



# BCP56-Q series

80 V, 1 A NPN medium power transistors

Rev. 2 — 24 June 2022

Product data sheet

## 1. General description

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

Table 1. Product overview

Type number	Package		PNP complement
	Nexperia	JEDEC	
BCP56-Q	SOT223	SC-73	BCP53-Q
BCP56-10-Q			BCP53-10-Q
BCP56-16-Q			BCP53-16-Q

## 2. Features and benefits

- High collector current capability  $I_C$  and  $I_{CM}$
- 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
- MOSFET drivers
- Low-side switches
- Power management
- Amplifiers
- Battery-driven devices

## 4. Quick reference data

**Table 2. Quick reference data**

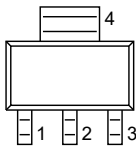
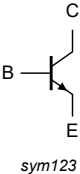
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base	-	-	80	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					
	BCP56-Q	$V_{CE} = 2\text{ V}; I_C = 150\text{ mA}$	[1]	63	-	250
	BCP56-10-Q		[1]	63	-	160
	BCP56-16-Q		[1]	100	-	250

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

## 5. Pinning information

**Table 3. Pinning**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		 sym123
2	C	collector		
3	E	emitter		
4	C	collector		

## 6. Ordering information

**Table 4. Ordering information**

Type number	Package		Version
	Name	Description	
<a href="#">BCP56-Q</a>	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads	<a href="#">SOT223</a>
<a href="#">BCP56-10-Q</a>			
<a href="#">BCP56-16-Q</a>			

## 7. Marking

**Table 5. Marking**

Type number	Marking code
BCP56-Q	BCP56
BCP56-10-Q	BCP56/10
BCP56-16-Q	BCP56/16

## 8. Limiting values

**Table 6. Limiting values**

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

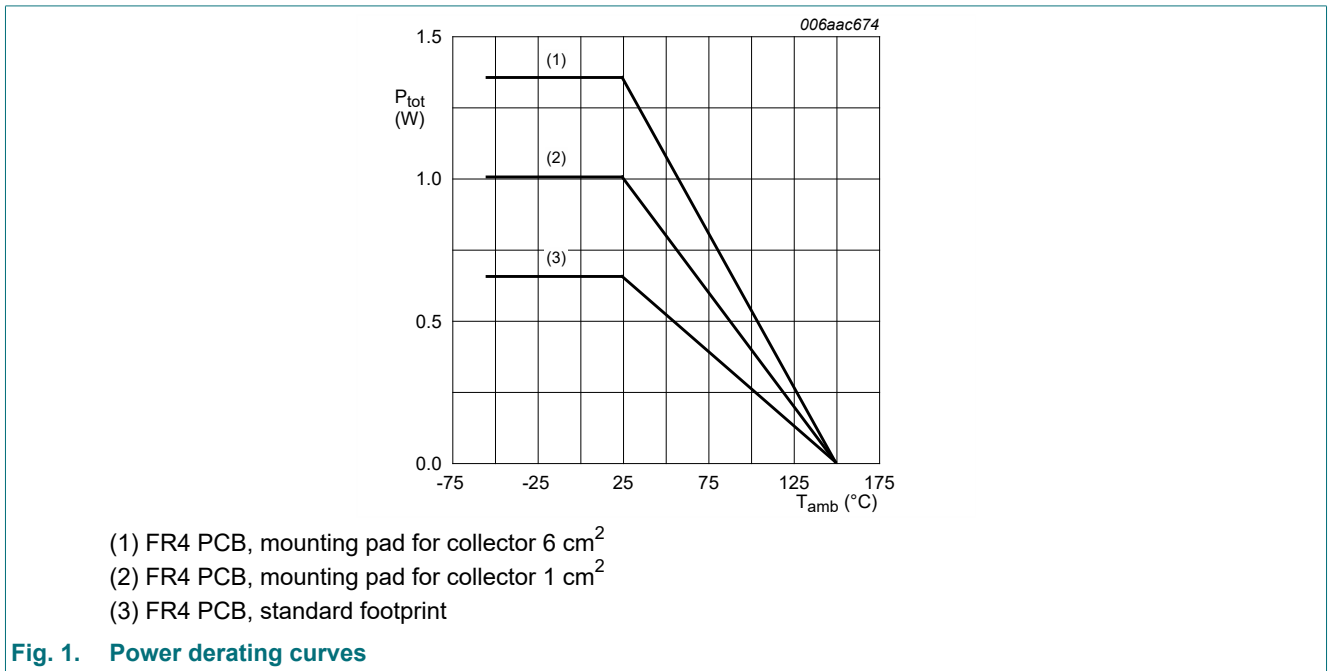
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter	-	100	V
$V_{CEO}$	collector-emitter voltage	open base	-	80	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 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.

