



# BCP54 series

45 V, 1 A NPN medium power transistors

Rev. 9 — 6 January 2023

Product data sheet

## 1. General description

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

## 2. Features and benefits

- High collector current capability  $I_C$  and  $I_{CM}$
- Three current gain selections
- High power dissipation capability
- AEC-Q101 qualified

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

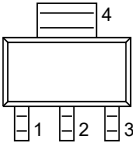
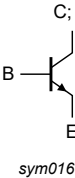
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

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						
	BCP54	$V_{CE} = 2\text{ V}; I_C = 150\text{ mA}$	[1]	63	-	250	
	BCP54-10		[1]	63	-	160	
	BCP54-16		[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="#">BCP54</a>	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads	<a href="#">SOT223</a>
<a href="#">BCP54-10</a>			
<a href="#">BCP54-16</a>			

7. Marking

Table 4. Marking

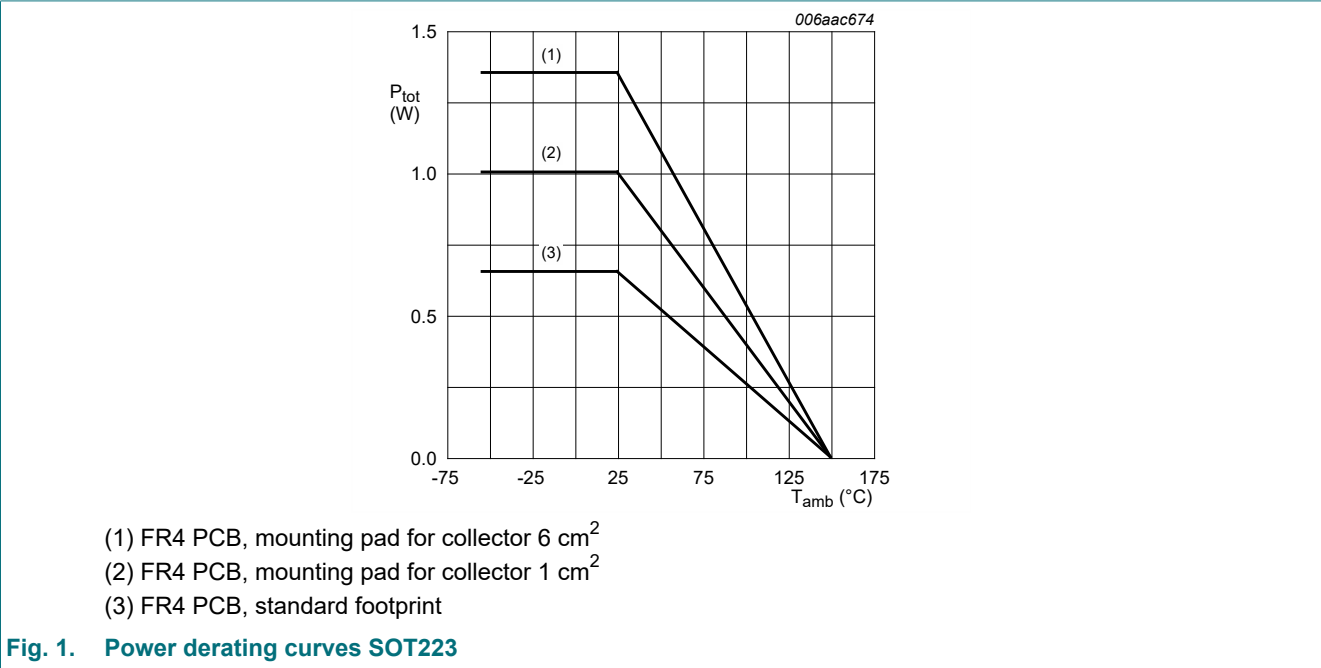
Type number	Marking code
BCP54	BCP54
BCP54-10	BCP54/10
BCP54-16	BCP54/16

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 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector  $1\text{ cm}^2$ .  
[3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector  $6\text{ cm}^2$ .



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]	-	-	195	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>.

