



BCP68-Q series

20 V, 2 A NPN medium power transistors

Rev. 1 — 9 May 2022

Product data sheet

1. General description

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

2. Features and benefits

- High collector current capability I_C and I_{CM}
- Two current gain selections
- High power dissipation capability
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

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

4. Quick reference data

Table 1. Quick reference data

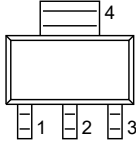
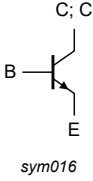
$T_{amb} = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
V_{CEO}	collector-emitter voltage	open base	-	-	20	V	
I_C	collector current		-	-	2	A	
I_{CM}	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	-	3	A	
h_{FE}	DC current gain						
	BCP68-Q	$V_{CE} = 1\text{ V}; I_C = 500\text{ mA}$	[1]	85	-	375	
	BCP68-25-Q		[1]	160	-	375	

[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		Version
	Name	Description	
BCP68-Q	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads	SOT223
BCP68-25-Q			

7. Marking

Table 4. Marking

Type number	Marking code
BCP68-Q	BCP68
BCP68-25-Q	BCP68/25

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	-	32	V	
V_{CEO}	collector-emitter voltage	open base	-	20	V	
V_{EBO}	emitter-base voltage	open collector	-	5	V	
I_C	collector current		-	2	A	
I_{CM}	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	3	A	
I_B	base current		-	0.4	A	
I_{BM}	peak base current	single pulse; $t_p \leq 1\text{ ms}$	-	0.4	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 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 1 cm².
- [3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 6 cm².

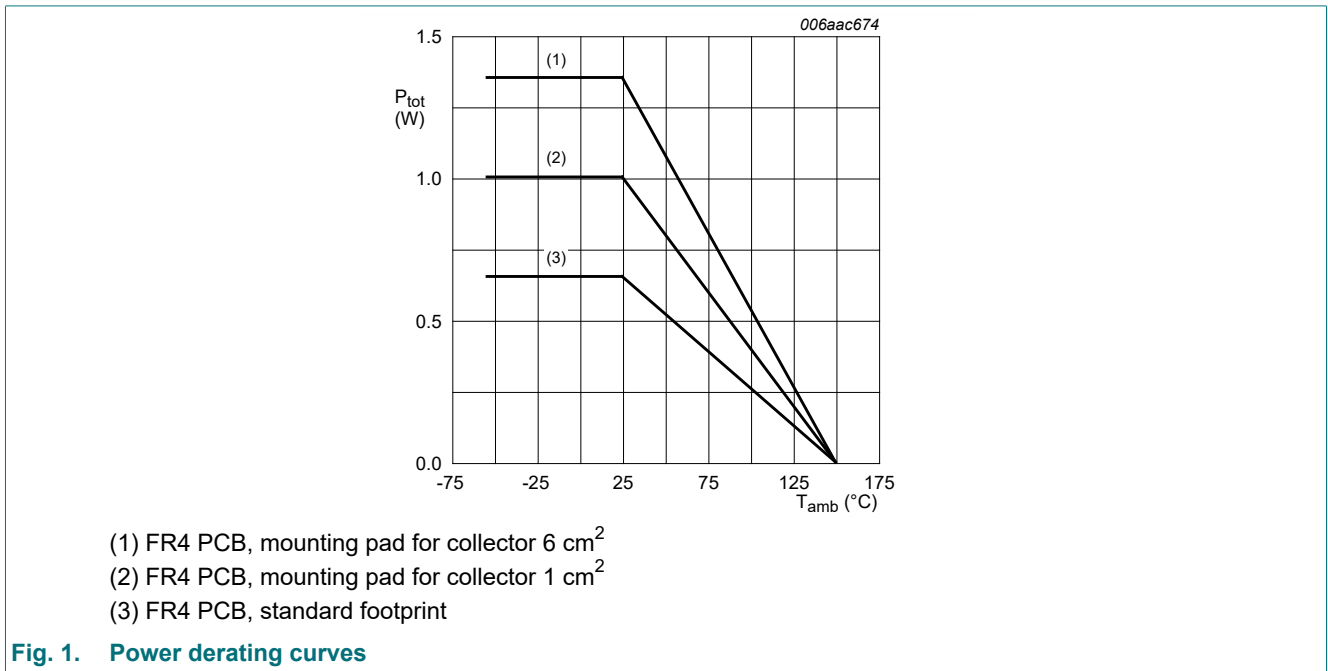


Fig. 1. Power derating curves

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 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 cm².
- [3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 6 cm².

