PBSS5350Z-Q

50 V, 3 A PNP low VCEsat transistor

31 August 2022 Product data sheet

1. General description

PNP low V_{CEsat} 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_{CEsat}
- High collector current capability: I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- 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_{CEO}	collector-emitter voltage	open base		-	-	-50	V
I_C	collector current			-	-	-3	A
I_{CM}	peak collector current	single pulse; $t_p \leq$ 1 ms		-	-	-5	A
R_{CEsat}	collector-emitter saturation resistance	I_C = -2 A; I_B = -200 mA; T_{amb} = 25 °C	[1]	-	120	150	mΩ

[1] Pulsed test: $t_p \leq 300$ µs; $\delta \leq 0.02$

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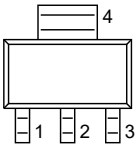
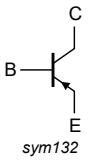
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 SC-73 (SOT223)	 sym132
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBSS5350Z-Q	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-Q	PB5350

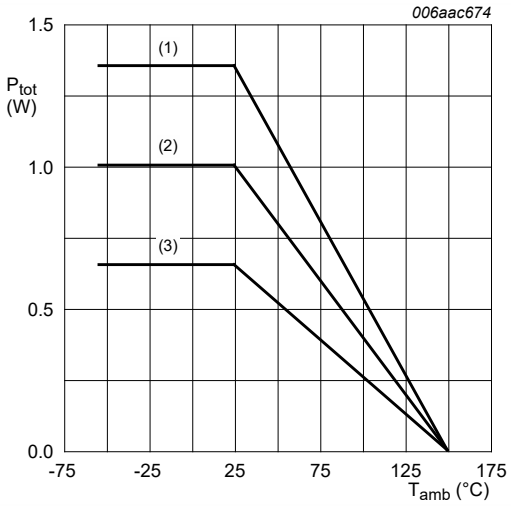
8. Limiting values

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



(1) FR4 PCB, mounting pad for collector 6 cm^2
(2) FR4 PCB, mounting pad for collector 1 cm^2
(3) FR4 PCB, standard footprint