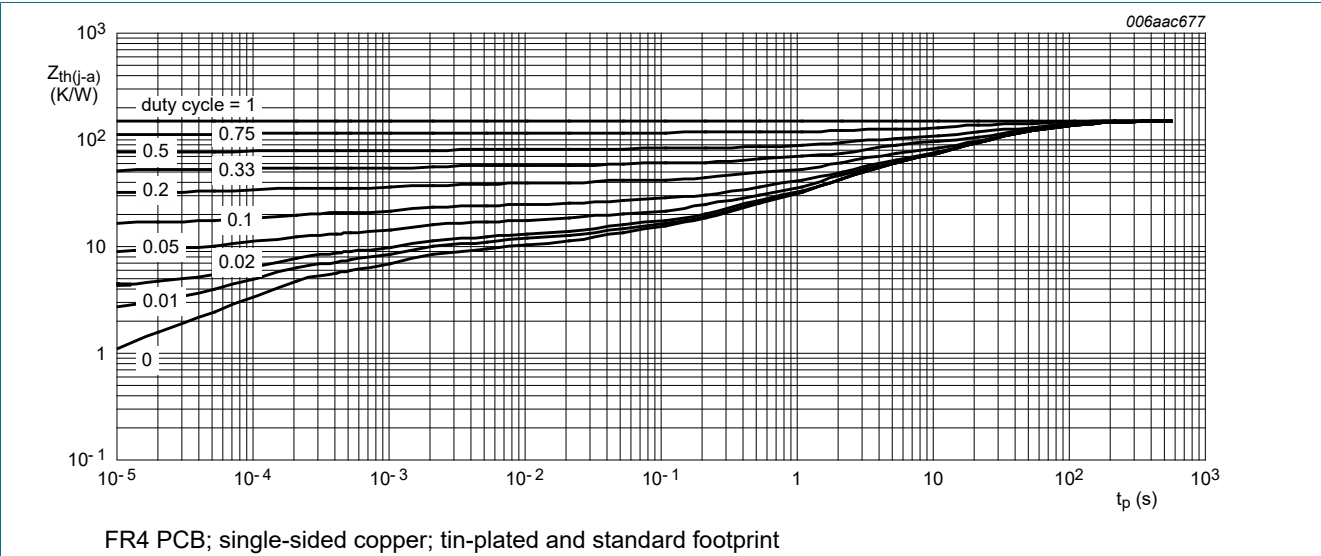


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