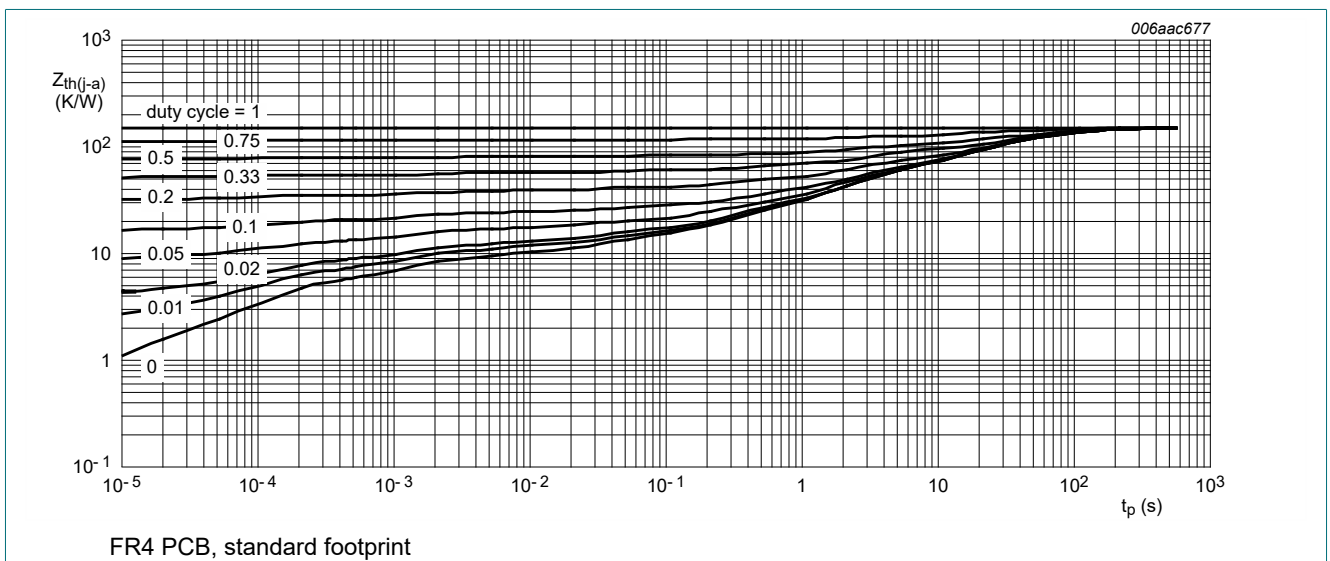


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

