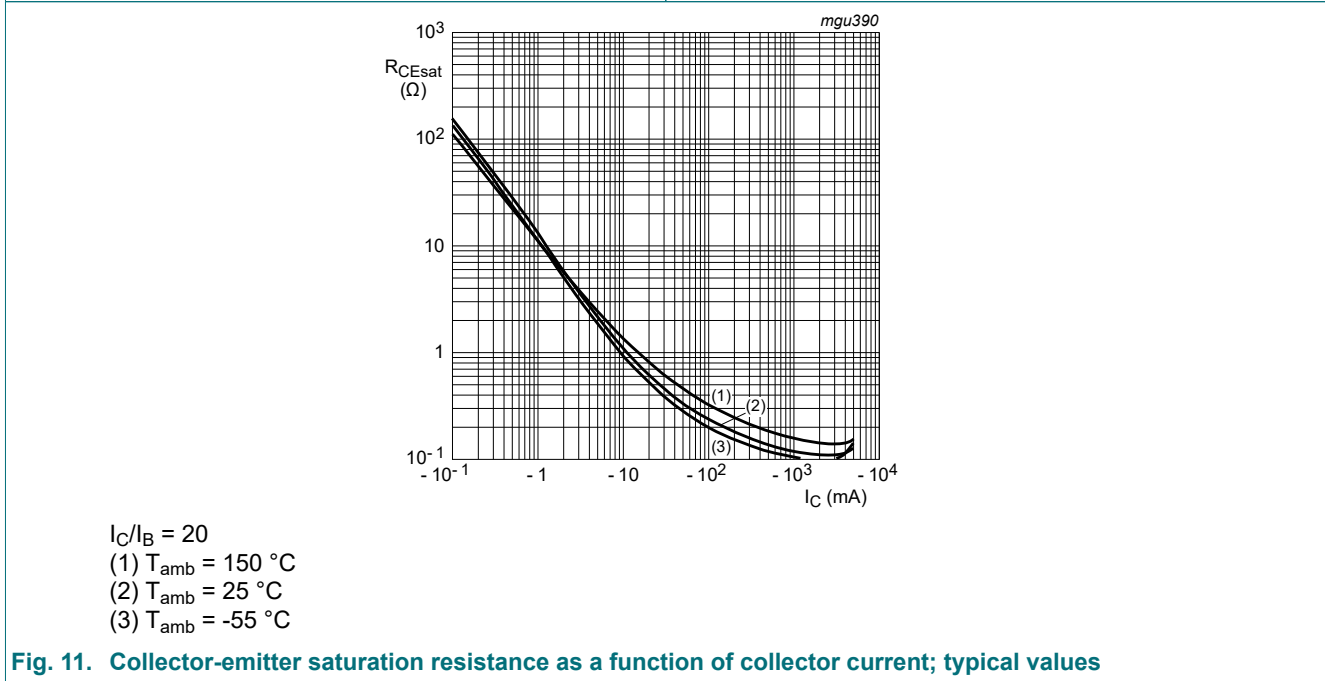
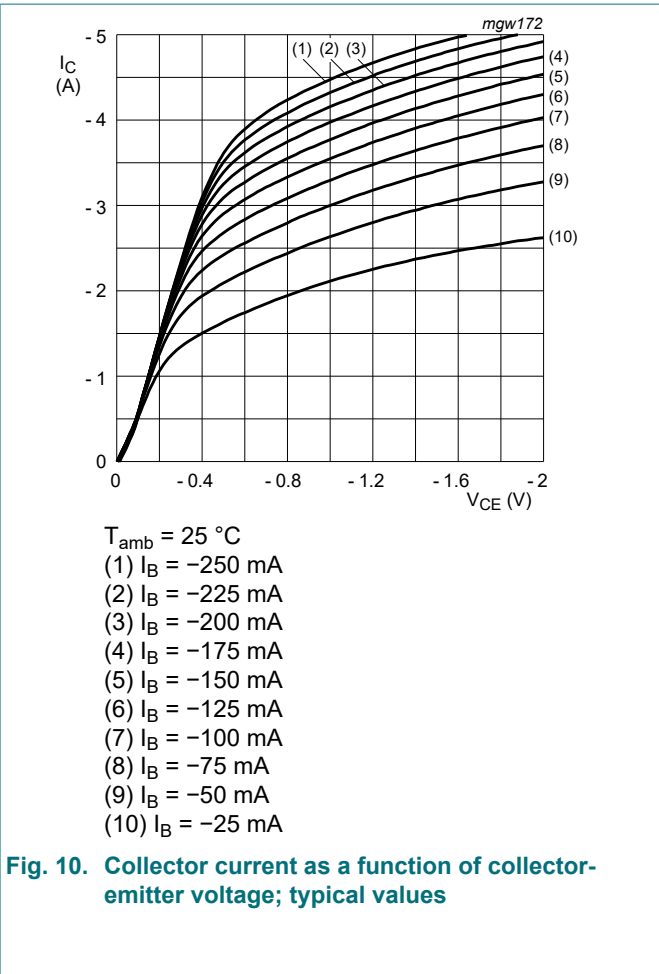
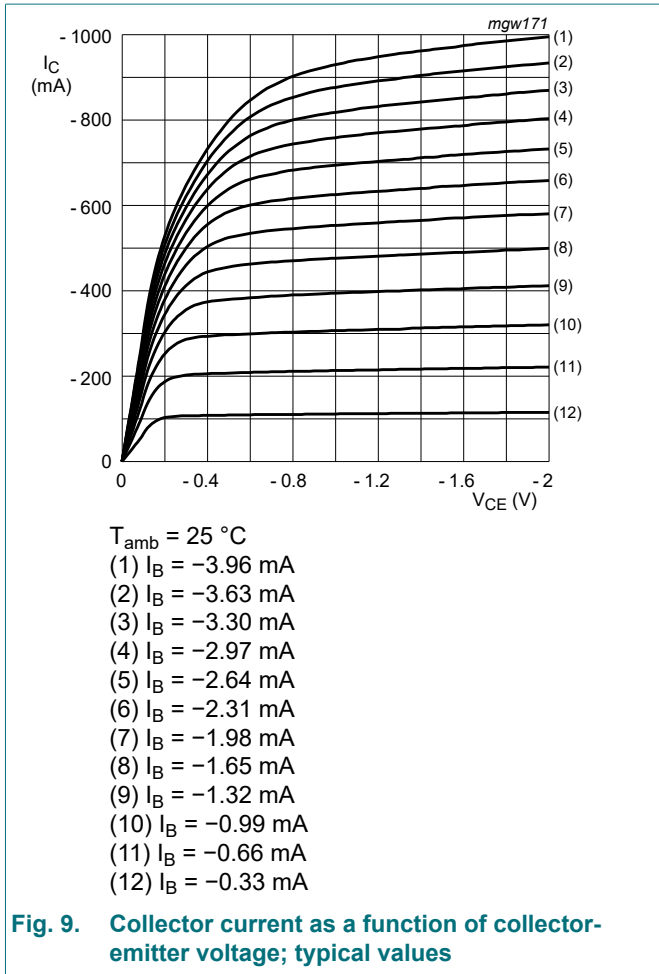
$I_C/I_B = 10$   
 (1)  $T_{amb} = 150^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = -55^\circ\text{C}$