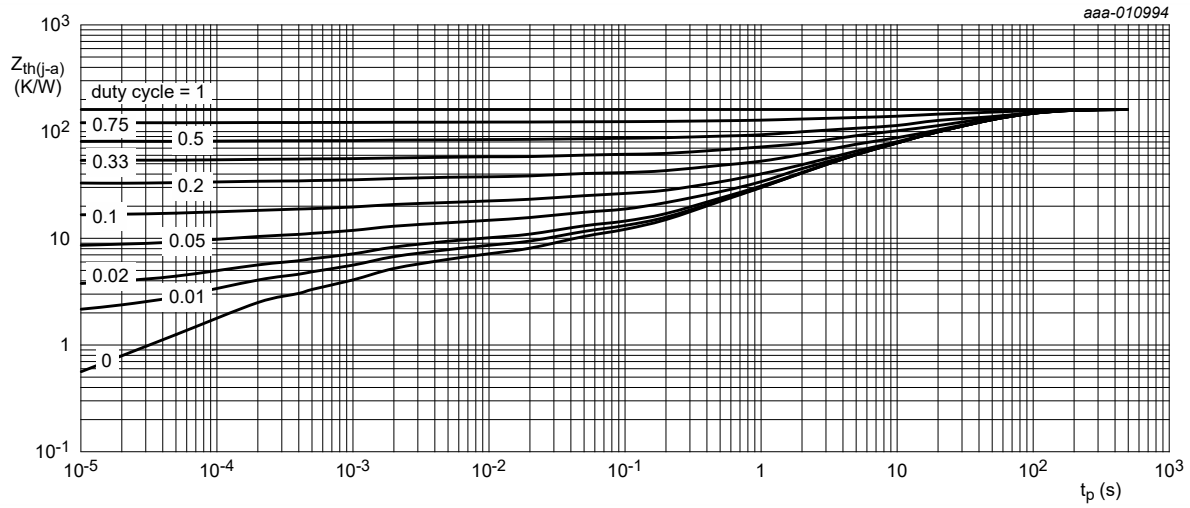
Fig. 1. Power derating curves

9. Thermal characteristics

Table 6. Thermal characteristics

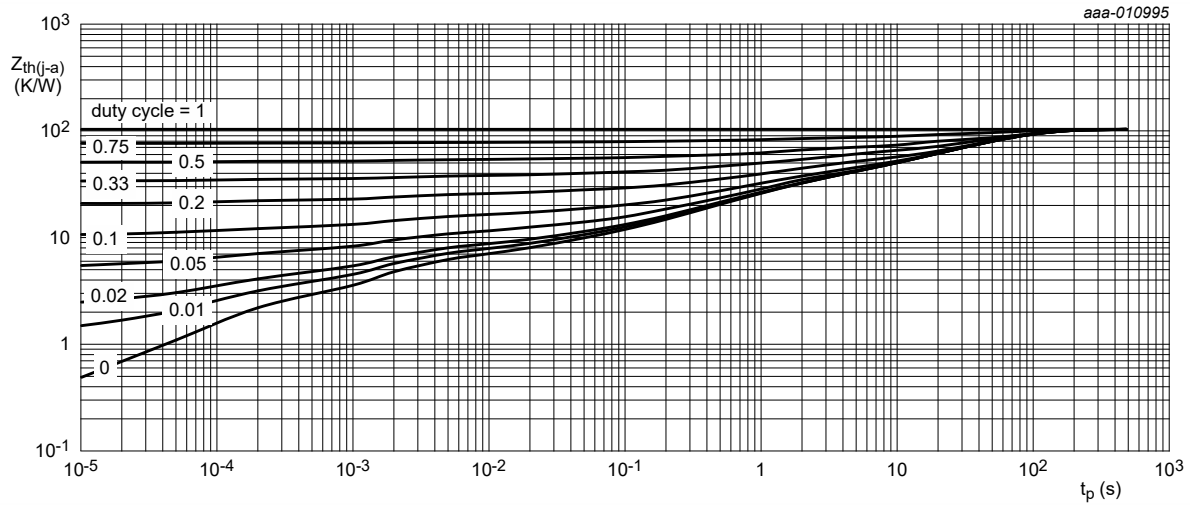
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	192	K/W
			[2]	-	-	125	K/W
			[3] [4]	-	-	92	K/W
			[5]	-	-	62.5	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	16	K/W

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



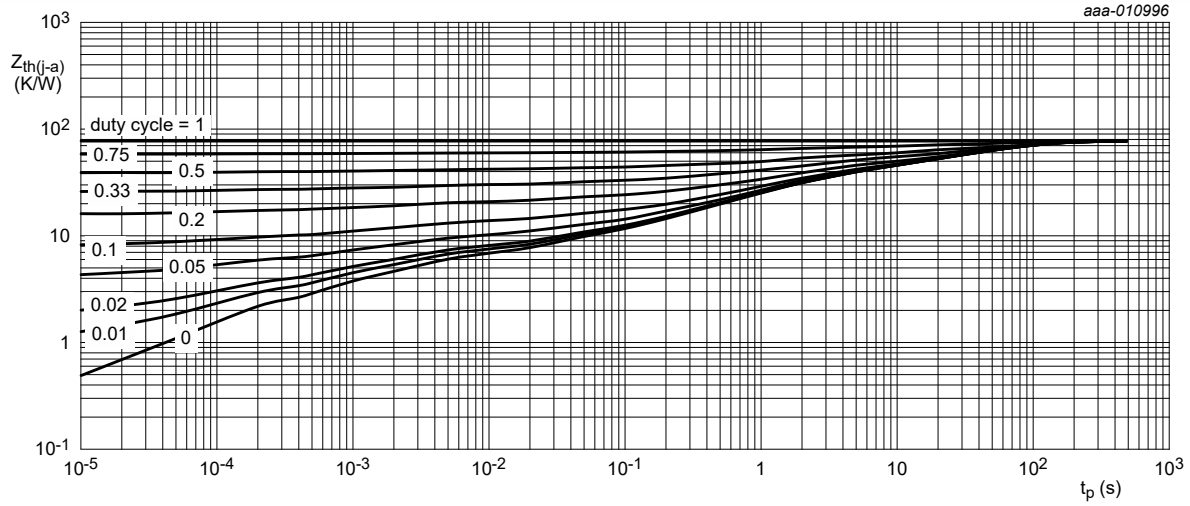
FR4 PCB, 35 µm single-sided copper, tin-plated and standard footprint.