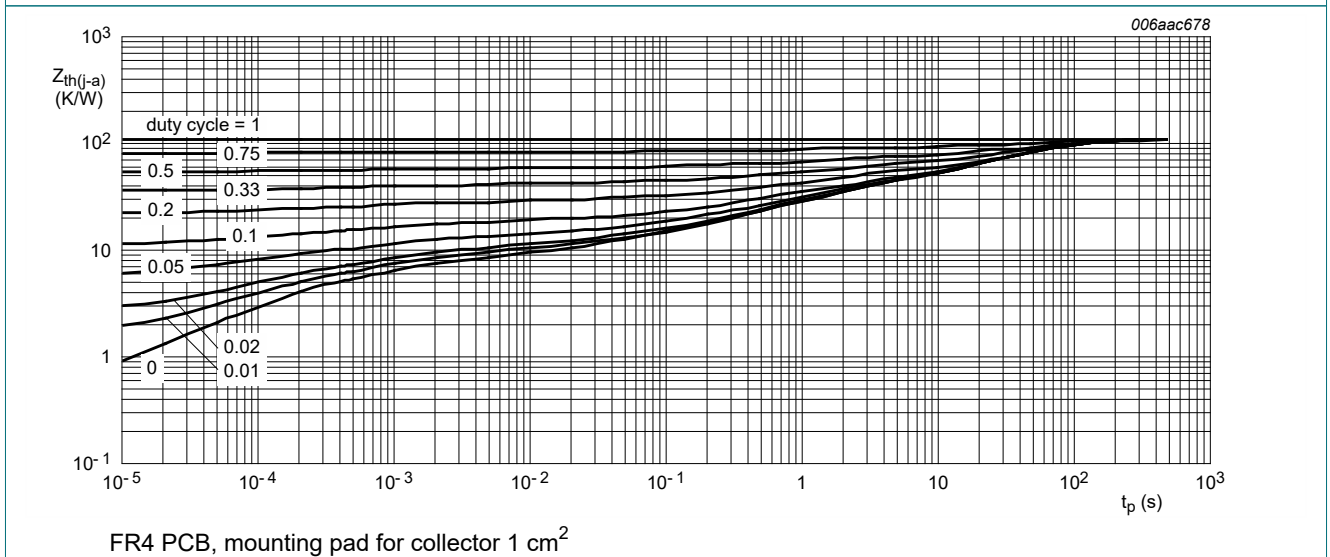
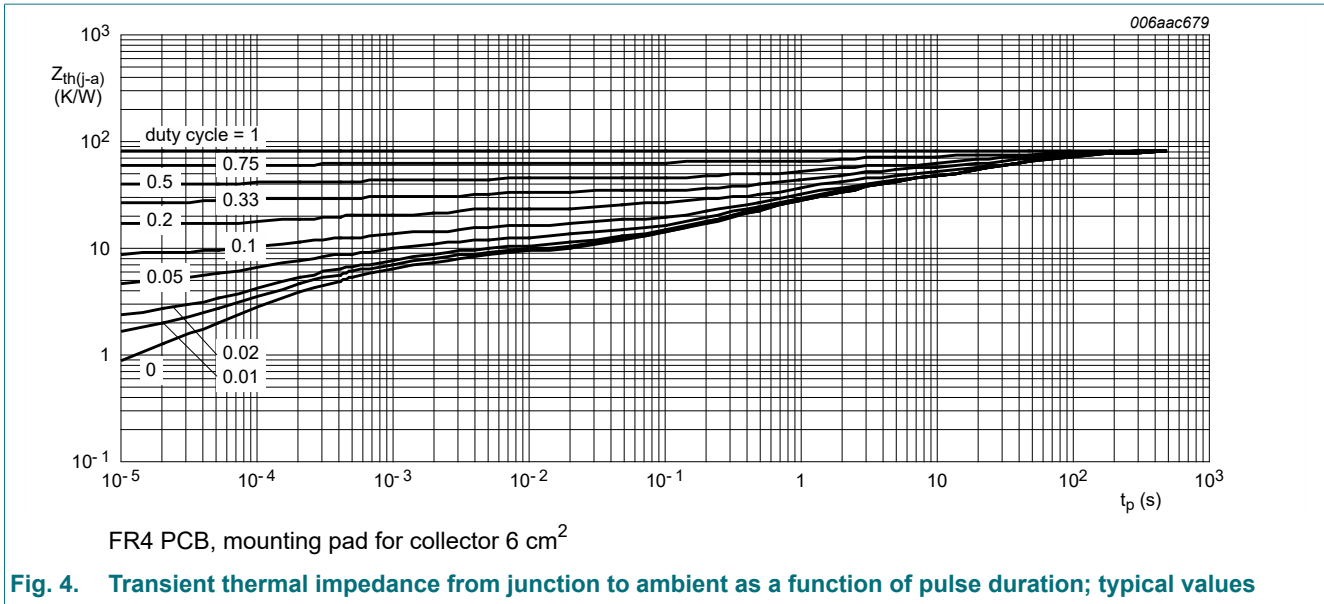


