



# PBSS5350Z

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

18 November 2019

Product data sheet

## 1. General description

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

NPN complement: PBSS4350Z

## 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
- AEC-Q101 qualified

## 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

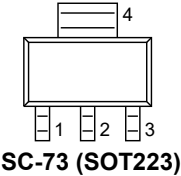
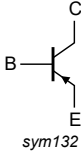
Table 1. Quick reference data

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>	 <p>sym132</p>
2	C	collector		
3	E	emitter		
4	C	collector		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS5350Z	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	SOT223

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PBSS5350Z	PB5350

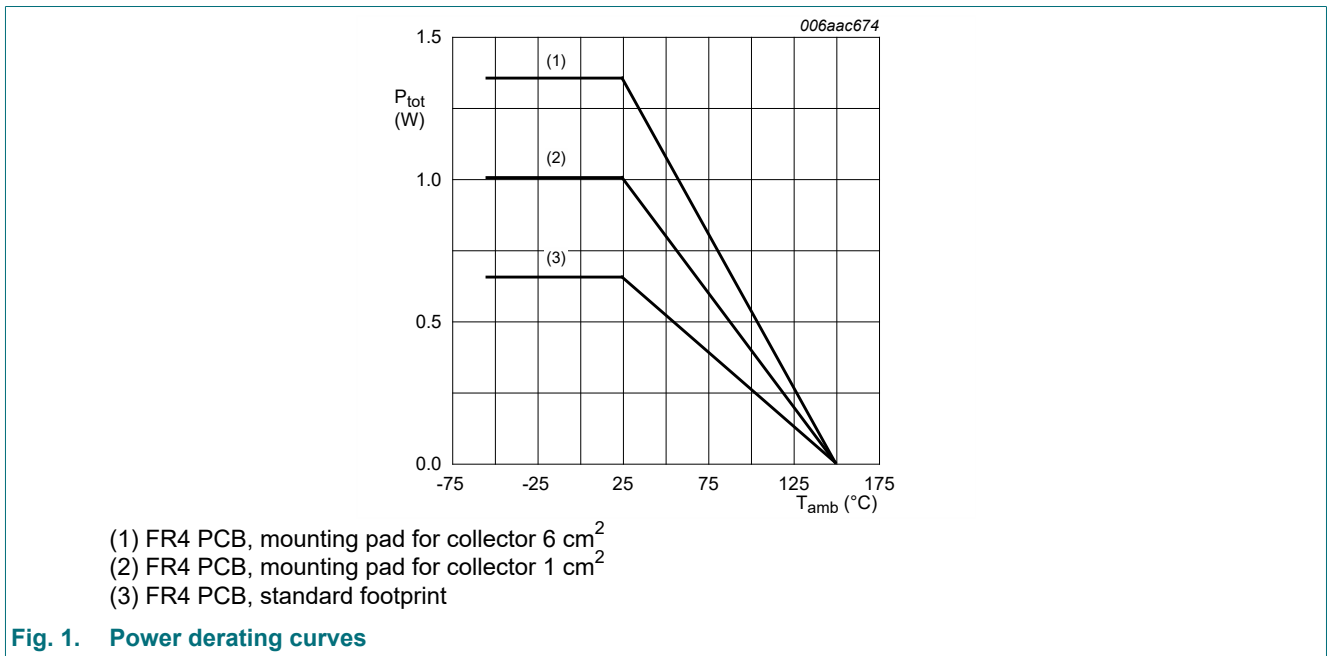
## 8. Limiting values

**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  $cm^2$ .
- [3] Device mounted on an FR4 PCB, 35  $\mu$ m single-sided copper, tin-plated, mounting pad for collector 6  $cm^2$ .
- [4] Device mounted on an FR4 PCB, 70  $\mu$ m single-sided copper, tin-plated, mounting pad for collector 1  $cm^2$ .
- [5] Device mounted on an FR4 PCB, 70  $\mu$ m single-sided copper, tin-plated, mounting pad for collector 6  $cm^2$ .



**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]	-	-	192	K/W
			[2]	-	-	125	K/W
			[3] [4]	-	-	92	K/W
			[5]	-	-	62.5	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	16	K/W

- [1] Device mounted on an FR4 PCB, 35  $\mu\text{m}$  single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, 35  $\mu\text{m}$  single-sided copper, tin-plated, mounting pad for collector 1  $\text{cm}^2$ .
- [3] Device mounted on an FR4 PCB, 35  $\mu\text{m}$  single-sided copper, tin-plated, mounting pad for collector 6  $\text{cm}^2$ .
- [4] Device mounted on an FR4 PCB, 70  $\mu\text{m}$  single-sided copper, tin-plated, mounting pad for collector 1  $\text{cm}^2$ .
- [5] Device mounted on an FR4 PCB, 70  $\mu\text{m}$  single-sided copper, tin-plated, mounting pad for collector 6  $\text{cm}^2$ .

