



# BCP51 series

45 V, 1 A PNP medium power transistors

Rev. 10 — 16 October 2023

Product data sheet

## 1. General description

PNP medium power transistors in a SOT223 (SC-73) Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- High current
- Three current gain selections
- High power dissipation capability
- AEC-Q101 qualified

## 3. Applications

- Linear voltage regulators
- High-side switches
- Battery-driven devices
- Power management
- MOSFET drivers
- Amplifiers

## 4. Quick reference data

Table 1. Quick reference data

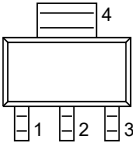
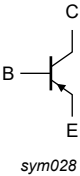
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base		-	-	-45	V
$I_C$	collector current			-	-	-1	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1\text{ ms}$		-	-	-2	A
$h_{FE}$	DC current gain						
	BCP51	$V_{CE} = -2\text{ V}$ ; $I_C = -150\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	63	-	250	
	BCP51-10		[1]	63	-	160	
	BCP51-16		[1]	100	-	250	

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

5. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">BCP51</a>	-	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>
<a href="#">BCP51-10</a>			
<a href="#">BCP51-16</a>			

7. Marking

Table 4. Marking

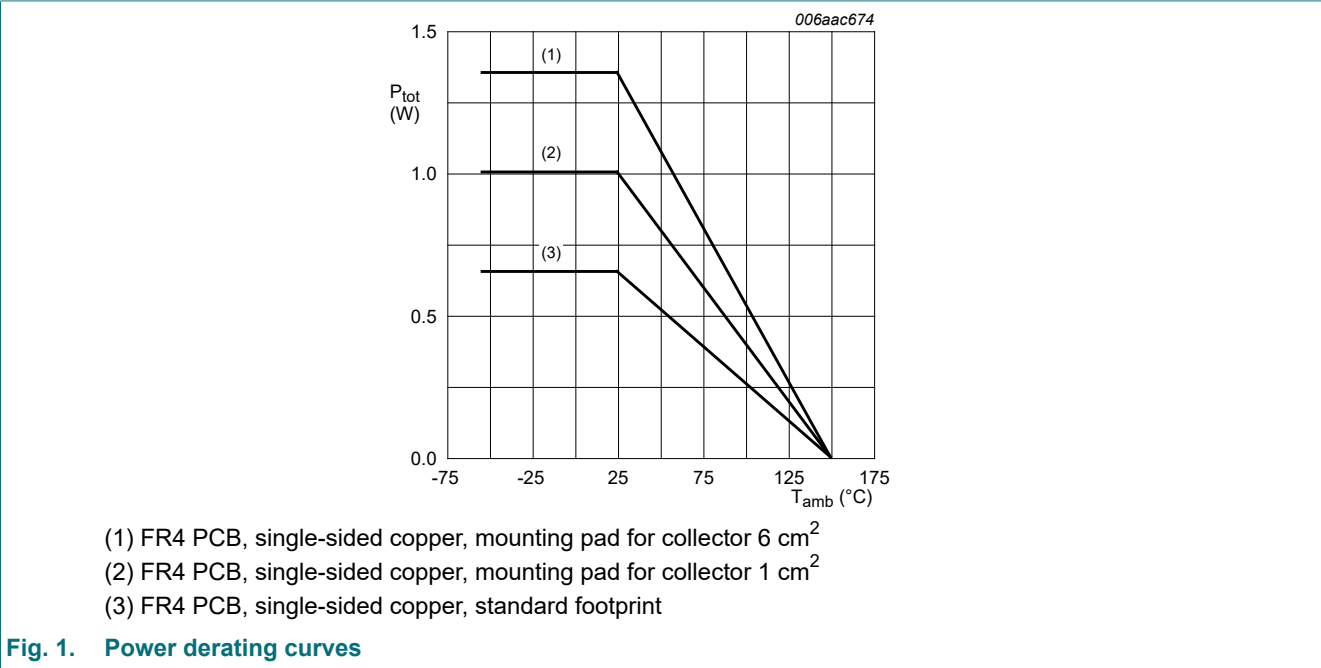
Type number	Marking code
BCP51	BCP51
BCP51-10	BCP51/10
BCP51-16	BCP51/16

8. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).  
 $T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter	-	-45	V
$V_{CEO}$	collector-emitter voltage	open base	-	-45	V
$V_{EBO}$	emitter-base voltage	open collector	-	-5	V
$I_C$	collector current		-	-1	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	-2	A
$I_B$	base current		-	-0.3	A
$I_{BM}$	peak base current	single pulse; $t_p \leq 1\text{ ms}$	-	-0.3	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$ [1]	-	0.65	W
		[2]	-	1.00	W
		[3]	-	1.35	W
$T_j$	junction temperature		-	150	$^{\circ}\text{C}$
$T_{amb}$	ambient temperature		-55	150	$^{\circ}\text{C}$
$T_{stg}$	storage temperature		-65	150	$^{\circ}\text{C}$

- [1] Device mounted on an FR4 Printed-Circuit-Board (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>.  
[3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm<sup>2</sup>.



9. Thermal characteristics

Table 6. Thermal characteristics  
 $T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

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]	-	-	93	K/W
$R_{(j-sp)}$	thermal resistance from junction to solder point			-	-	16	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>.  
[3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm<sup>2</sup>.

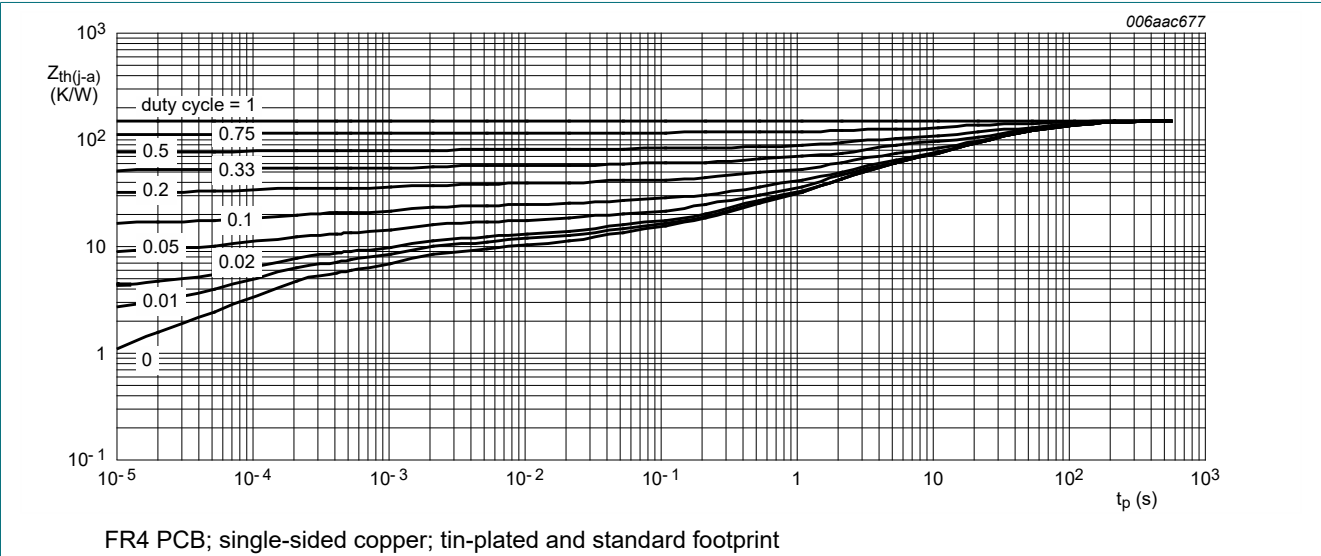


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

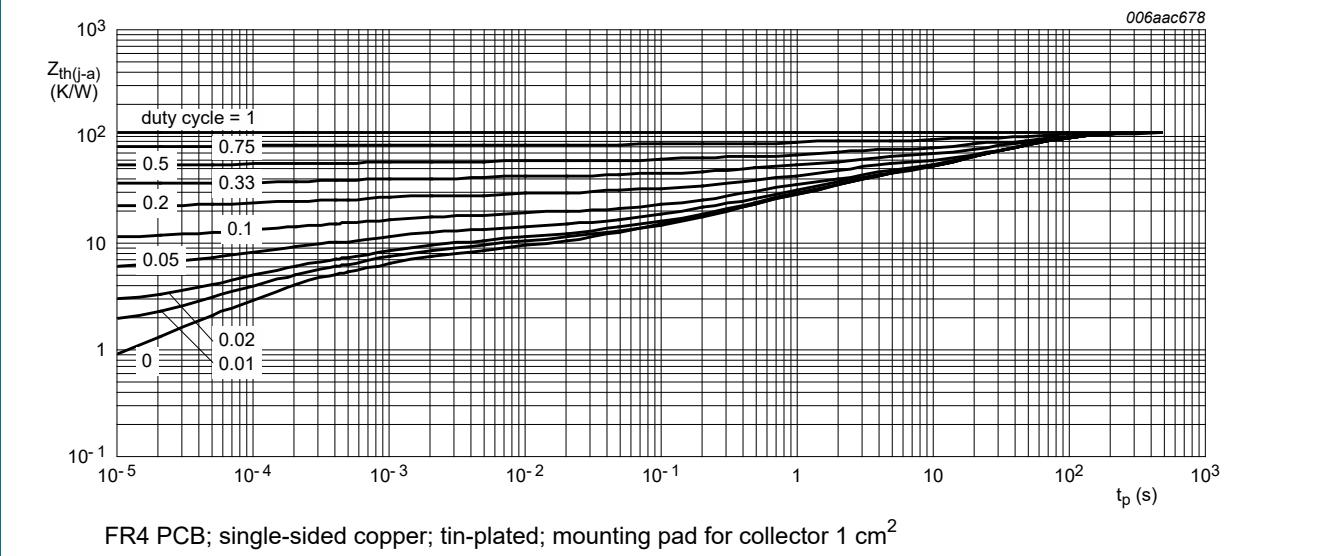
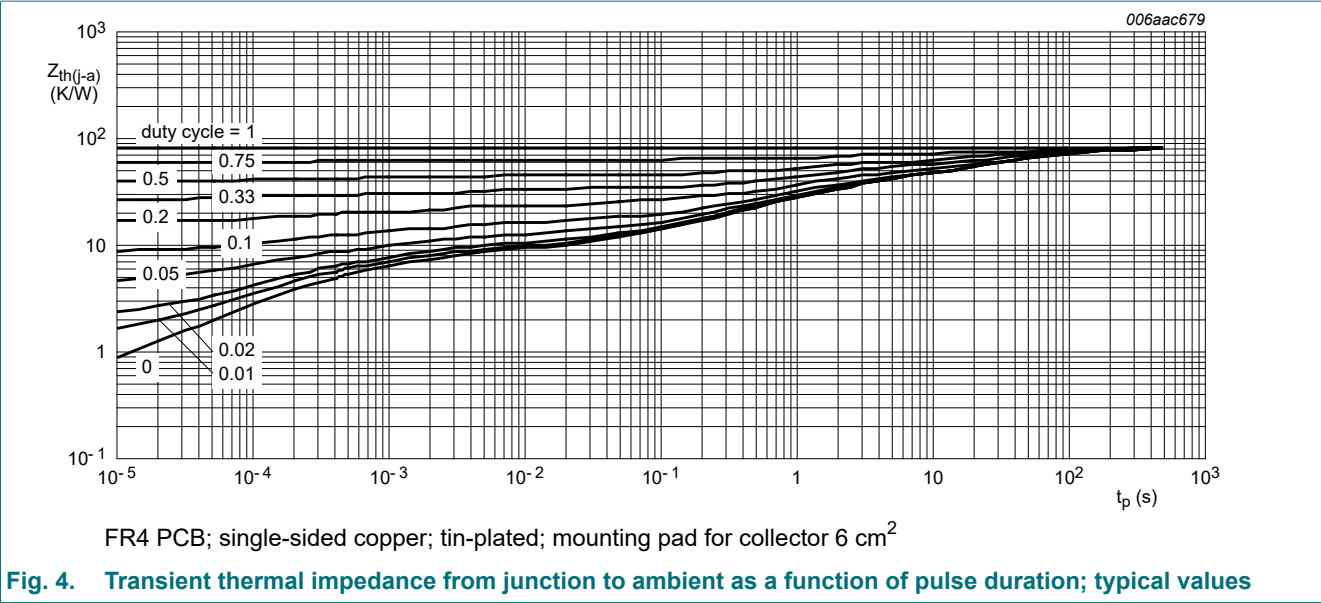