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



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	$I_C = 100\ \mu\text{A}; I_E = 0\ \text{A}$	32	-	-	V	
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 30\ \text{mA}; I_B = 0\ \text{A}$	20	-	-	V	
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 100\ \mu\text{A}; I_C = 0\ \text{A}$	5	-	-	V	
I_{CBO}	collector-base cut-off current	$V_{CB} = 25\ \text{V}; I_E = 0\ \text{A}$	-	-	100	nA	
		$V_{CB} = 25\ \text{V}; I_E = 0\ \text{A}; T_j = 150\text{ °C}$	-	-	10	μA	
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\ \text{V}; I_C = 0\ \text{A}$	-	-	100	nA	
h_{FE}	DC current gain						
	BCP68-Q	$V_{CE} = 10\ \text{V}; I_C = 5\ \text{mA}$	[1]	50	-	-	
		$V_{CE} = 1\ \text{V}; I_C = 500\ \text{mA}$	[1]	85	-	375	
		$V_{CE} = 1\ \text{V}; I_C = 1\ \text{A}$	[1]	60	-	-	
		$V_{CE} = 1\ \text{V}; I_C = 2\ \text{A}$	[1]	40	-	-	
	BCP68-25-Q	$V_{CE} = 10\ \text{V}; I_C = 5\ \text{mA}$	[1]	50	-	-	
		$V_{CE} = 1\ \text{V}; I_C = 500\ \text{mA}$	[1]	160	-	375	
		$V_{CE} = 1\ \text{V}; I_C = 1\ \text{A}$	[1]	60	-	-	
$V_{CE} = 1\ \text{V}; I_C = 2\ \text{A}$		[1]	40	-	-		
V_{CEsat}	collector-emitter saturation voltage	$I_C = 1\ \text{A}; I_B = 100\ \text{mA}$	[1]	-	-	0.5 V	
		$I_C = 2\ \text{A}; I_B = 200\ \text{mA}$	[1]	-	-	0.6 V	
V_{BE}	base-emitter voltage	$V_{CE} = 10\ \text{V}; I_C = 5\ \text{mA}$	[1]	-	-	0.7 V	
		$V_{CE} = 1\ \text{V}; I_C = 1\ \text{A}$	[1]	-	-	1 V	
C_c	collector capacitance	$V_{CB} = 10\ \text{V}; I_E = i_e = 0\ \text{A}; f = 1\ \text{MHz}$	-	22	-	pF	
f_T	transition frequency	$V_{CE} = 5\ \text{V}; I_C = 50\ \text{mA}; f = 100\ \text{MHz}$	40	170	-	MHz	