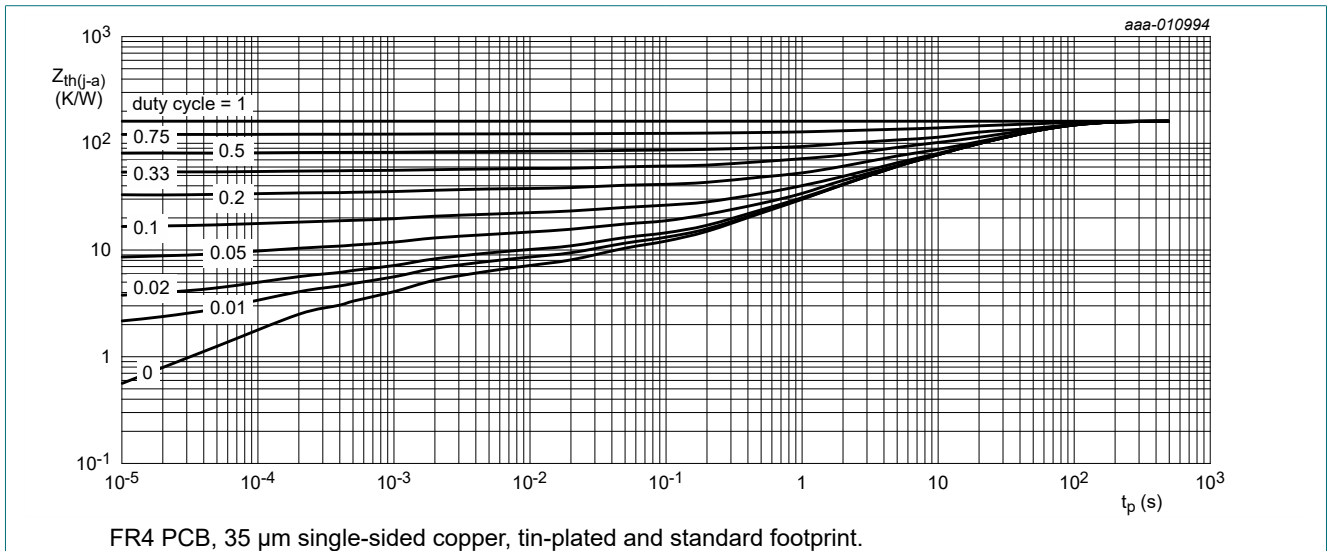


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

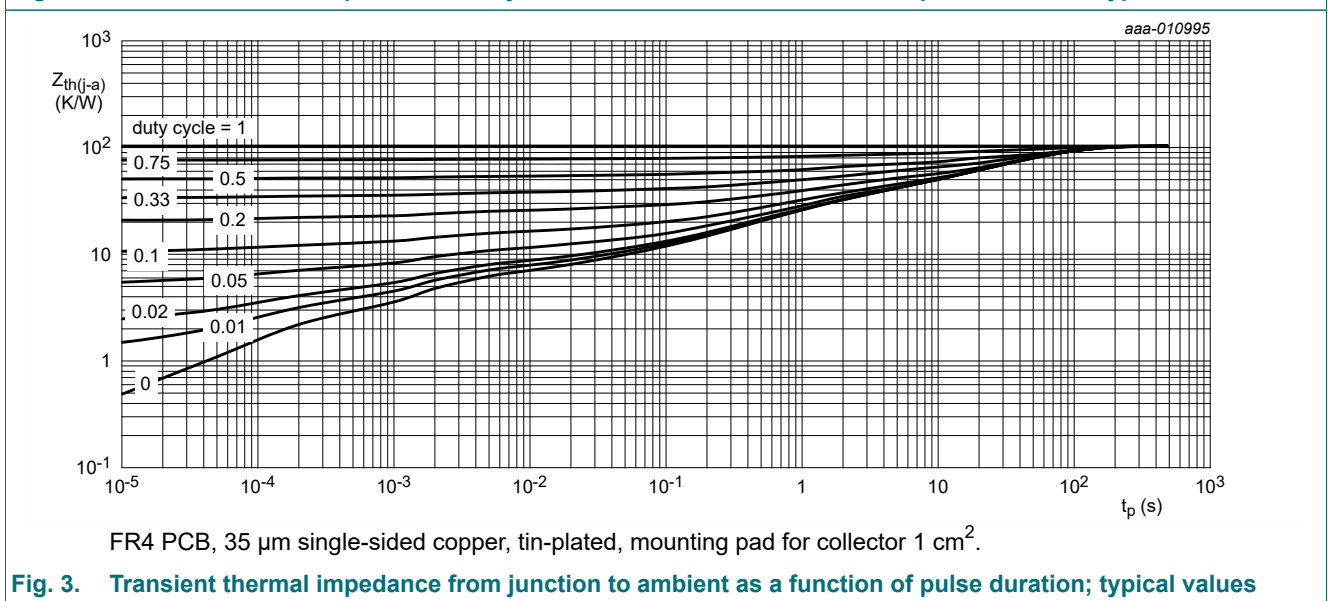
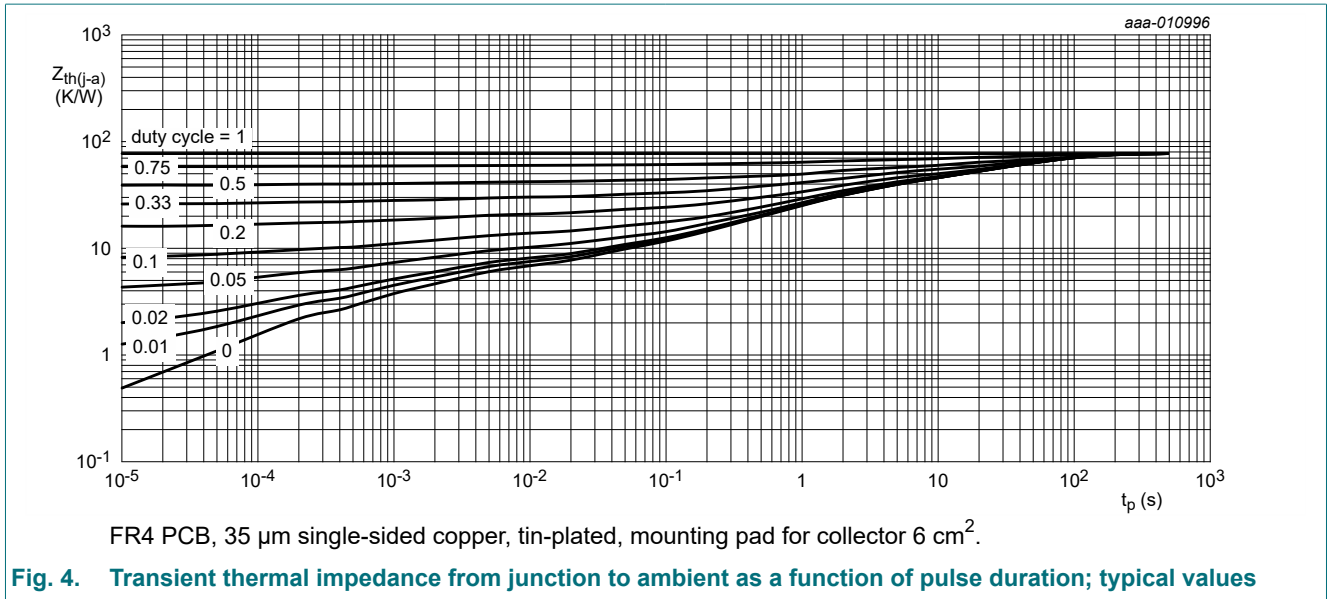


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



## 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	$I_C = -100\text{ }\mu\text{A}$ ; $I_E = 0\text{ A}$	-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)	$I_E = -100\text{ }\mu\text{A}$ ; $I_C = 0\text{ A}$	-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	mV
$R_{CEsat}$	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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$C_c$	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:  $t_p \leq 300\ \mu\text{s}$ ;  $\delta \leq 0.02$