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



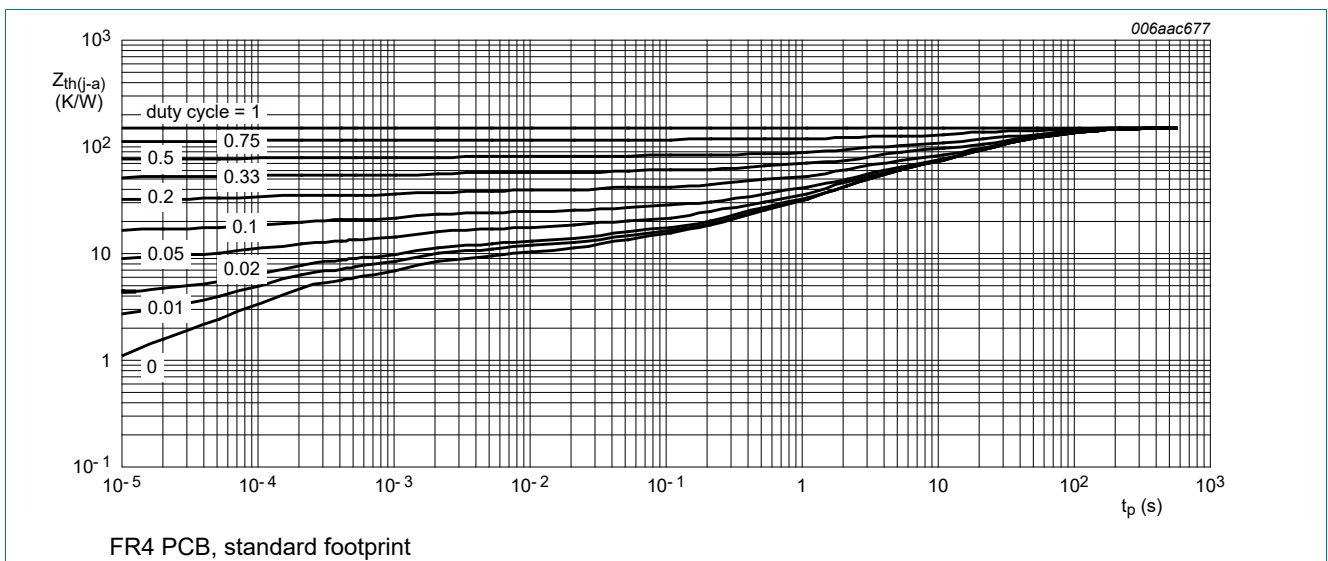
## 9. Thermal characteristics

**Table 7. Thermal characteristics**

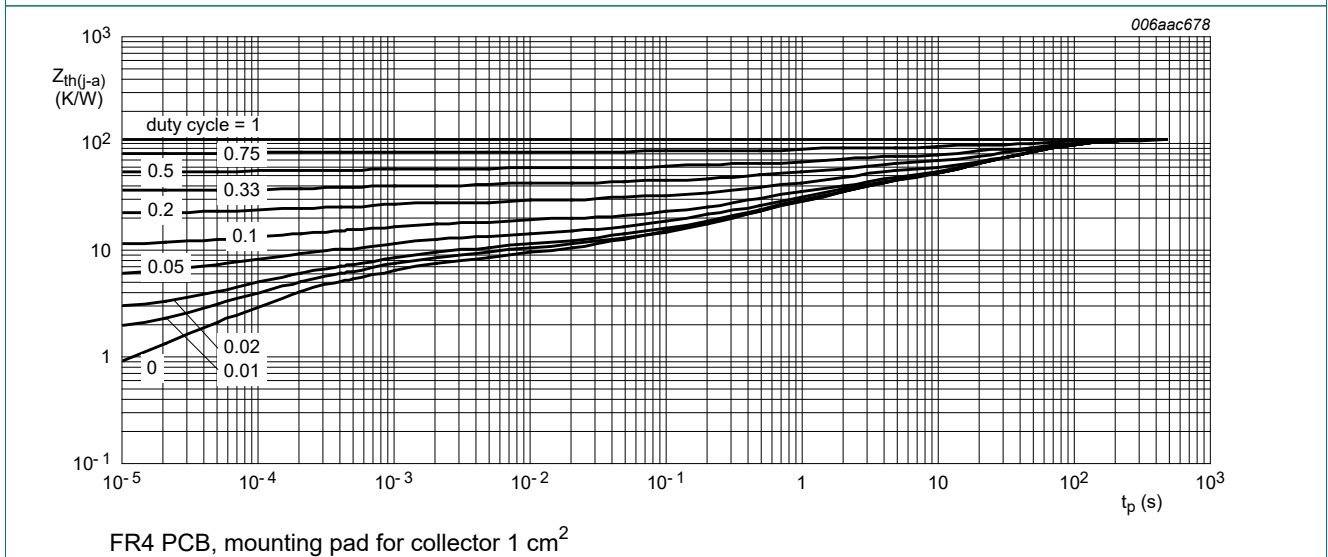
$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

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	