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

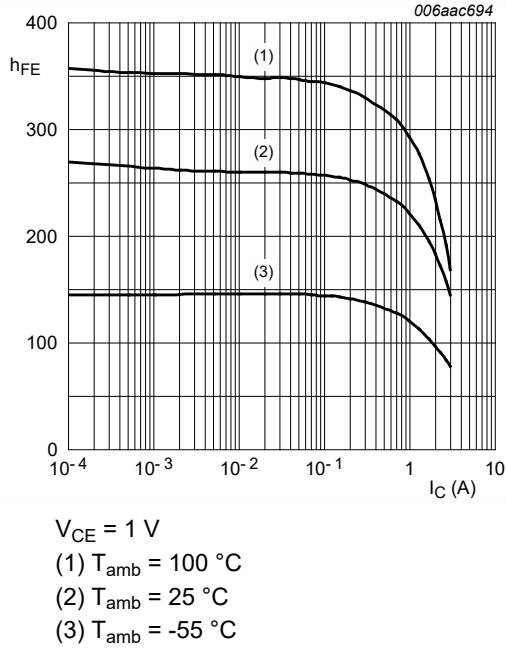


Fig. 5. DC current gain as a function of collector current; typical values

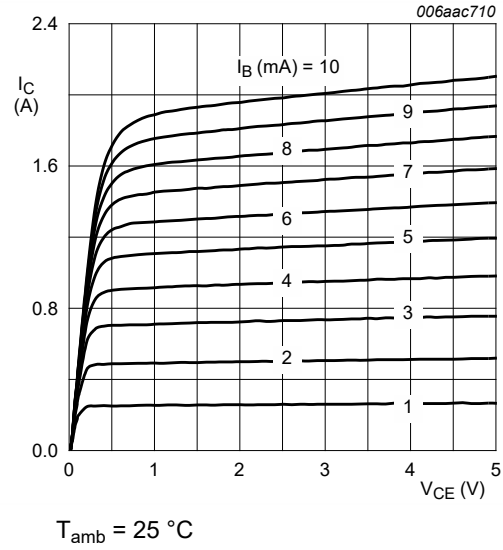


Fig. 6. Collector current as a function of collector-emitter voltage; typical values