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -30\text{ V}; I_E = 0\text{ A}$ $T_{amb} = 25\text{ °C}$		-	-	-100	nA
		$V_{CB} = -30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$		-	-	-10	μA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$ $T_{amb} = 25\text{ °C}$		-	-	-100	nA
$h_{FE}$	DC current gain						
	BCP51	$V_{CE} = -2\text{ V}; I_C = -5\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	63	-	-	
		$V_{CE} = -2\text{ V}; I_C = -150\text{ mA}$ $T_{amb} = 25\text{ °C}$		63	-	250	
		$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$ $T_{amb} = 25\text{ °C}$		40	-	-	
	BCP51-10	$V_{CE} = -2\text{ V}; I_C = -5\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	63	-	-	
		$V_{CE} = -2\text{ V}; I_C = -150\text{ mA}$ $T_{amb} = 25\text{ °C}$		63	-	160	
		$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$ $T_{amb} = 25\text{ °C}$		40	-	-	
	BCP51-16	$V_{CE} = -2\text{ V}; I_C = -5\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	63	-	-	
		$V_{CE} = -2\text{ V}; I_C = -150\text{ mA}$ $T_{amb} = 25\text{ °C}$		100	-	250	
		$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$ $T_{amb} = 25\text{ °C}$		40	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -500\text{ mA}; I_B = -50\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	-	-	-0.5	V
$V_{BE}$	base-emitter voltage	$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	-	-	-1	V
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_C = 0\text{ A}; f = 1\text{ MHz}$ $T_{amb} = 25\text{ °C}$		-	15	-	pF
$f_T$	transition frequency	$V_{CE} = -5\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}$ $T_{amb} = 25\text{ °C}$		-	145	-	MHz

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

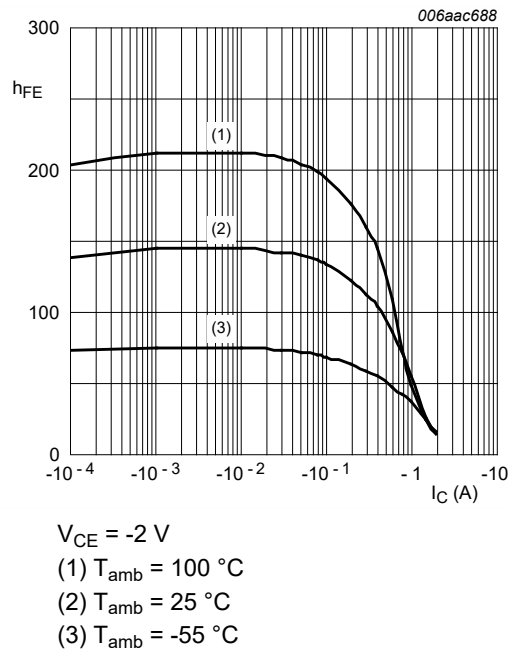


Fig. 5. DC current gain as a function of collector current; typical values

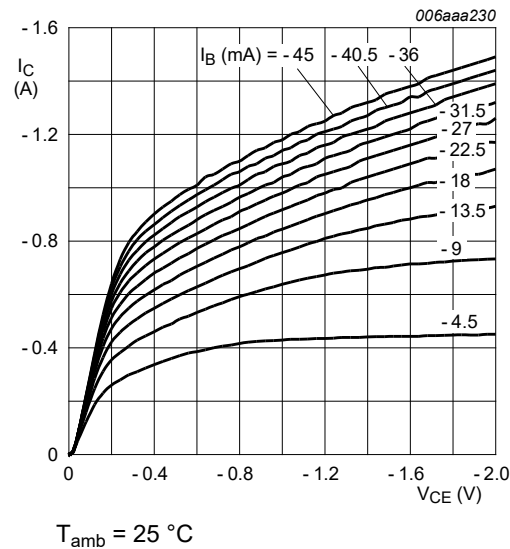


Fig. 6. Collector current as a function of collector-emitter voltage; typical values

