



BCP51-Q series

45 V, 1 A PNP medium power transistors

Rev. 1 — 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
- Qualified according to AEC-Q101 and recommended for use in automotive applications

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

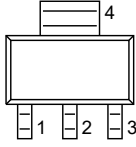
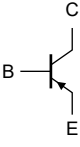
$T_{amb} = 25\text{ °C}$ unless otherwise specified.

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-Q	$V_{CE} = -2\text{ V}; I_C = -150\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	63	-	250	
	BCP51-10-Q		[1]	63	-	160	
	BCP51-16-Q		[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		 sym028
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BCP51-Q	-	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
BCP51-10-Q			
BCP51-16-Q			

7. Marking

Table 4. Marking

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

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

$T_{amb} = 25\text{ °C}$ 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	$T_{amb} \leq 25\text{ °C}$	[1]	0.65	W
			[2]	1.00	W
			[3]	1.35	W
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	150	°C
T_{stg}	storage temperature		-65	150	°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 cm².
- [3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm².

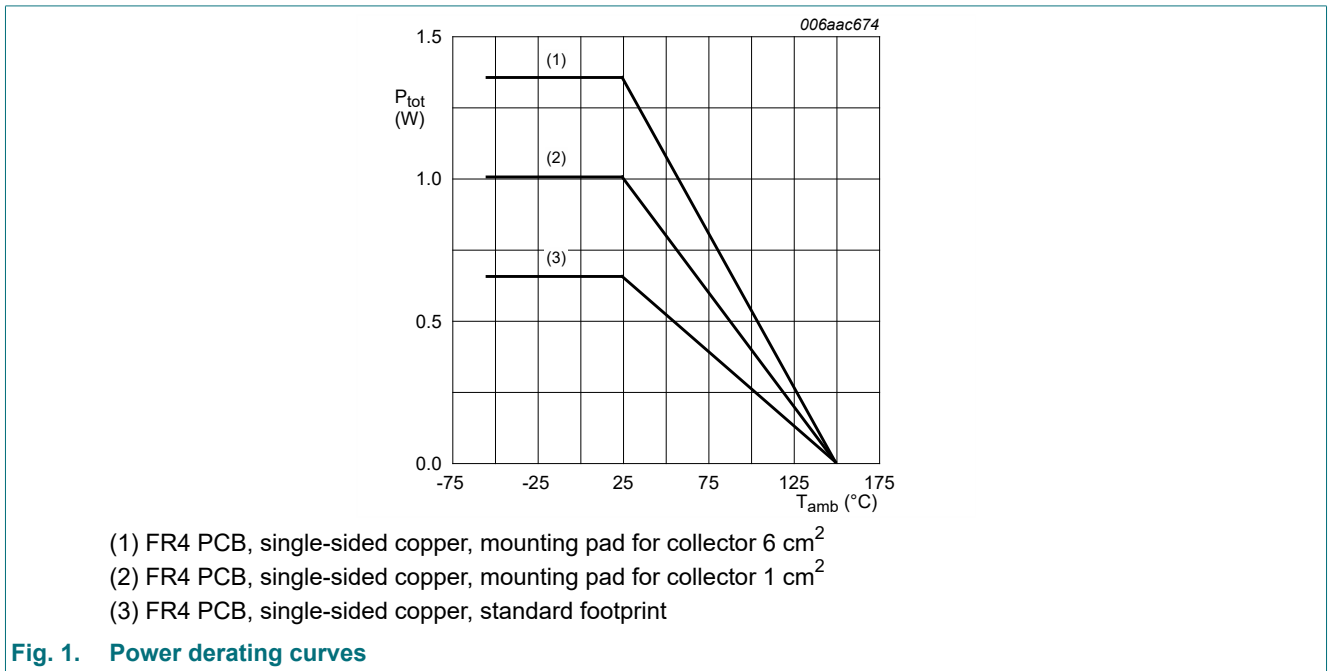


Fig. 1. Power derating curves

9. Thermal characteristics

Table 6. Thermal characteristics

$T_{amb} = 25\text{ °C}$ 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^2 .
- [3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm^2 .