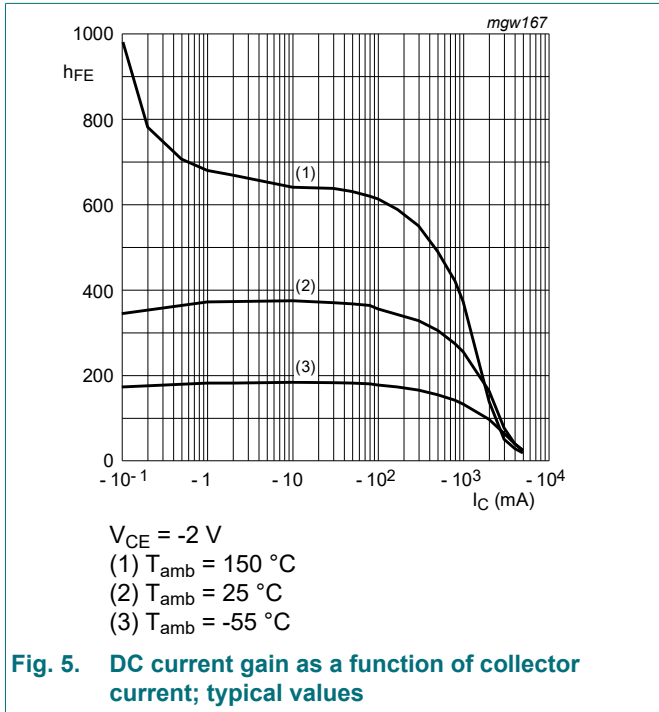


Fig. 5. DC current gain as a function of collector current; typical values

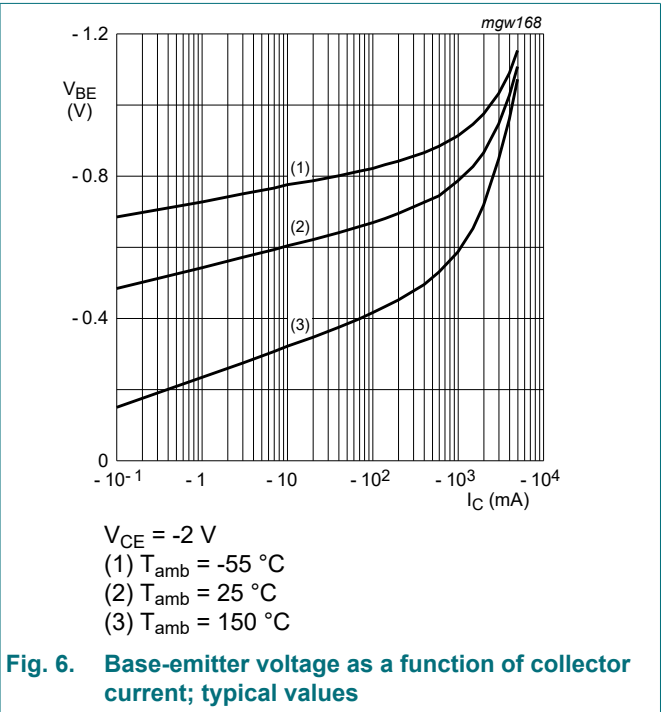