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



FR4 PCB, 35 µm single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

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



FR4 PCB, 35 µm single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

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

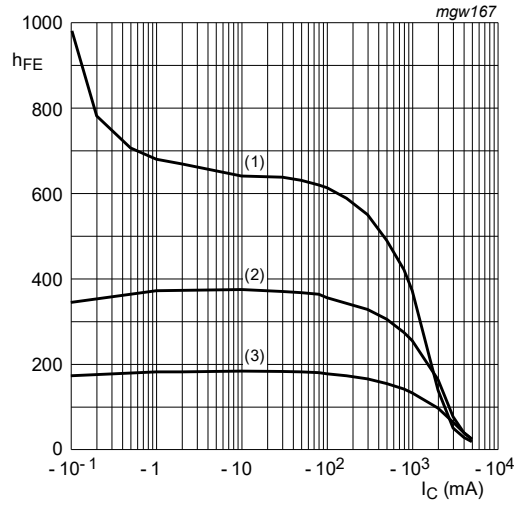
10. Characteristics

Table 7. Characteristics

T_{amb} = 25 °C unless otherwise specified.

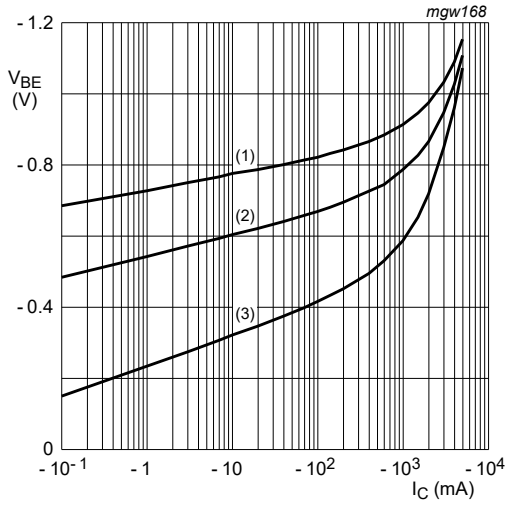
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = -100 µA; I_E = 0 A		-60	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = -10 mA; I_B = 0 A		-50	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage (collector open)	I_E = -100 µA; I_C = 0 A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

[1] Pulsed test: $t_p \leq 300$ µs; $\delta \leq 0.02$



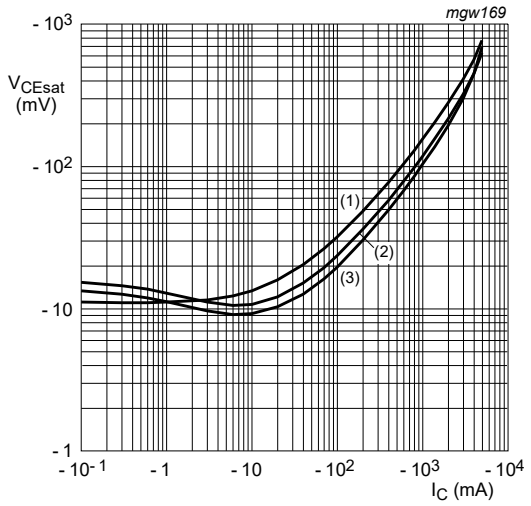
V_{CE} = -2 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



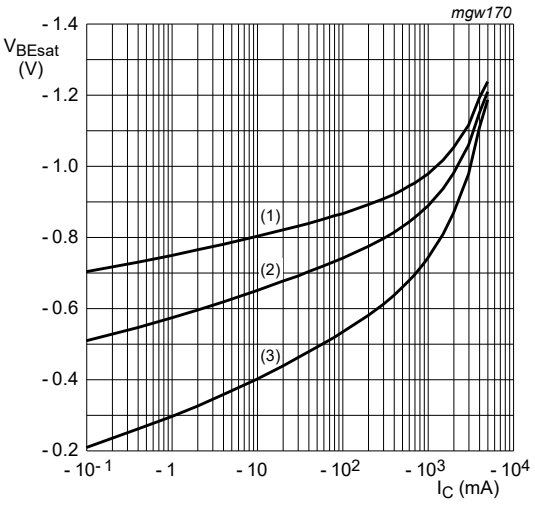
V_{CE} = -2 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

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



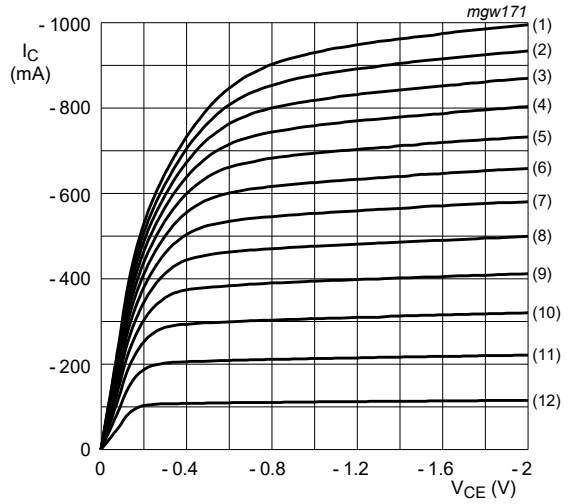
I_C/I_B = 10
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