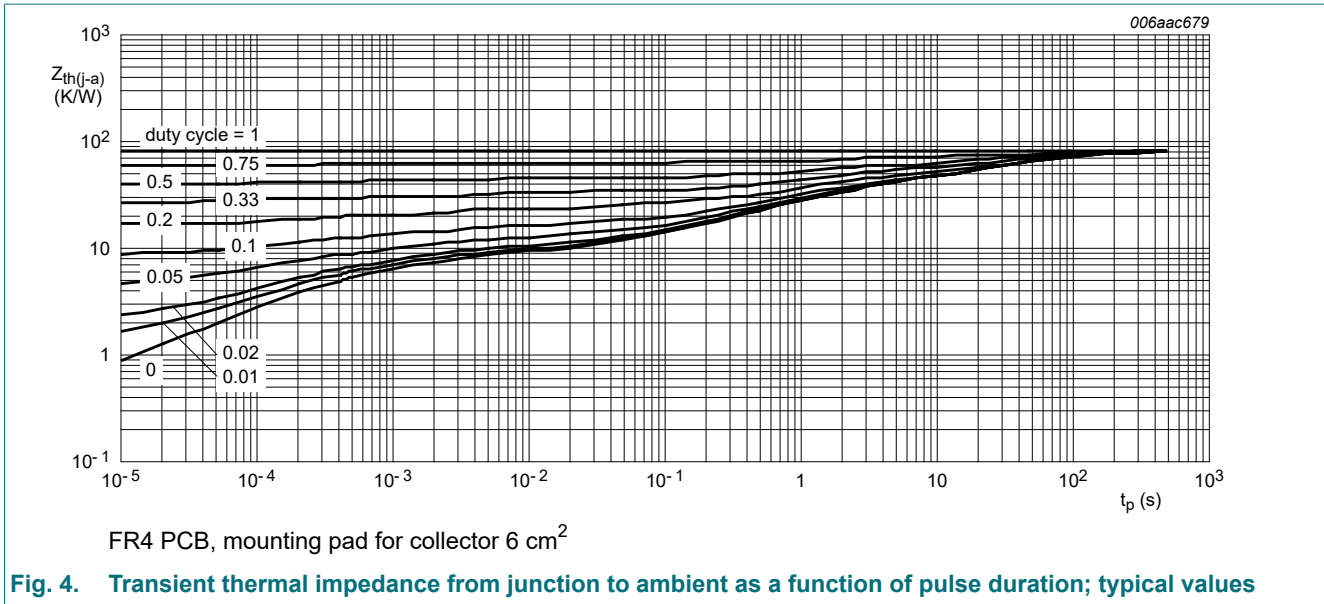
- [1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.
- [2] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.
- [3] Device mounted on an FR4 Printed-Circuit-Board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