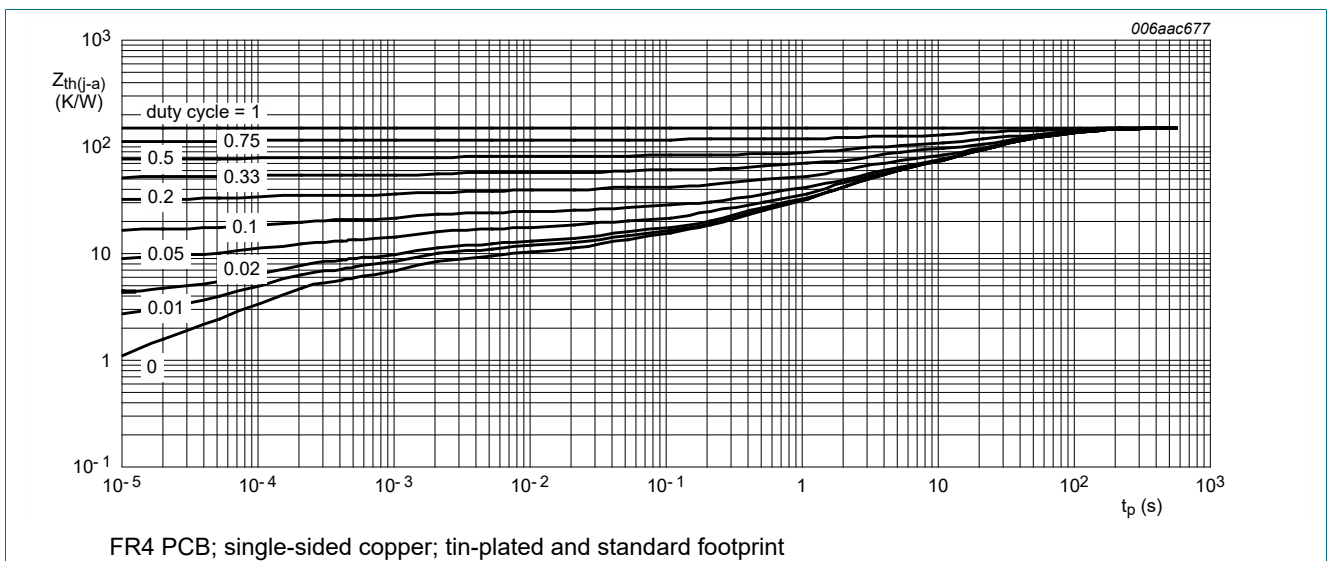


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