Fig. 6. Base-emitter voltage as a function of collector current; typical values

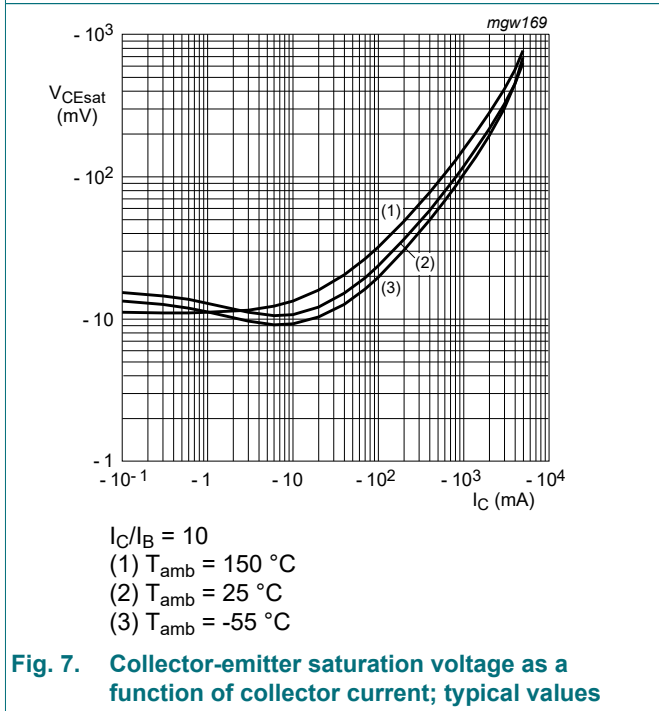


Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values