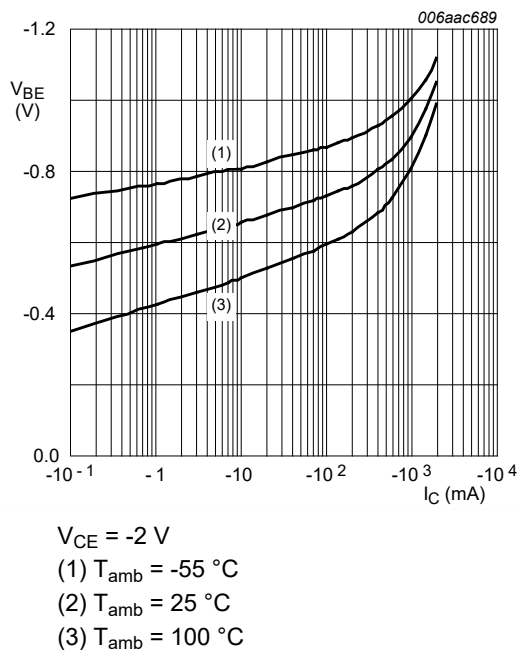


Fig. 7. Base-emitter voltage as a function of collector current; typical values

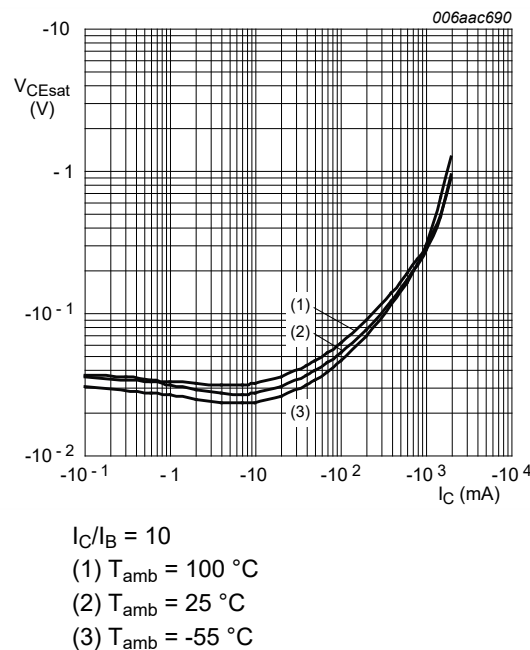


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

11. Test information

11.1. 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

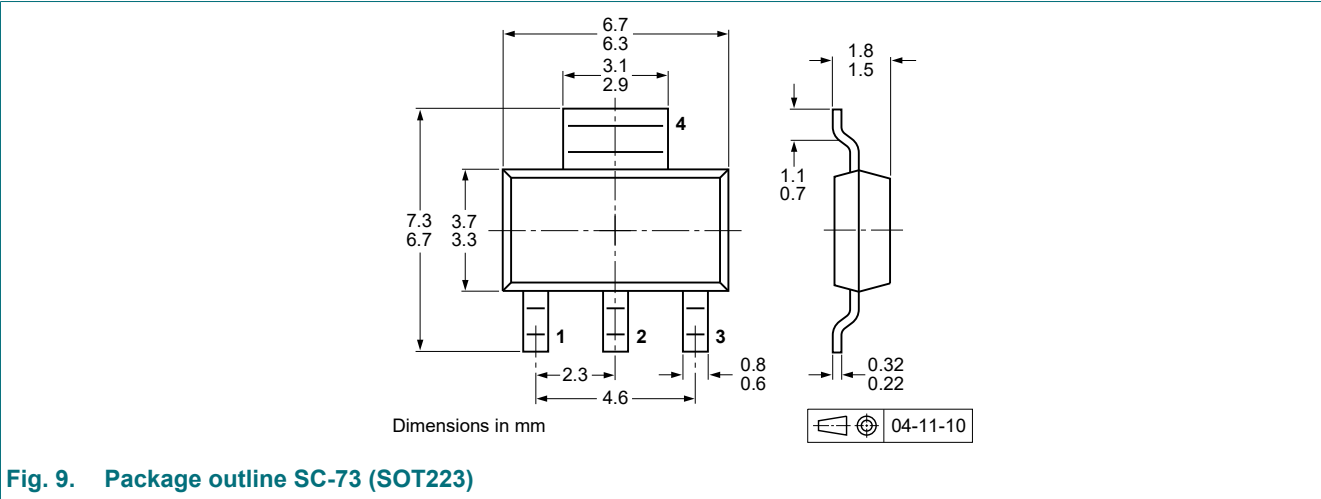
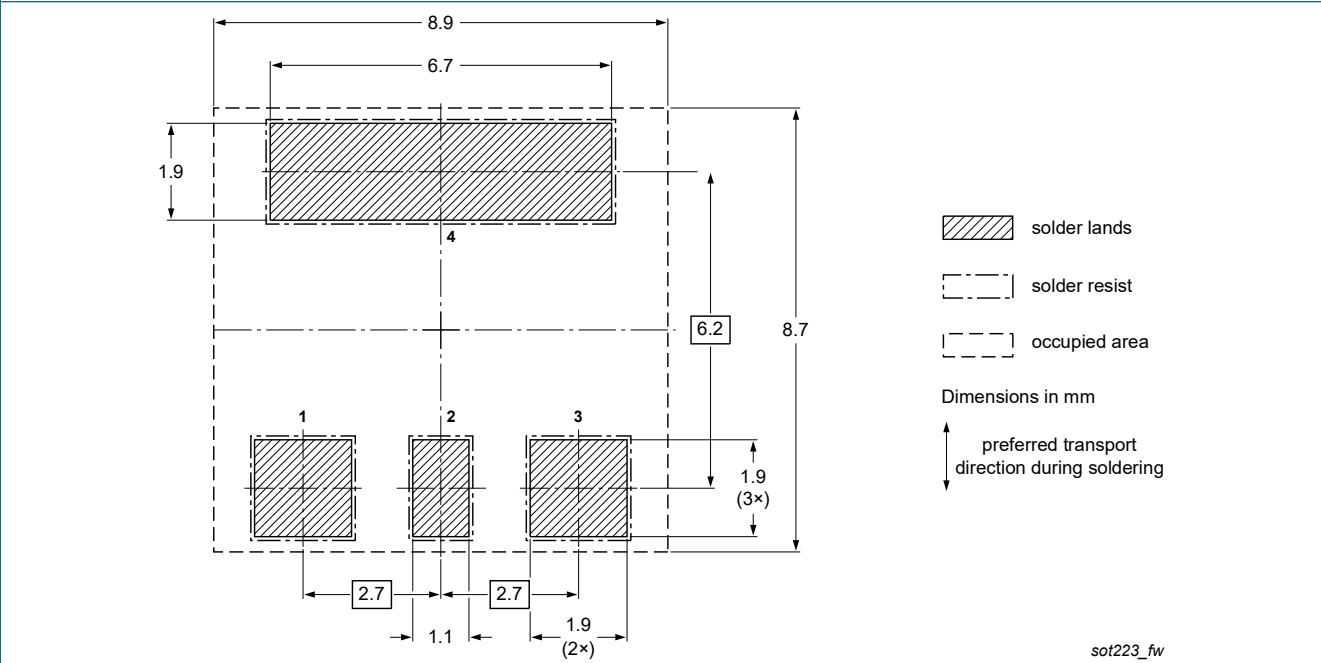
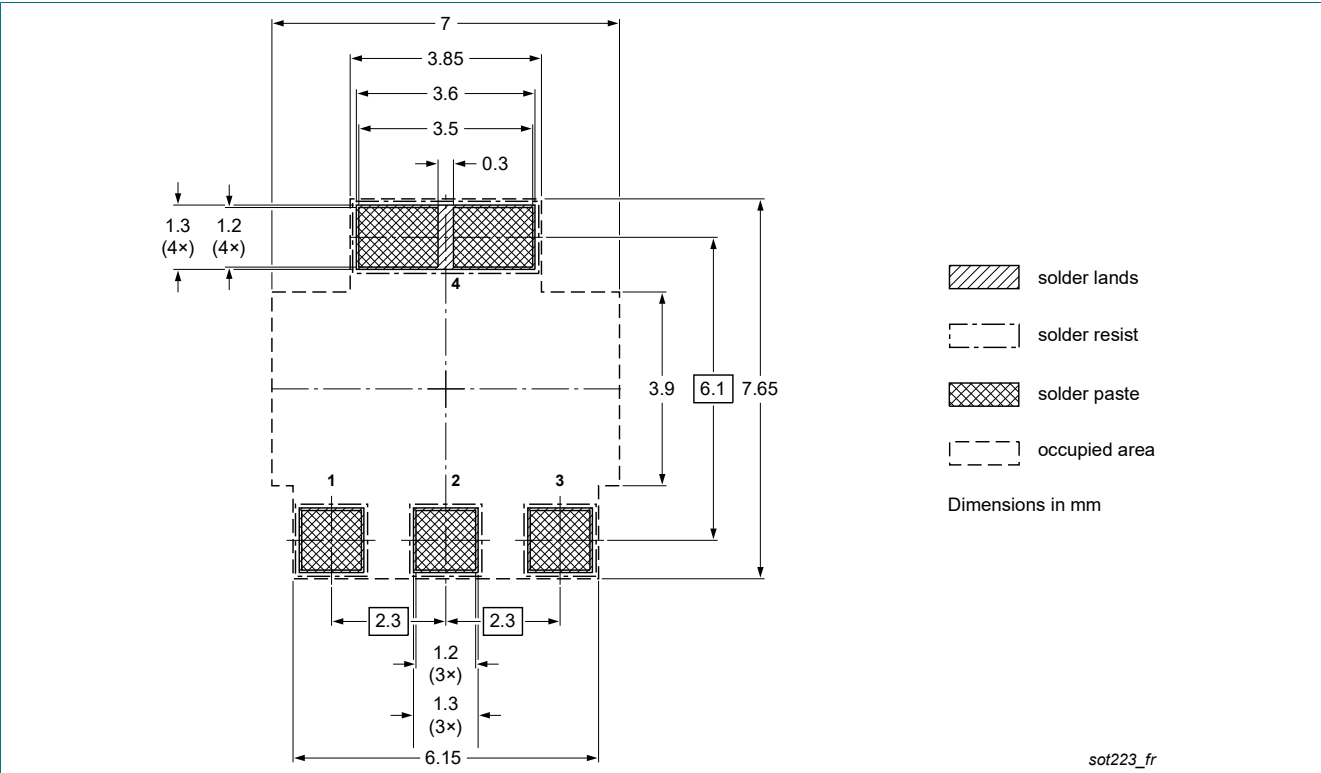


Fig. 9. Package outline SC-73 (SOT223)



13. Soldering



14. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP51_SER v.10	20231016	Product data sheet	-	BCP51_BCX51_BC51PA v.9
Modifications:	<ul style="list-style-type: none"><li>Data sheet separated into 3 data sheets</li><li>Section "Packing information" removed</li></ul>			
BCP51_BCX51_BC51PA v.9	20111013	Product data sheet	-	BC636_BCP51_BCX51 v.8
BC636_BCP51_BCX51 v.8	20080222	Product data sheet	-	BC636_BCP51_BCX51 v.7
BC636_BCP51_BCX51 v.7	20070629	Product data sheet	-	BC636_BCP51_BCX51 v.6
BC636_BCP51_BCX51 v.6	20060329	Product data sheet	-	BC636_638_640 v.5 BCP51_52_53 v.5 BCX51_52_53 v.4
BC636_638_640 v.5	20041011	Product specification	-	BCX51_52_53 v.5
BCX51_52_53 v.5	20030206	Product specification	-	BCX51_52_53 v.4
BCX51_52_53 v.4	20011010	Product specification	-	BCX51_52_53 v.3

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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