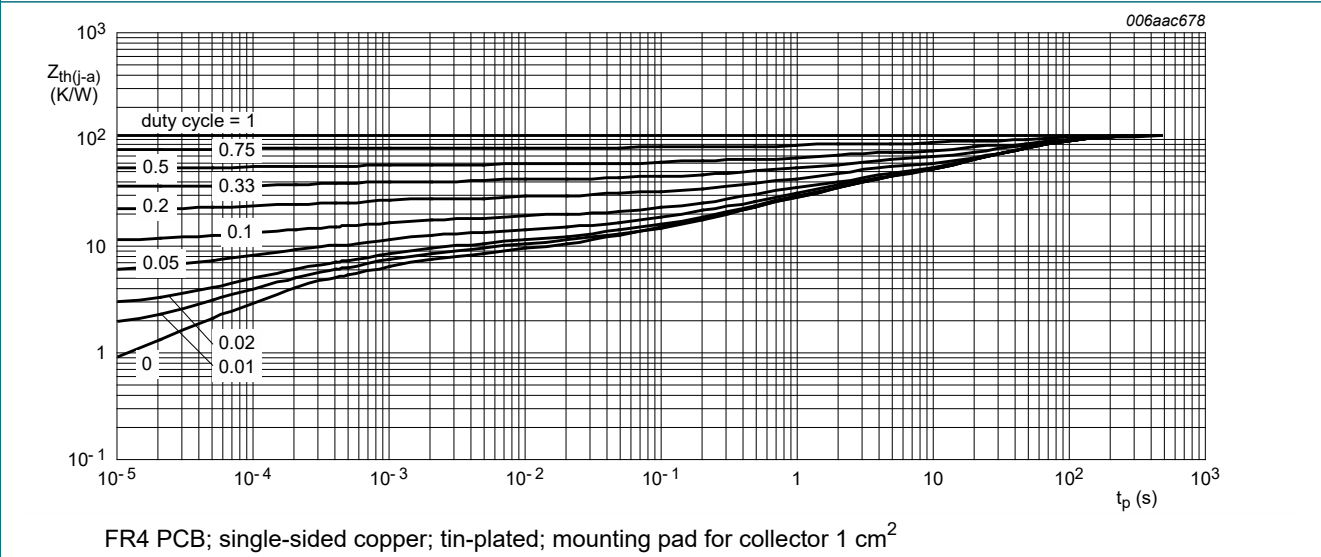
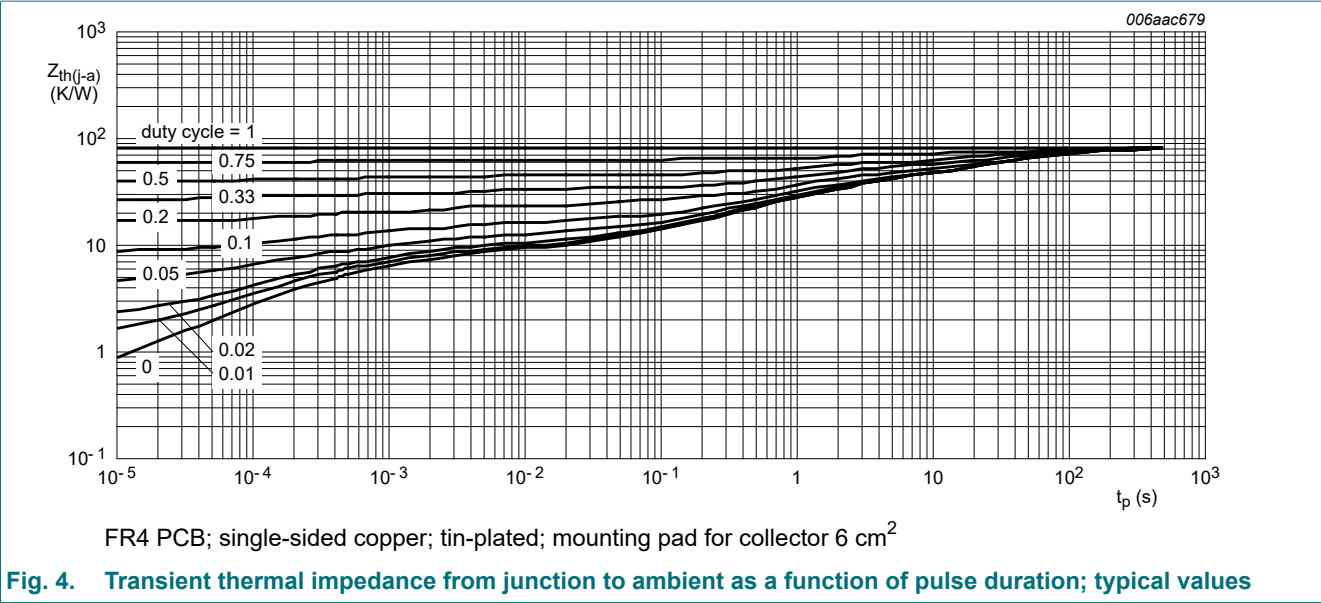