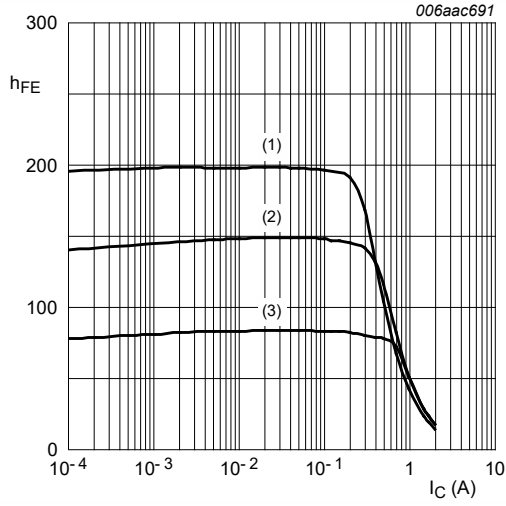


## 10. Characteristics

**Table 8. Characteristics**
 $T_{amb} = 25\text{ °C}$  unless otherwise specified.

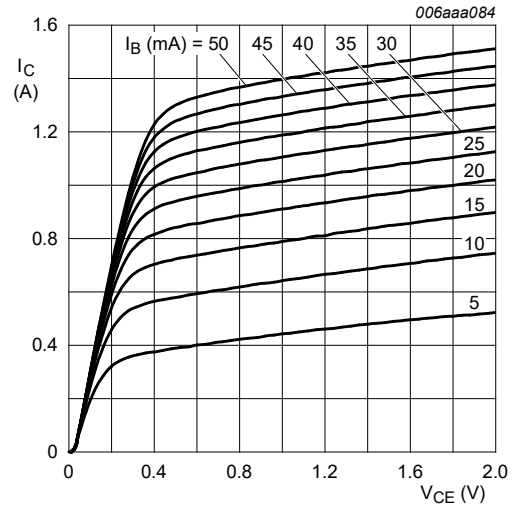
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\ \mu\text{A}; I_E = 0\ \text{A}$	100	-	-	V	
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2\ \text{mA}; I_B = 0\ \text{A}$	80	-	-	V	
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 100\ \mu\text{A}; I_C = 0\ \text{A}$	5	-	-	V	
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 30\ \text{V}; I_E = 0\ \text{A}$	-	-	100	nA	
		$V_{CB} = 30\ \text{V}; I_E = 0\ \text{A}; T_j = 150\text{ °C}$	-	-	10	$\mu\text{A}$	
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\ \text{V}; I_C = 0\ \text{A}$	-	-	100	nA	
$h_{FE}$	DC current gain						
	BCP56-Q	$V_{CE} = 2\ \text{V}; I_C = 5\ \text{mA}$	[1]	63	-	-	
		$V_{CE} = 2\ \text{V}; I_C = 150\ \text{mA}$	[1]	63	-	250	
		$V_{CE} = 2\ \text{V}; I_C = 500\ \text{mA}$	[1]	40	-	-	
	BCP56-10-Q	$V_{CE} = 2\ \text{V}; I_C = 5\ \text{mA}$	[1]	63	-	-	
		$V_{CE} = 2\ \text{V}; I_C = 150\ \text{mA}$	[1]	63	-	160	
		$V_{CE} = 2\ \text{V}; I_C = 500\ \text{mA}$	[1]	40	-	-	
	BCP56-16-Q	$V_{CE} = 2\ \text{V}; I_C = 5\ \text{mA}$	[1]	63	-	-	
		$V_{CE} = 2\ \text{V}; I_C = 150\ \text{mA}$		100	-	250	
$V_{CE} = 2\ \text{V}; I_C = 500\ \text{mA}$			40	-	-		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 500\ \text{mA}; I_B = 50\ \text{mA}$	[1]	-	500	mV	
$V_{BE}$	base-emitter voltage	$V_{CE} = 2\ \text{V}; I_C = 500\ \text{mA}$	[1]	-	1	V	
$C_C$	collector capacitance	$V_{CB} = 10\ \text{V}; I_E = i_e = 0\ \text{A}; f = 1\ \text{MHz}$	-	6	-	pF	
$f_T$	transition frequency	$V_{CE} = 5\ \text{V}; I_C = 50\ \text{mA}; f = 100\ \text{MHz}$	100	180	-	MHz	