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



$I_C/I_B = 10$   
 (1)  $T_{amb} = -55^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = 150^\circ\text{C}$

**Fig. 8. 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

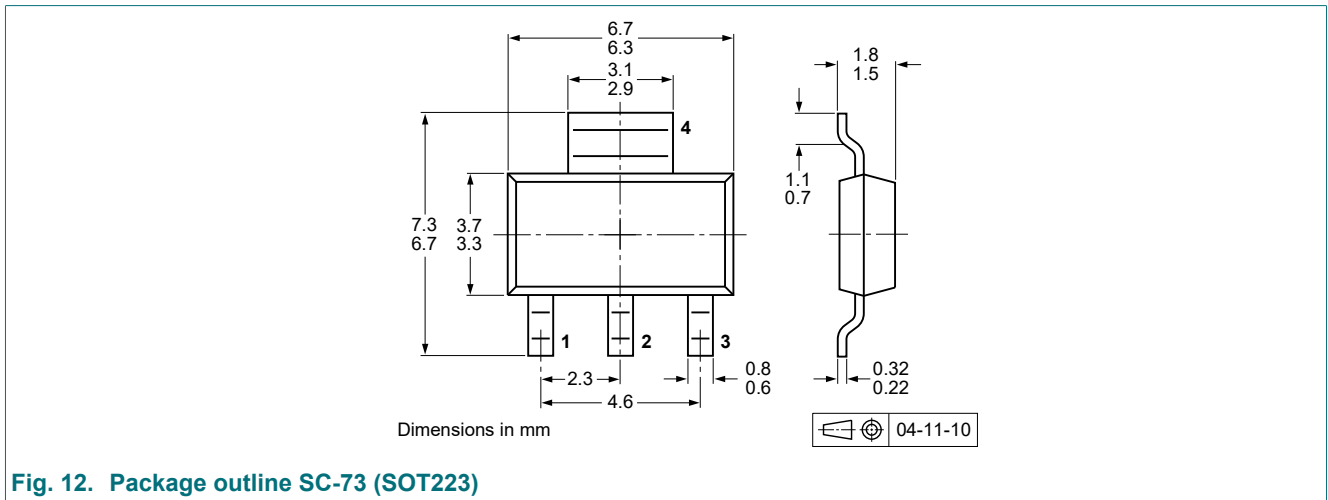


Fig. 12. Package outline SC-73 (SOT223)