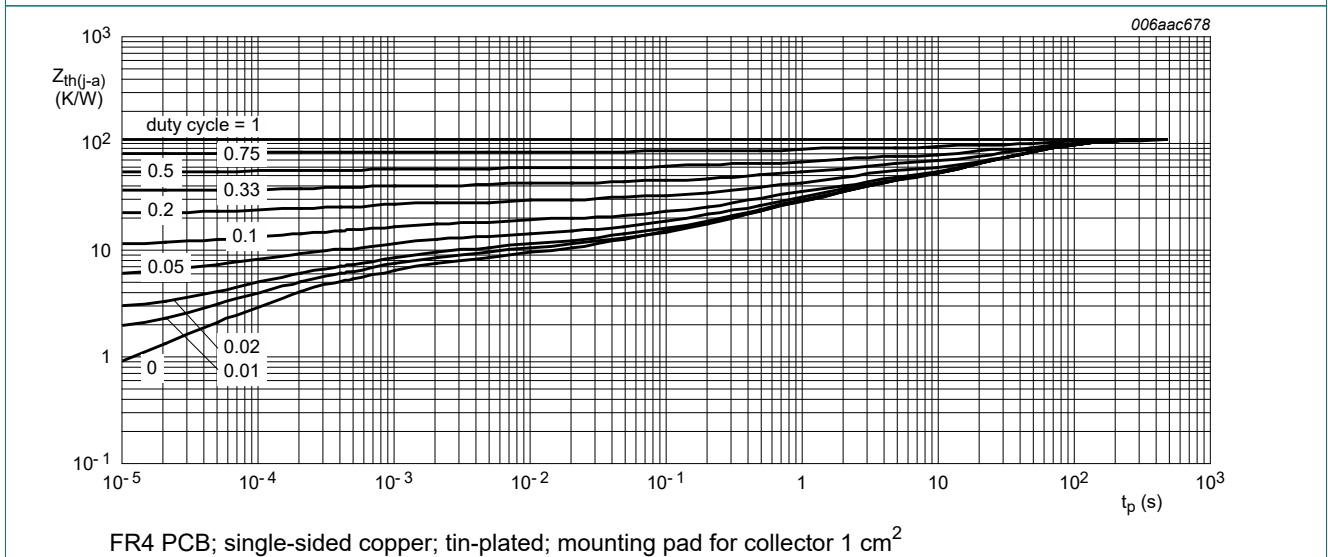
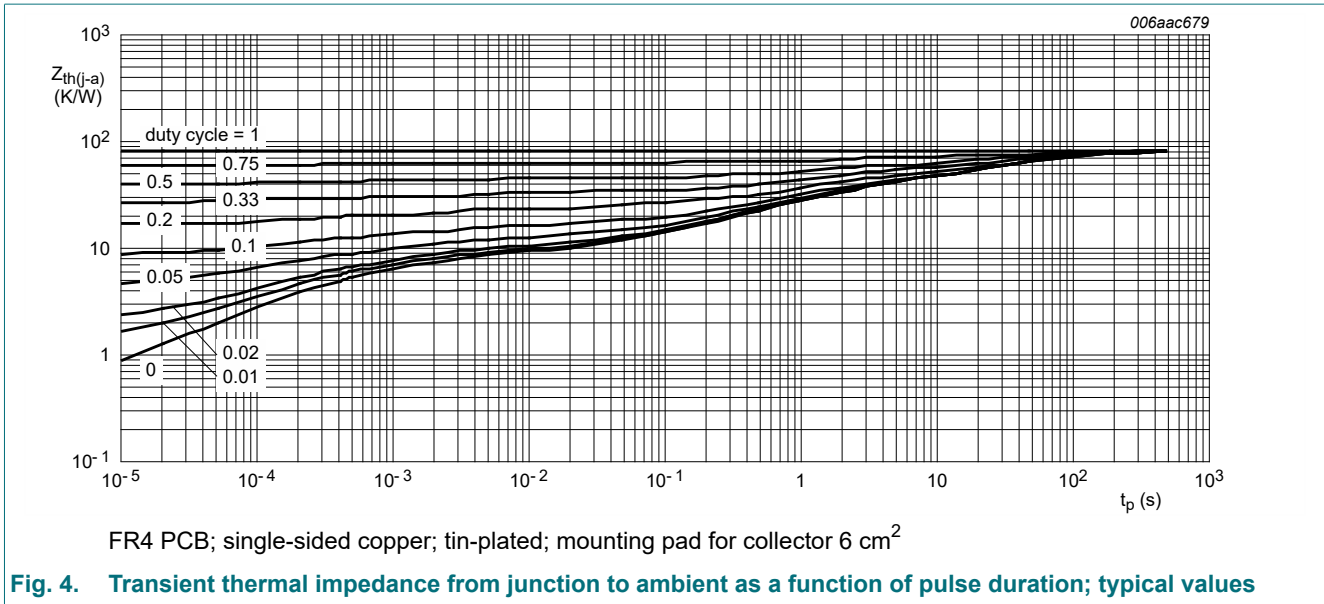