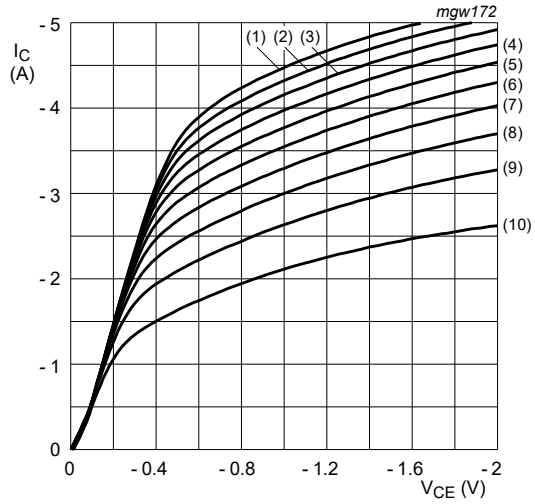
I_C/I_B = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

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



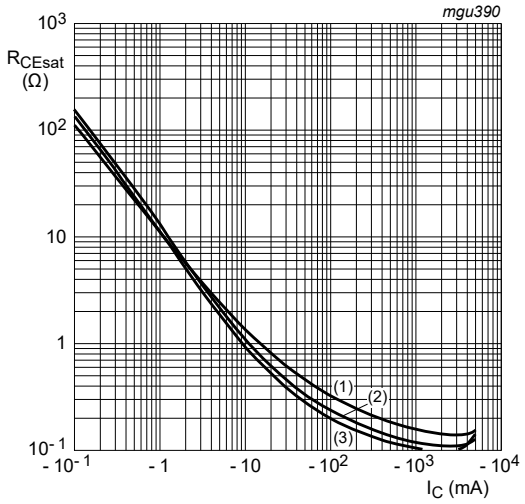
T_{amb} = 25 °C
(1) I_B = −3.96 mA
(2) I_B = −3.63 mA
(3) I_B = −3.30 mA
(4) I_B = −2.97 mA
(5) I_B = −2.64 mA
(6) I_B = −2.31 mA
(7) I_B = −1.98 mA
(8) I_B = −1.65 mA
(9) I_B = −1.32 mA
(10) I_B = −0.99 mA
(11) I_B = −0.66 mA
(12) I_B = −0.33 mA

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



T_{amb} = 25 °C
(1) I_B = −250 mA
(2) I_B = −225 mA
(3) I_B = −200 mA
(4) I_B = −175 mA
(5) I_B = −150 mA
(6) I_B = −125 mA
(7) I_B = −100 mA
(8) I_B = −75 mA
(9) I_B = −50 mA
(10) I_B = −25 mA

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



I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 11. Collector-emitter saturation 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

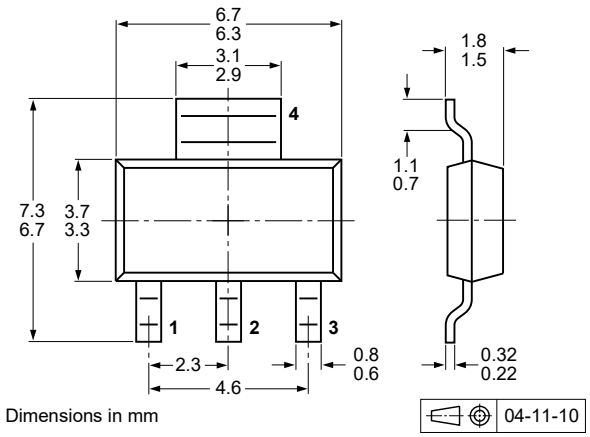


Fig. 12. Package outline SC-73 (SOT223)