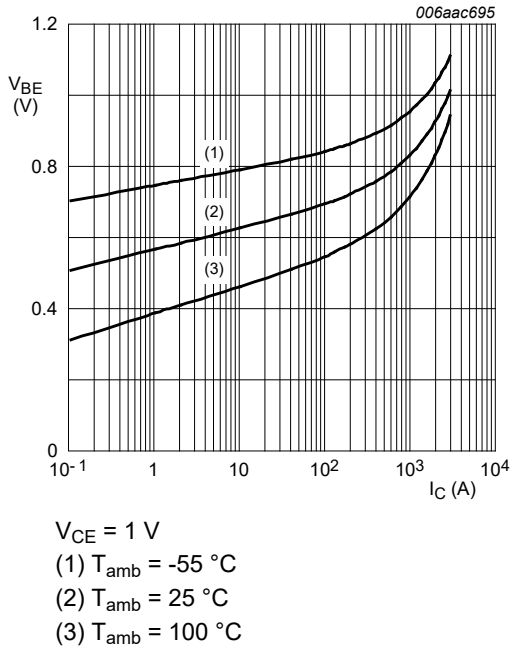


Fig. 7. Base-emitter voltage as a function of collector current; typical values

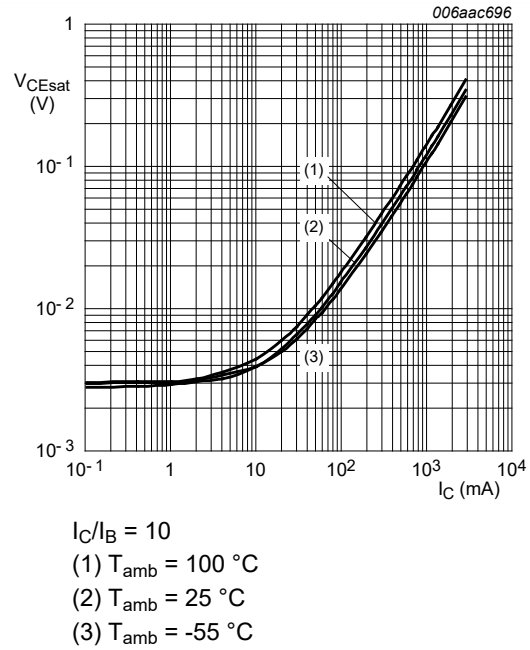


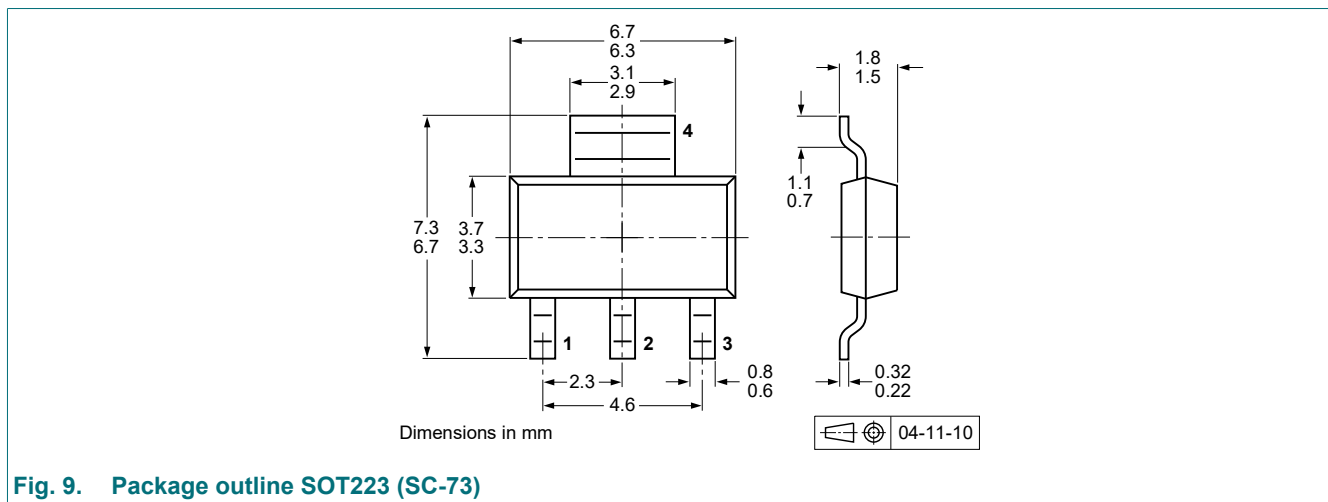
Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