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

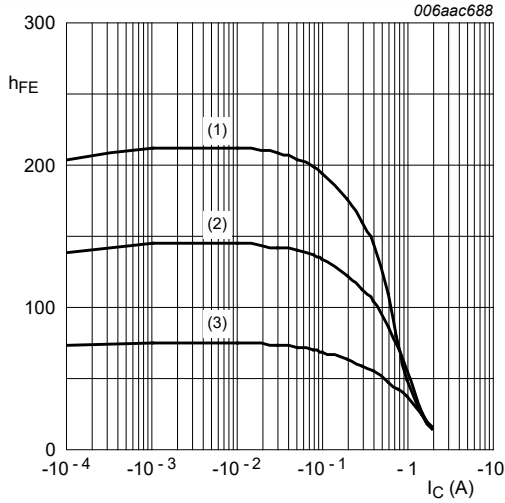


10. Characteristics

Table 7. Characteristics

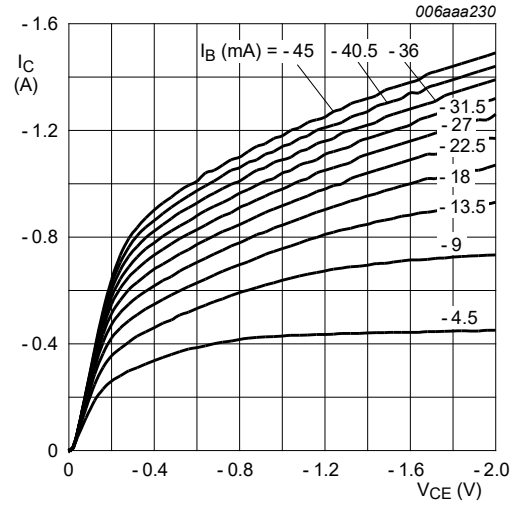
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
I_{CBO}	collector-base cut-off current	$V_{CB} = -30 \text{ V}; I_E = 0 \text{ A}$ $T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA	
		$V_{CB} = -30 \text{ V}; I_E = 0 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	-	-	-10	μA	
I_{EBO}	emitter-base cut-off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

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



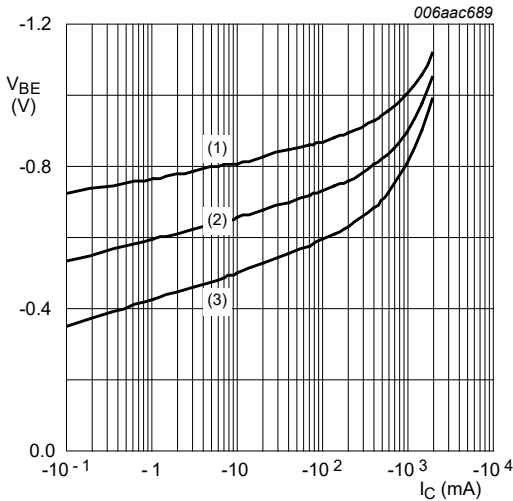
$V_{CE} = -2 \text{ V}$
 (1) $T_{amb} = 100 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = -55 \text{ }^\circ\text{C}$

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



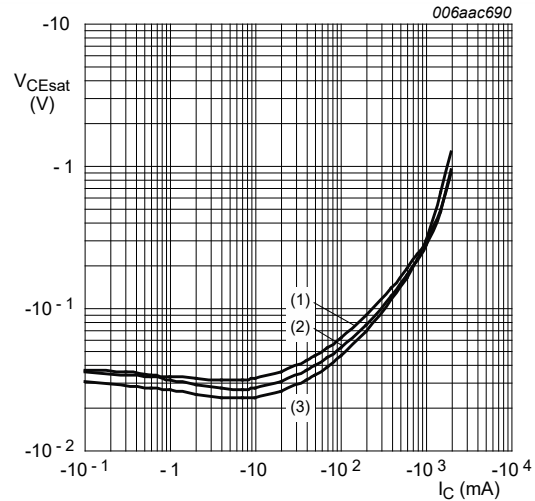
$T_{amb} = 25 \text{ }^\circ\text{C}$

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



$V_{CE} = -2 \text{ V}$
 (1) $T_{amb} = -55 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = 100 \text{ }^\circ\text{C}$

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



$I_C/I_B = 10$
 (1) $T_{amb} = 100 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = -55 \text{ }^\circ\text{C}$