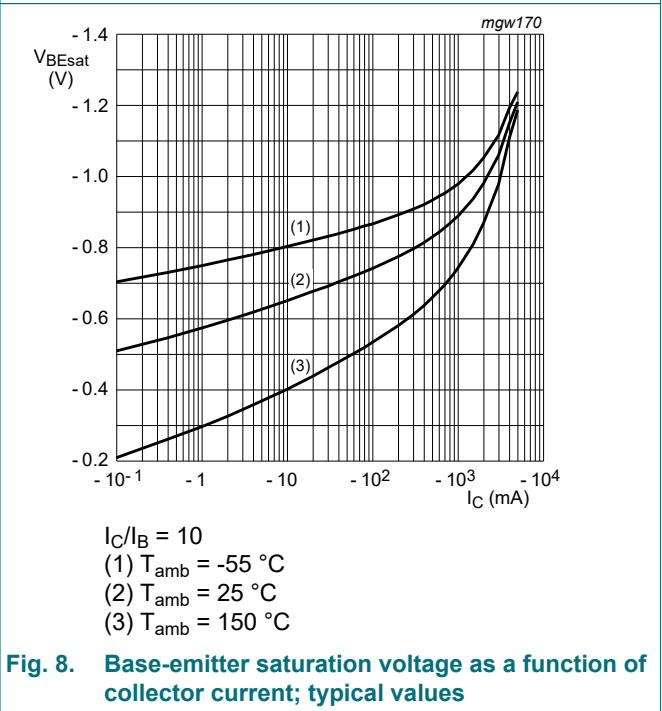
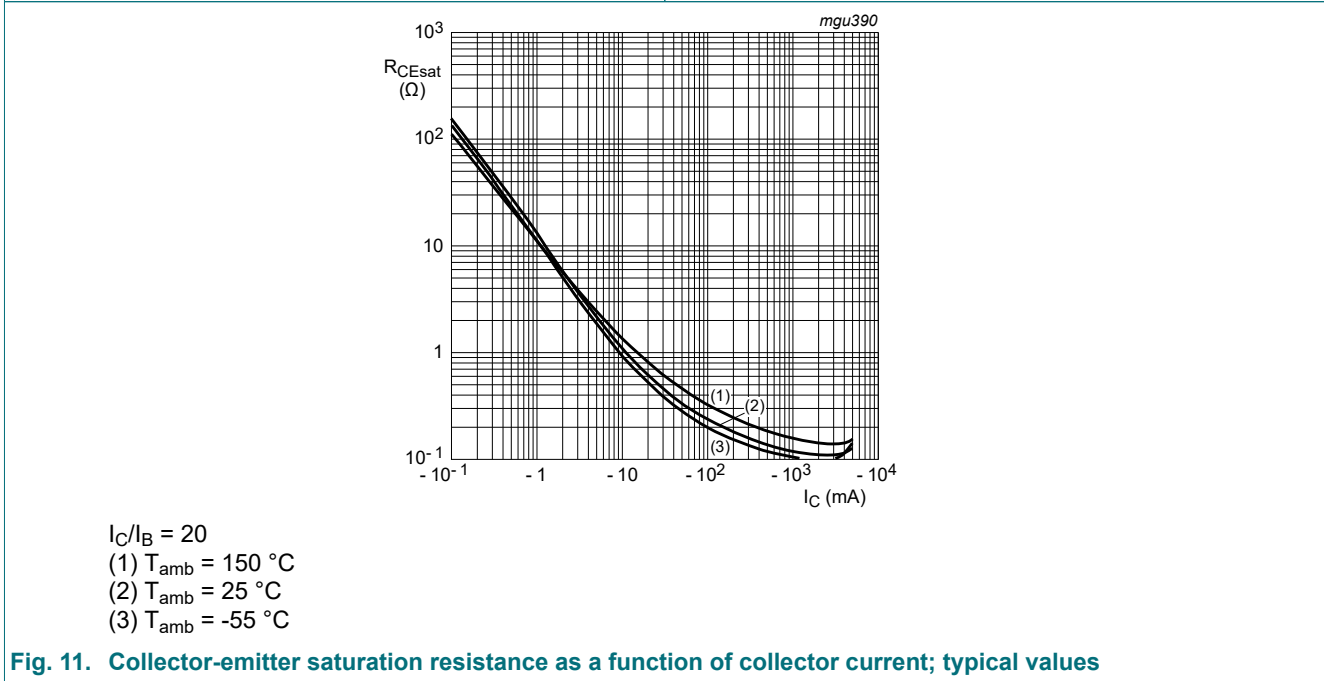
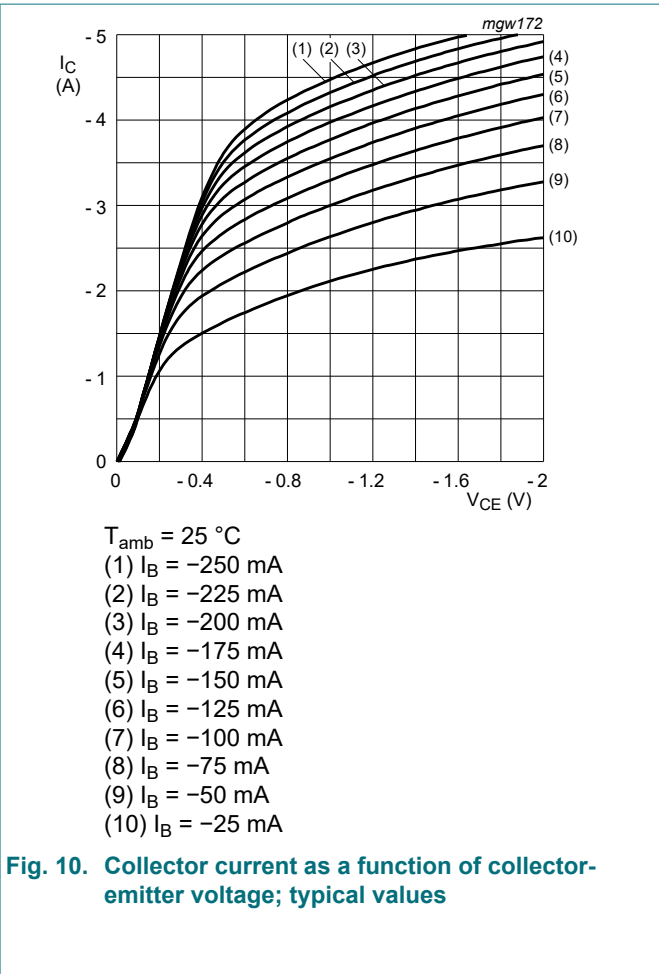
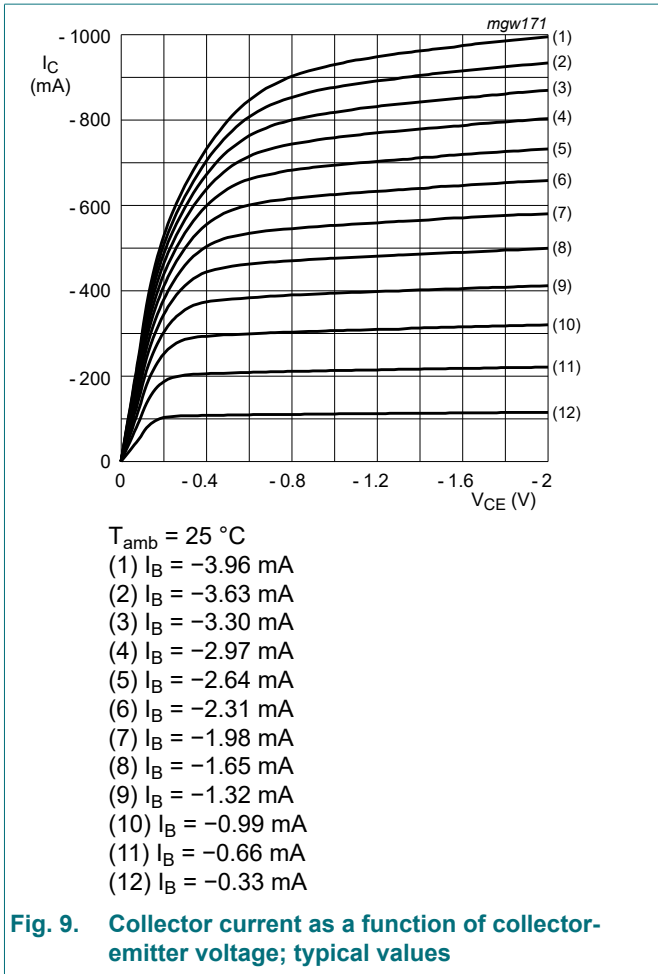