## 13. Soldering

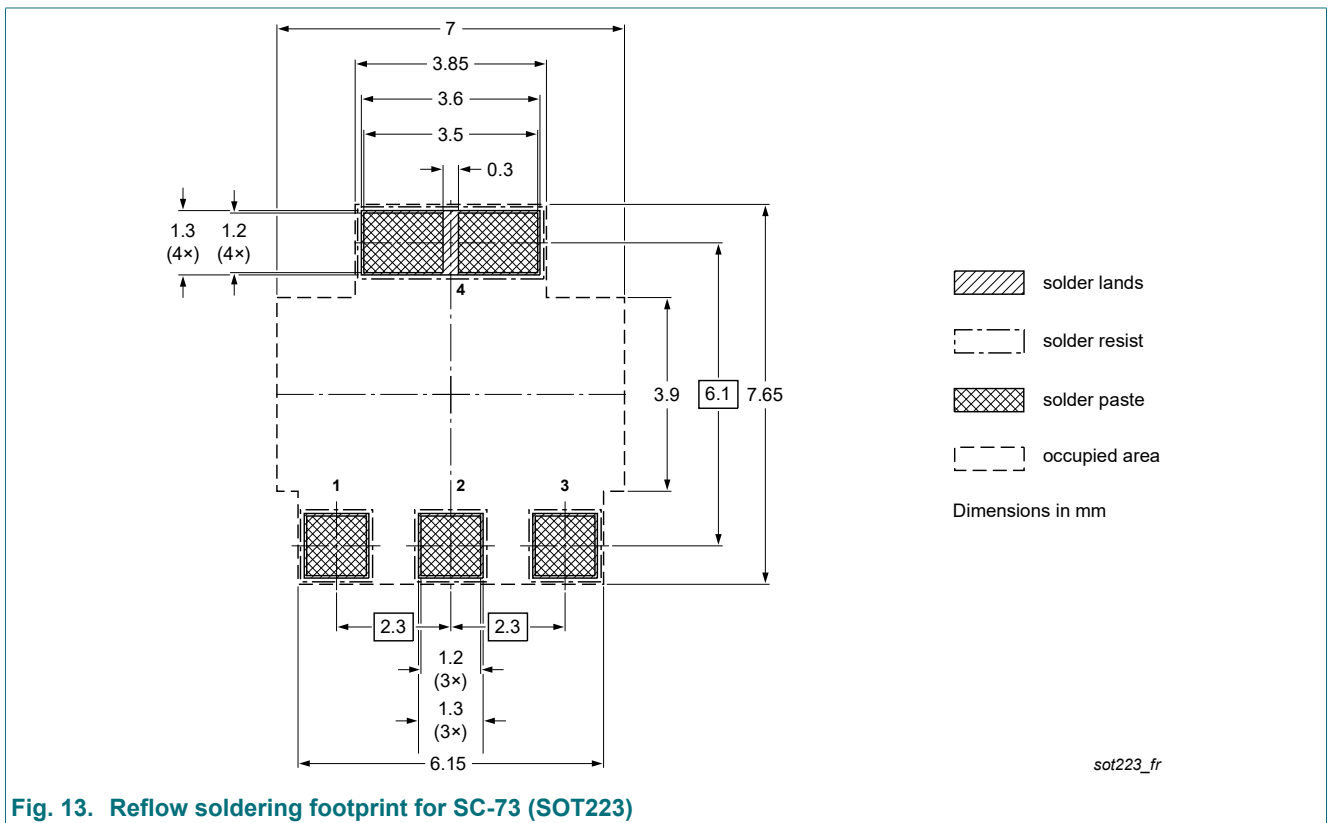


Fig. 13. Reflow soldering footprint for SC-73 (SOT223)



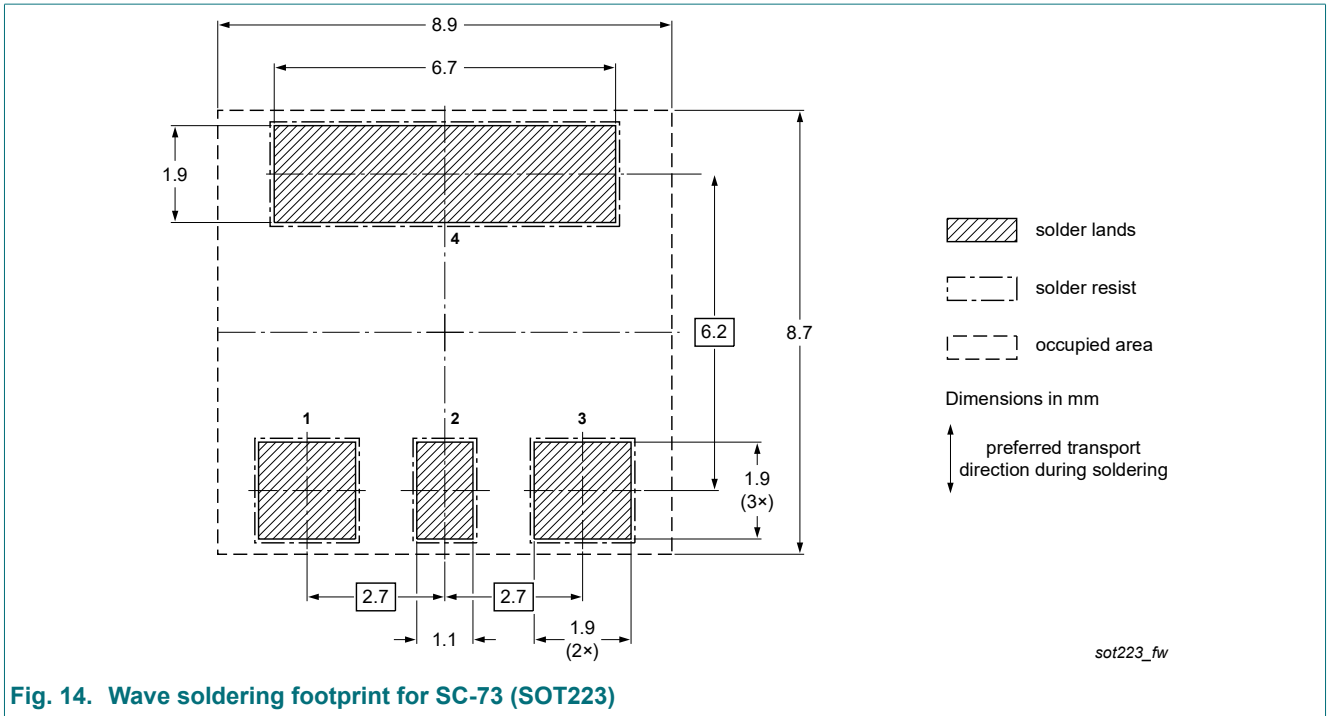


Fig. 14. Wave soldering footprint for SC-73 (SOT223)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5350Z-Q v.1	20220831	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.

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

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1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	2
9. Thermal characteristics.....	3
10. Characteristics.....	5
11. Test information.....	8
12. Package outline.....	8
13. Soldering.....	8
14. Revision history.....	10
15. Legal information.....	11

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Date of release: 31 August 2022

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