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

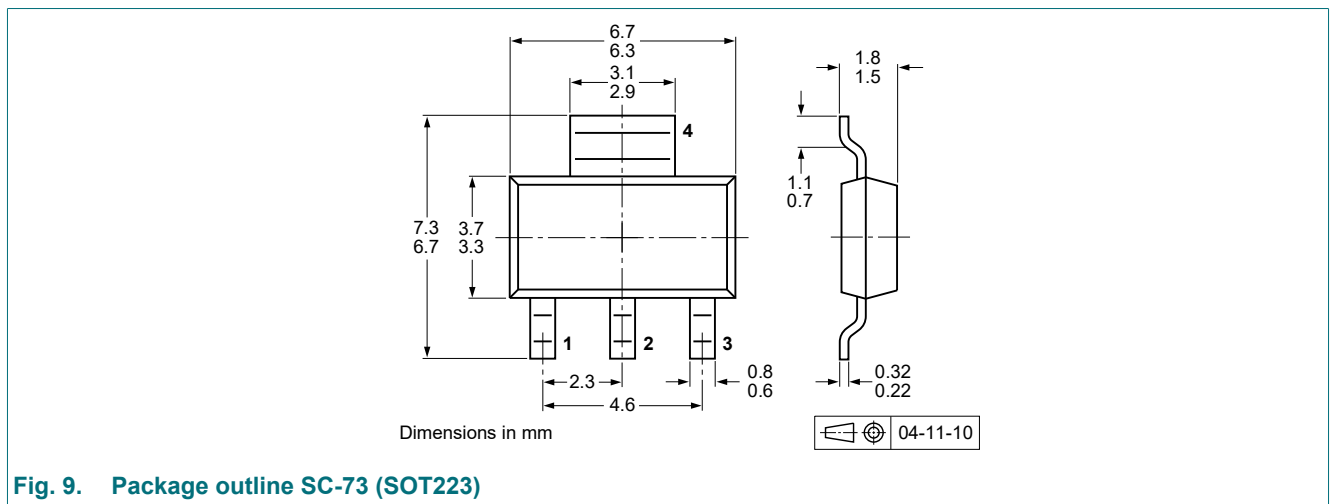


Fig. 9. Package outline SC-73 (SOT223)