Fig. 8. Base-emitter saturation voltage as a function of collector current; typical values



## 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

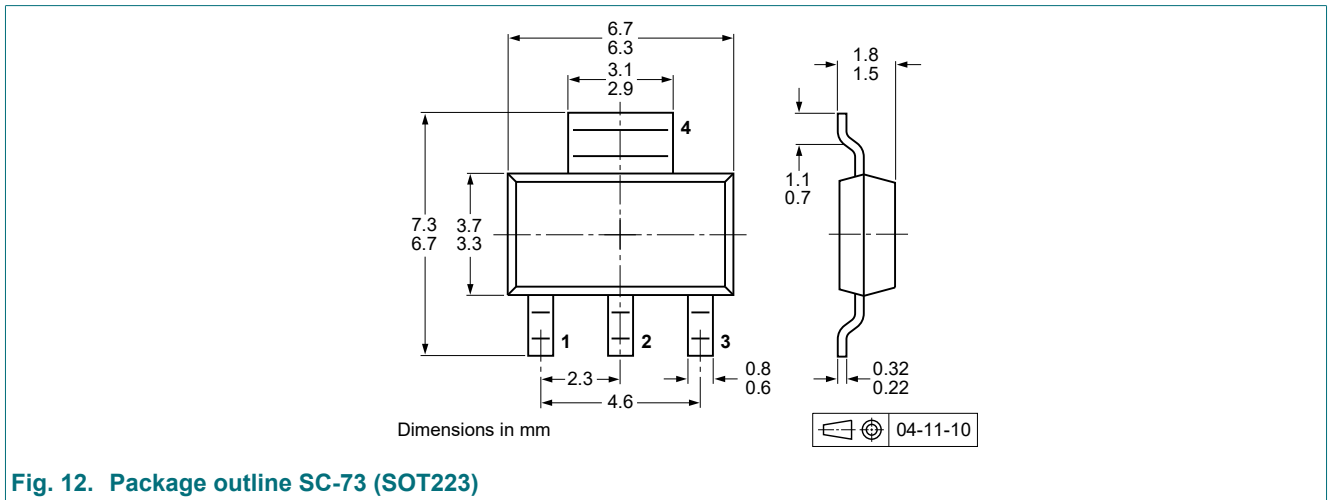


Fig. 12. Package outline SC-73 (SOT223)