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



10. Characteristics

Table 7. Characteristics  
*T<sub>amb</sub> = 25 °C unless otherwise specified.*

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V <sub>(BR)CBO</sub>	collector-base breakdown voltage	I <sub>C</sub> = 100 µA; I <sub>E</sub> = 0 A		45	-	-	V
V <sub>(BR)CEO</sub>	collector-emitter breakdown voltage	I <sub>C</sub> = 2 mA; I <sub>B</sub> = 0 A		45	-	-	V
V <sub>(BR)EBO</sub>	emitter-base breakdown voltage	I <sub>E</sub> = 100 µA; I <sub>C</sub> = 0 A		5	-	-	V
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = 30 V; I <sub>E</sub> = 0 A		-	-	100	nA
		V <sub>CB</sub> = 30 V; I <sub>E</sub> = 0 A; T <sub>J</sub> = 150 °C		-	-	10	µA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0 A		-	-	100	nA
h <sub>FE</sub>	DC current gain						
	BCP54	V <sub>CE</sub> = 2 V; I <sub>C</sub> = 5 mA	[1]	63	-	-	
		V <sub>CE</sub> = 2 V; I <sub>C</sub> = 150 mA		63	-	250	
		V <sub>CE</sub> = 2 V; I <sub>C</sub> = 500 mA		40	-	-	
	BCP54-10	V <sub>CE</sub> = 2 V; I <sub>C</sub> = 5 mA	[1]	63	-	-	
		V <sub>CE</sub> = 2 V; I <sub>C</sub> = 150 mA		63	-	160	
		V <sub>CE</sub> = 2 V; I <sub>C</sub> = 500 mA		40	-	-	
	BCP54-16	V <sub>CE</sub> = 2 V; I <sub>C</sub> = 5 mA	[1]	63	-	-	
		V <sub>CE</sub> = 2 V; I <sub>C</sub> = 150 mA		100	-	250	
		V <sub>CE</sub> = 2 V; I <sub>C</sub> = 500 mA		40	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 500 mA; I <sub>B</sub> = 50 mA	[1]	-	-	0.5	V
V <sub>BE</sub>	base-emitter voltage	V <sub>CE</sub> = 2 V; I <sub>C</sub> = 500 mA	[1]	-	-	1	V
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = 10 V; I <sub>E</sub> = i <sub>e</sub> = 0 A; f = 1 MHz		-	6	-	pF
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = 5 V; I <sub>C</sub> = 50 mA; f = 100 MHz		100	180	-	MHz

[1] pulsed; t<sub>p</sub> ≤ 300 µs; δ ≤ 0.02

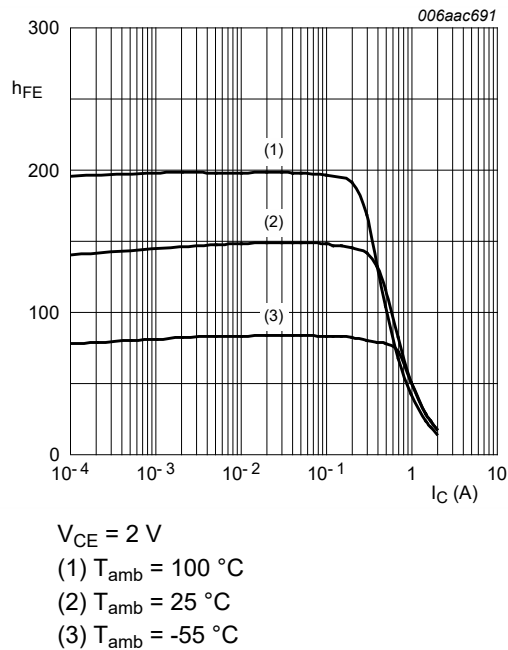


Fig. 5. DC current gain as a function of collector current; typical values

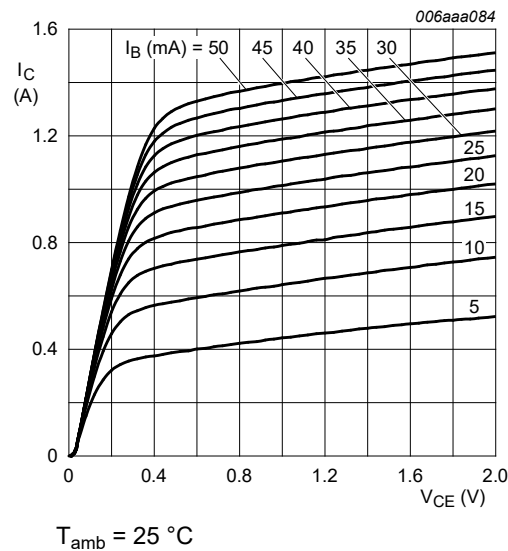


Fig. 6. Collector current as a function of collector-emitter voltage; typical values