13. Soldering

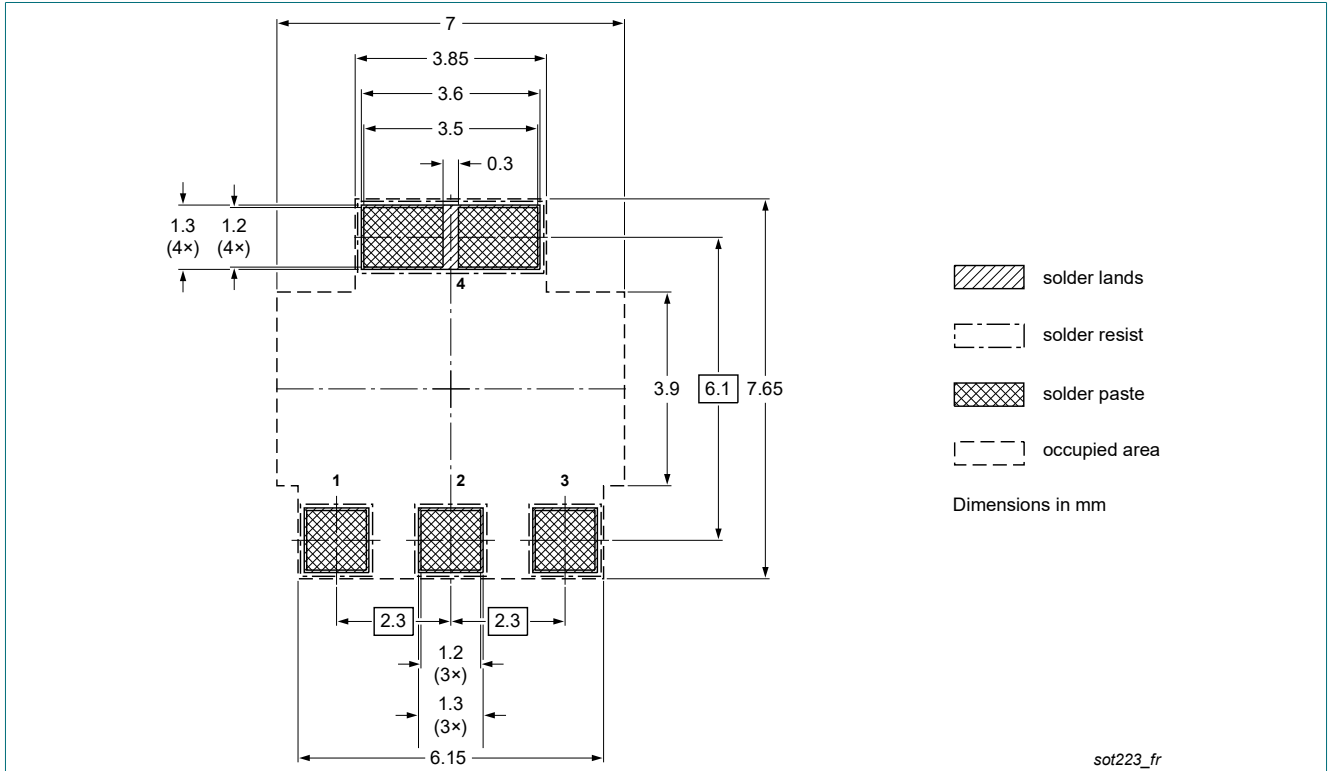


Fig. 10. Reflow soldering footprint for SC-73 (SOT223)

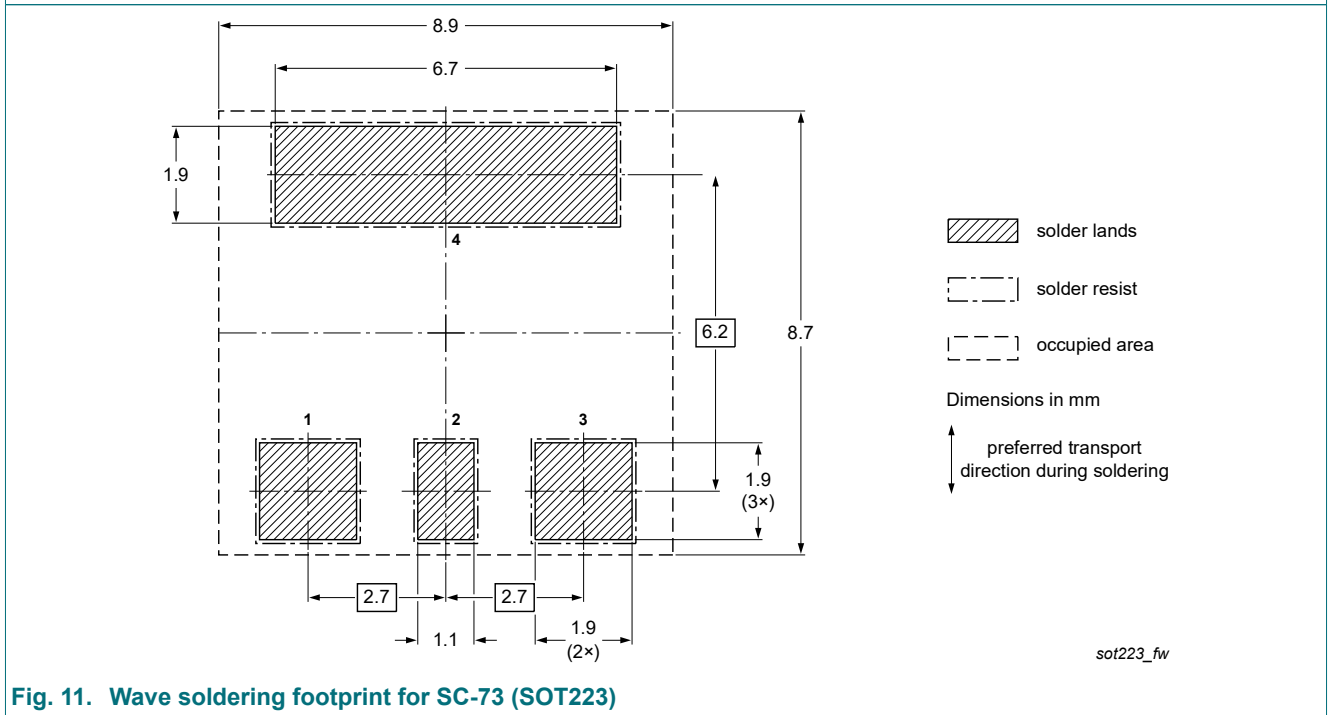


Fig. 11. Wave soldering footprint for SC-73 (SOT223)

14. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP51-Q_SER v.1	20231016	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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