## 13. Soldering

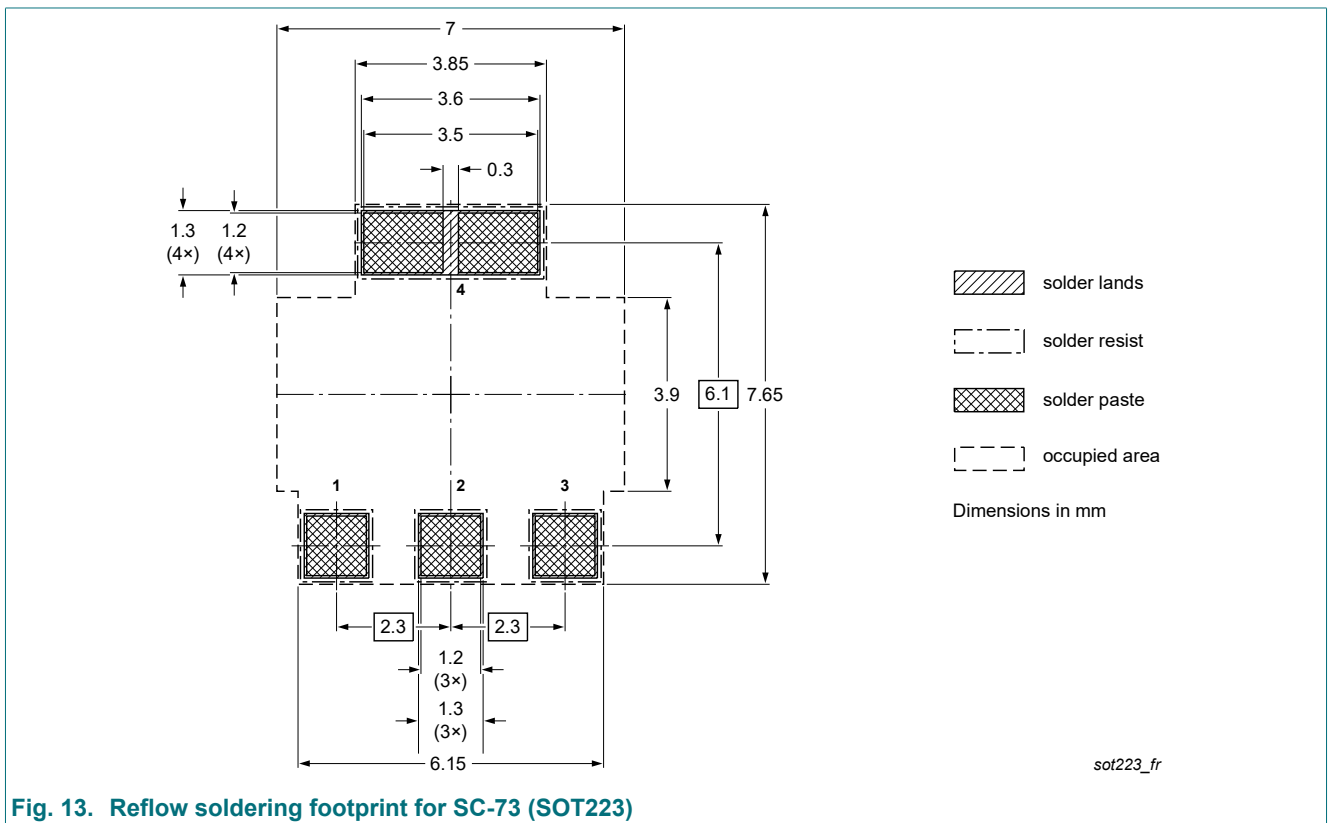


Fig. 13. Reflow soldering footprint for SC-73 (SOT223)



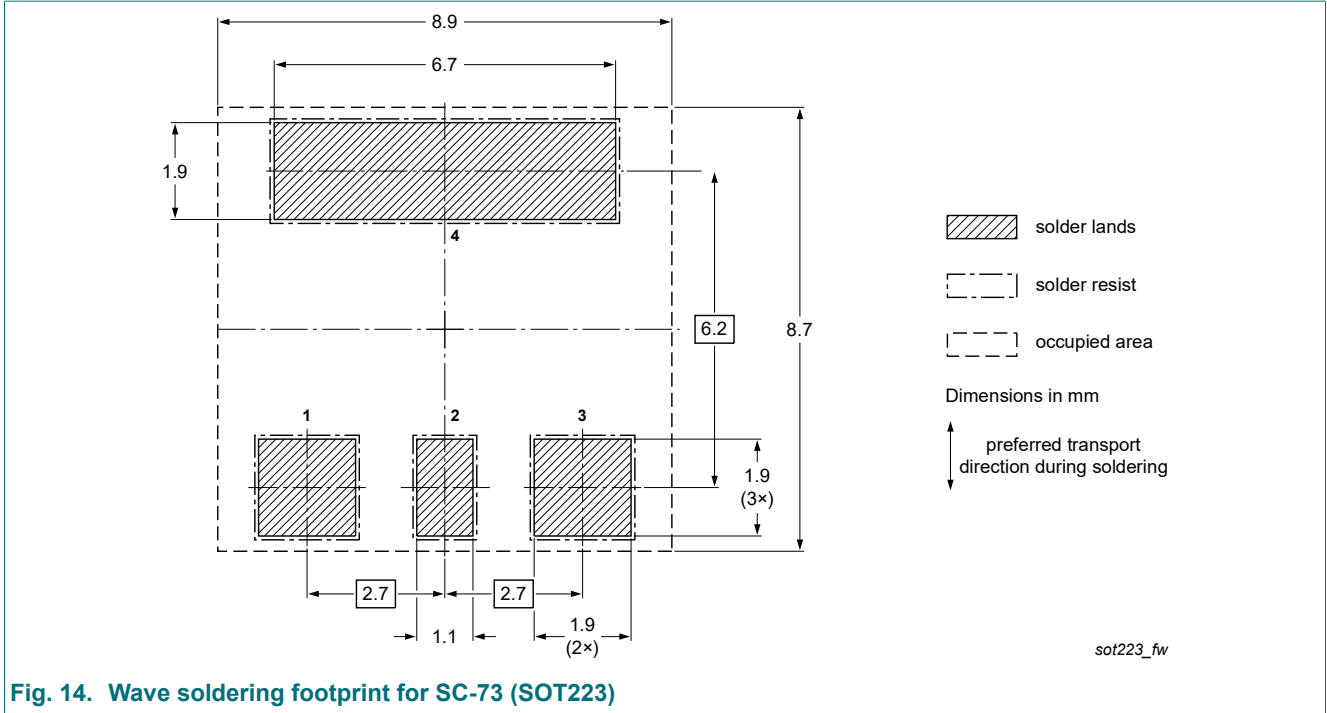


Fig. 14. Wave soldering footprint for SC-73 (SOT223)

## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5350Z v.5	20191118	Product data sheet	-	PBSS5350Z v.4
Modifications:	<ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>Legal texts have been adapted to the new company name where appropriate.</li></ul>			
PBSS5350Z v.4	20030513	Product data sheet	-	PBSS5350Z v.3
PBSS5350Z v.3	20030120	Product data sheet	-	PBSS5350Z v.2
PBSS5350Z v.2	20011113	Product data sheet	-	PBSS5350Z v.1
PBSS5350Z v.1	20010717	Product data sheet	-	-

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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