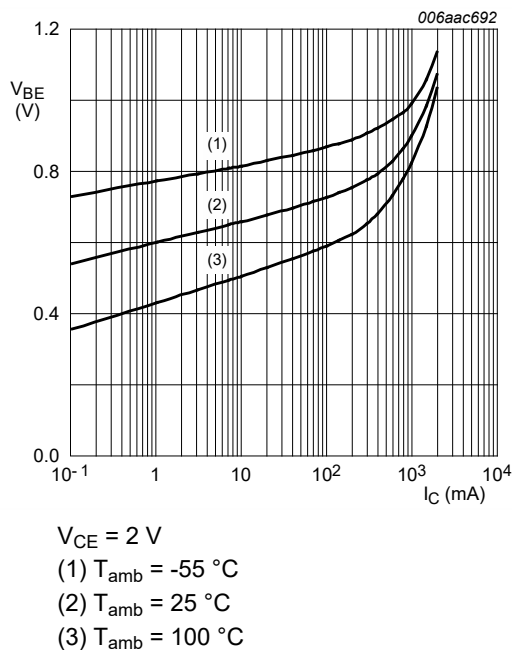


Fig. 7. Base-emitter voltage as a function of collector current; typical values

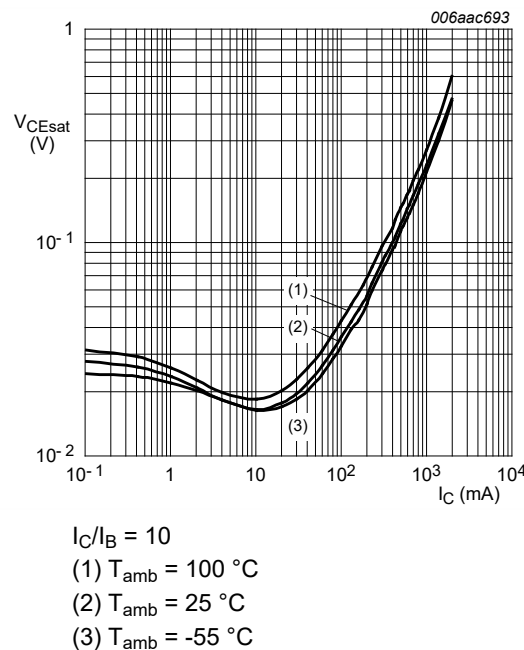


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

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

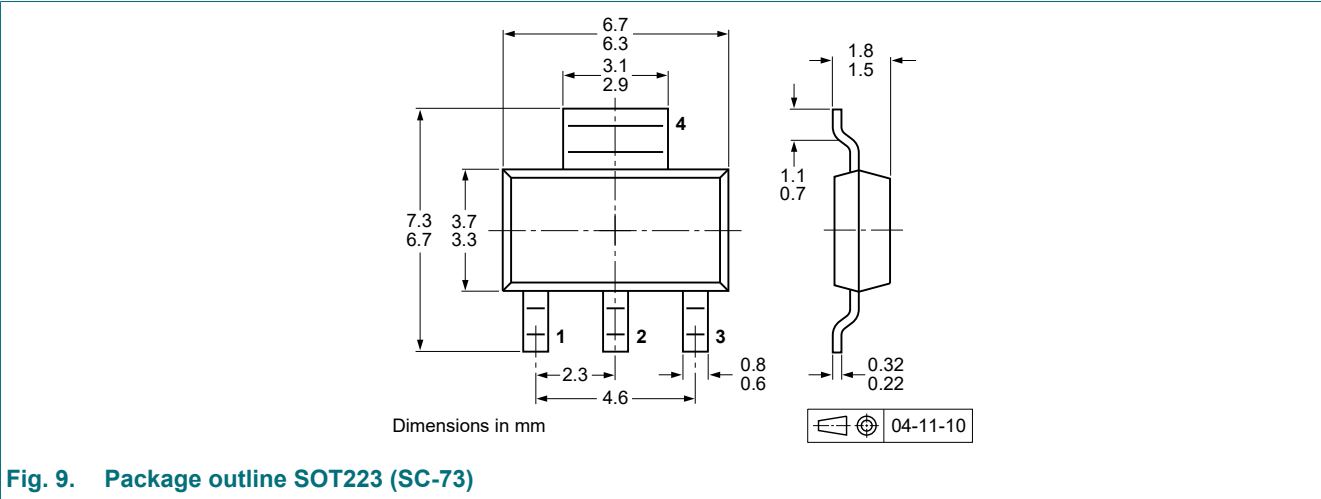
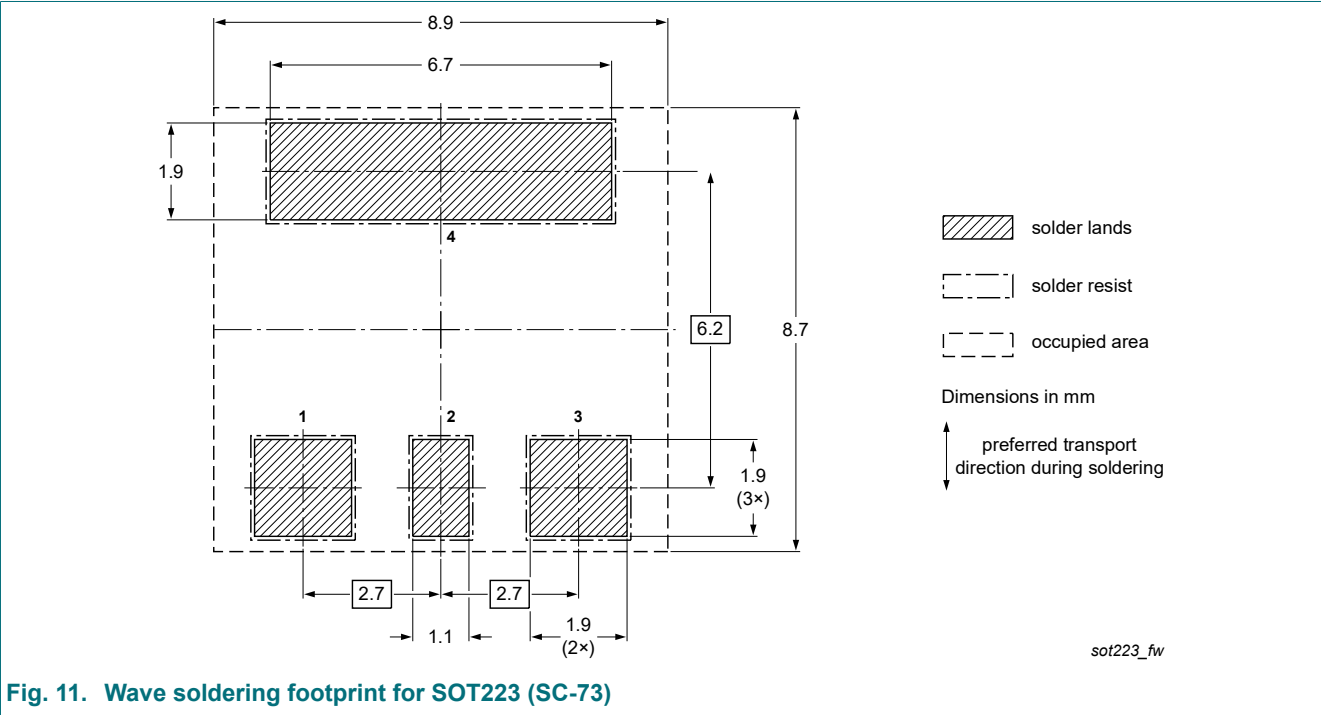
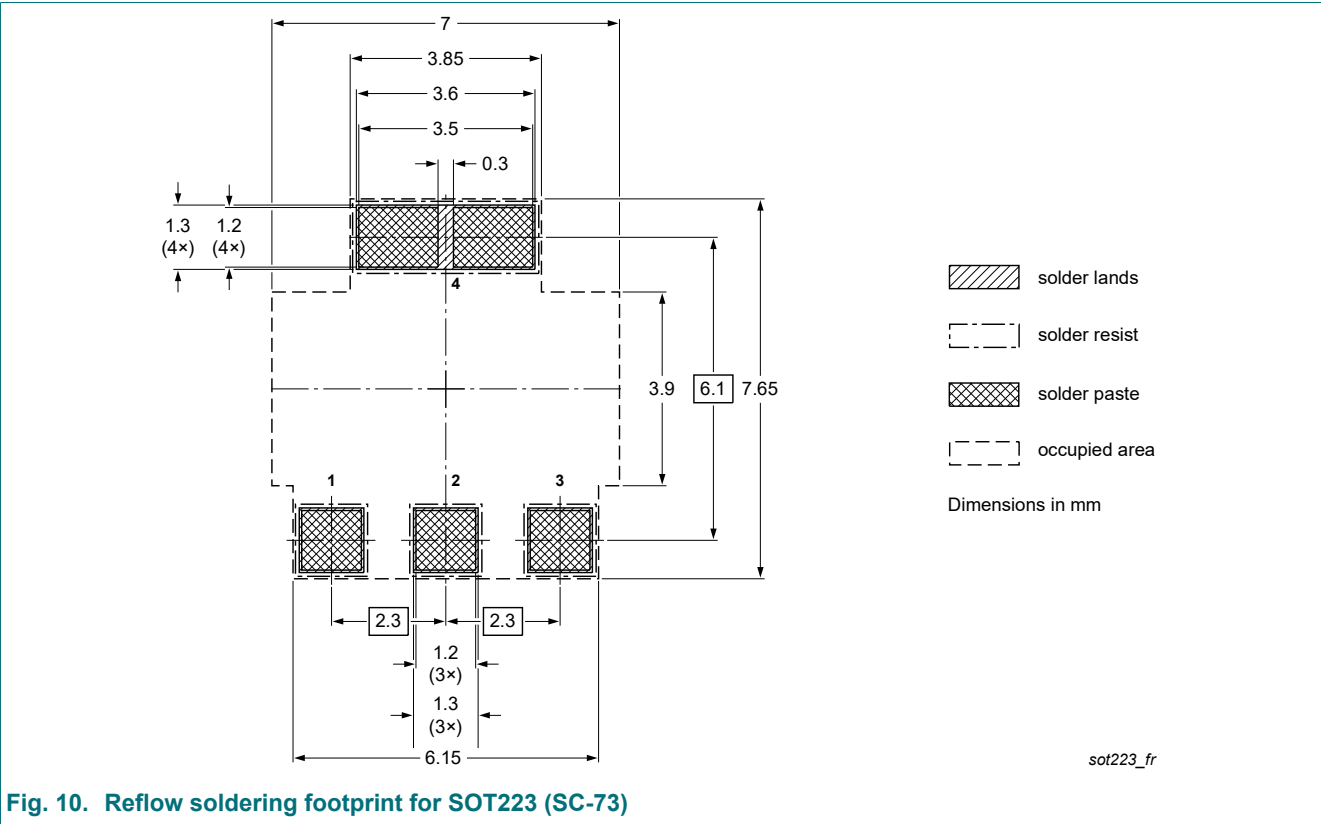


Fig. 9. Package outline SOT223 (SC-73)



13. Soldering



## 14. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP54_SER v.9	20220106	Product data sheet	-	BCP54_BCX54_BC54PA v.8
Modifications:	<ul style="list-style-type: none"> <li>Data sheet separated into 3 data sheets</li> </ul>			
BCP54_BCX54_BC54PA v.8	20111021	Product data sheet	-	BC635_BCP54_BCX54 v.7
BC635_BCP54_BCX54 v.7	20070604	Product data sheet	-	BC635_BCP54_BCX54 v.6
BC635_BCP54_BCX54 v.6	20050225	Product data sheet	CPCN200405 029	BC635_637_639 v.4 BCP54_55_56 v.5 BCP54_55_56 v.4
BC635_637_639 v.4	20011010	Product specification	-	BC635_637_639 v.3
BCX54_55_56 v.5	20030206	Product specification	-	BCX54_55_56 v.4
BCX54_55_56 v.4	20011010	Product specification	-	BCX54_55_56 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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