11. Test information

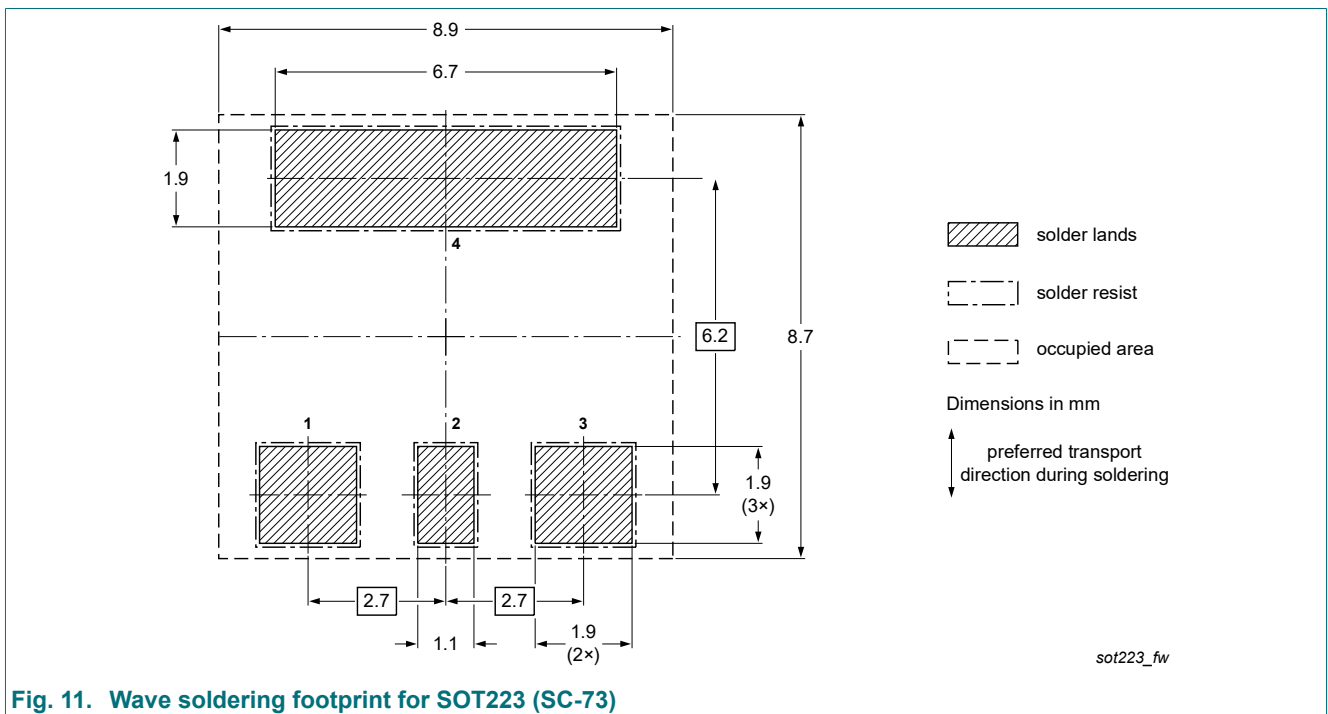
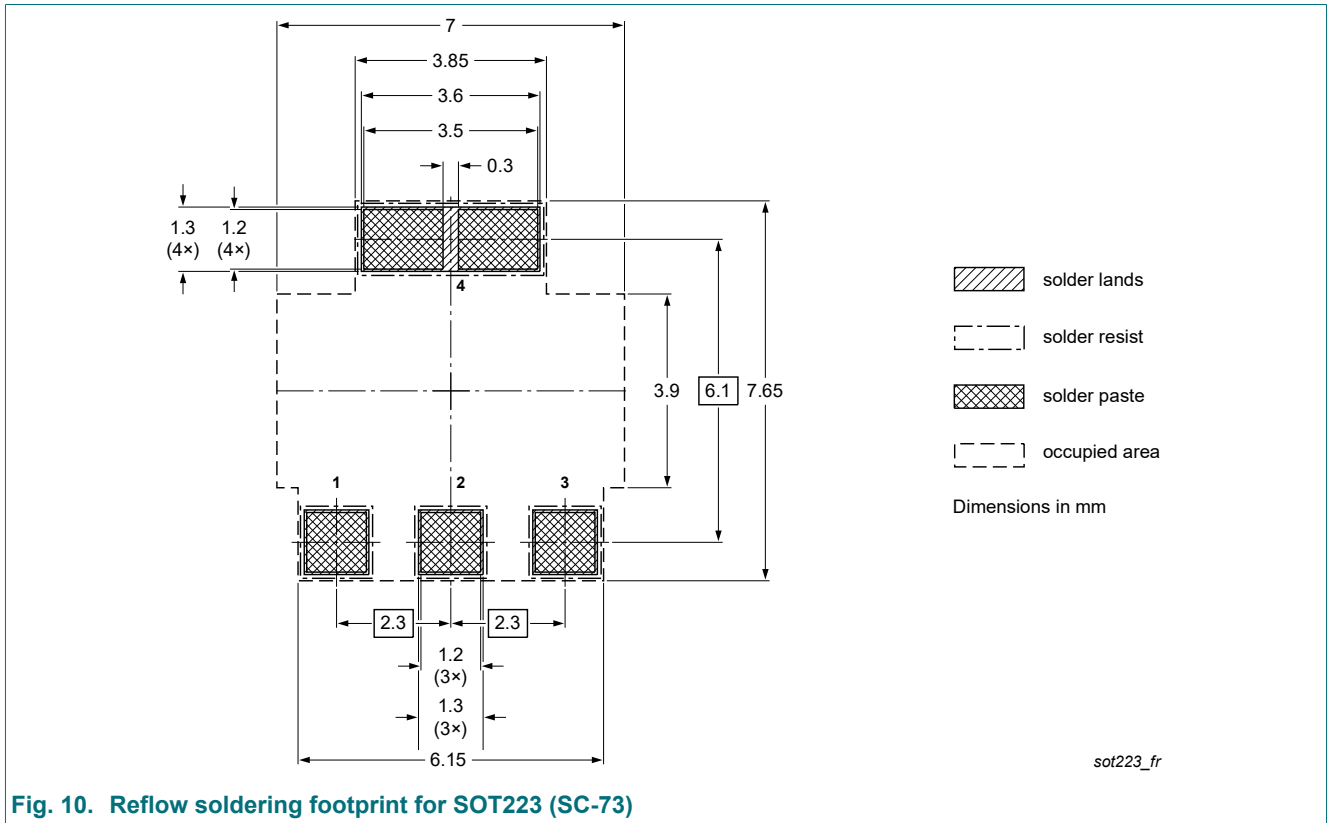
11.1. Quality information

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



13. Soldering



14. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP68-Q_SER v.1	20220509	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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