13. Soldering

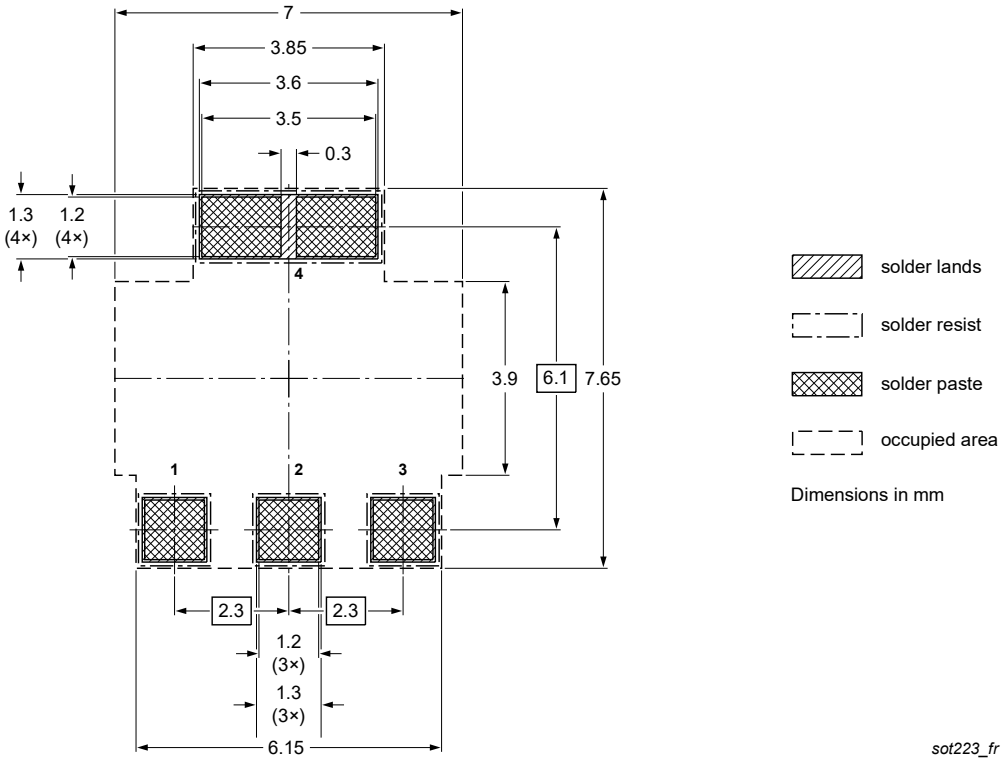


Fig. 13. Reflow soldering footprint for SC-73 (SOT223)

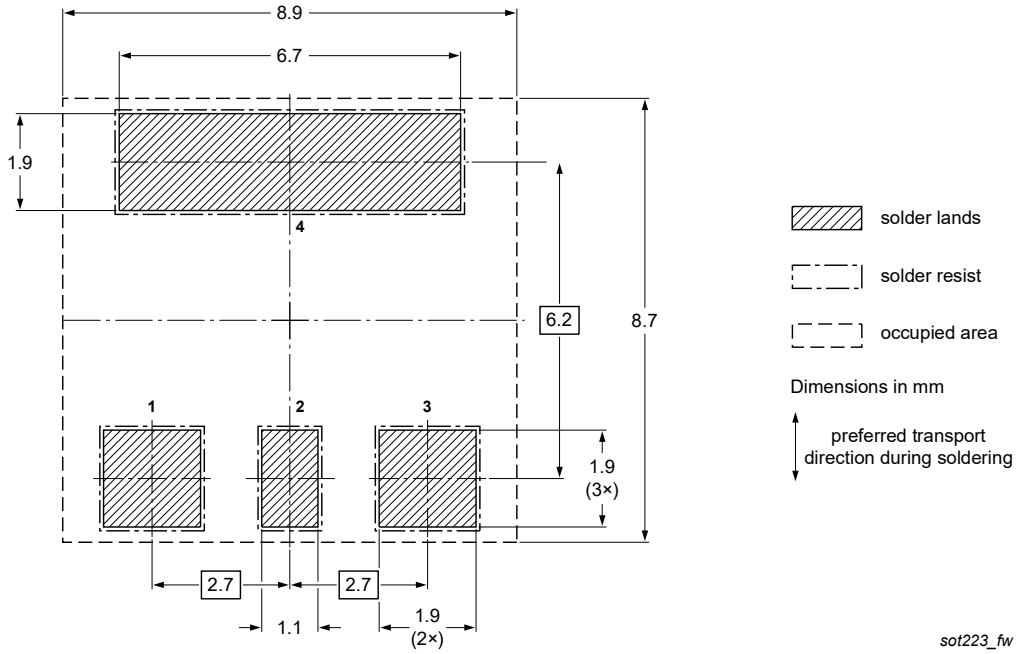


Fig. 14. Wave soldering footprint for SC-73 (SOT223)

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.

[1] Please consult the most recently issued document before initiating or completing a design.
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