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



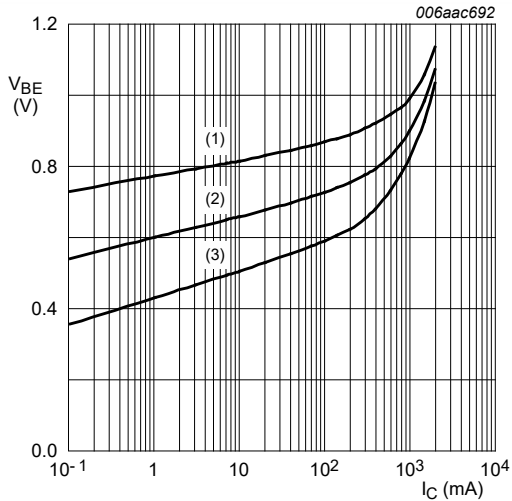
$V_{CE} = 2\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



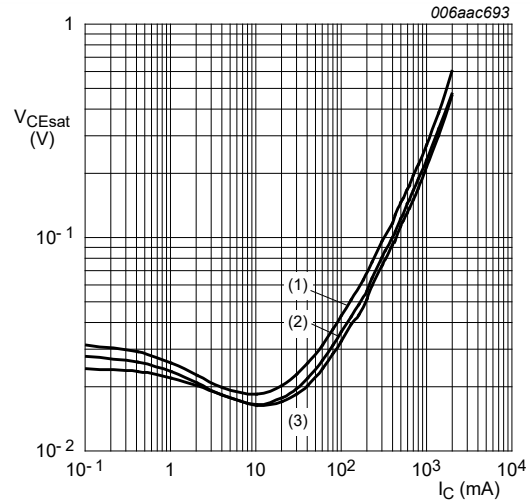
$T_{amb} = 25\text{ °C}$

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



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

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



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

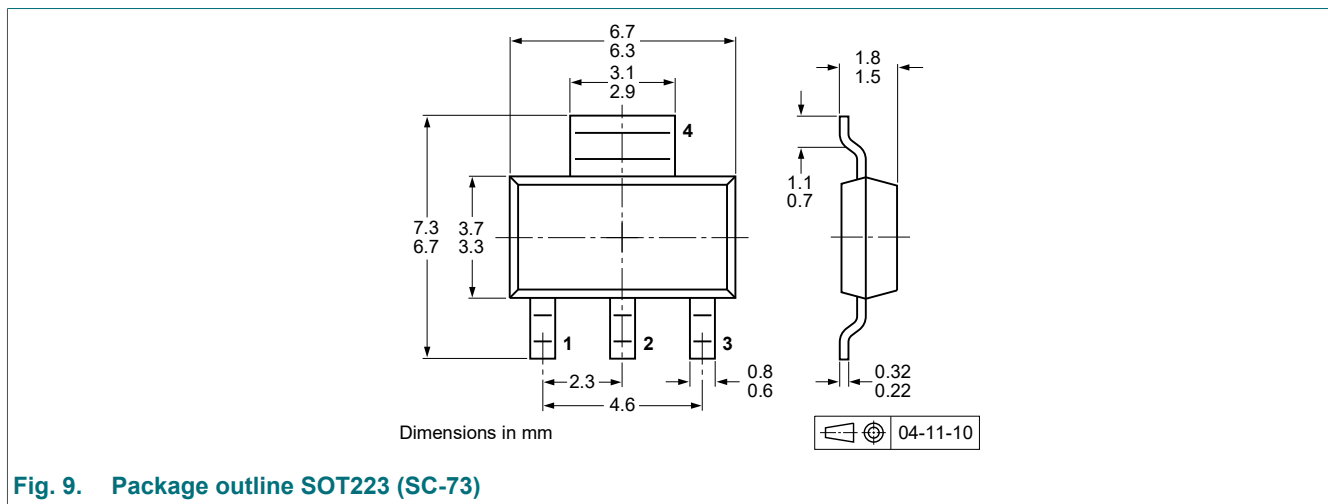
Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

## 11. Test information

### 11.1. Quality information

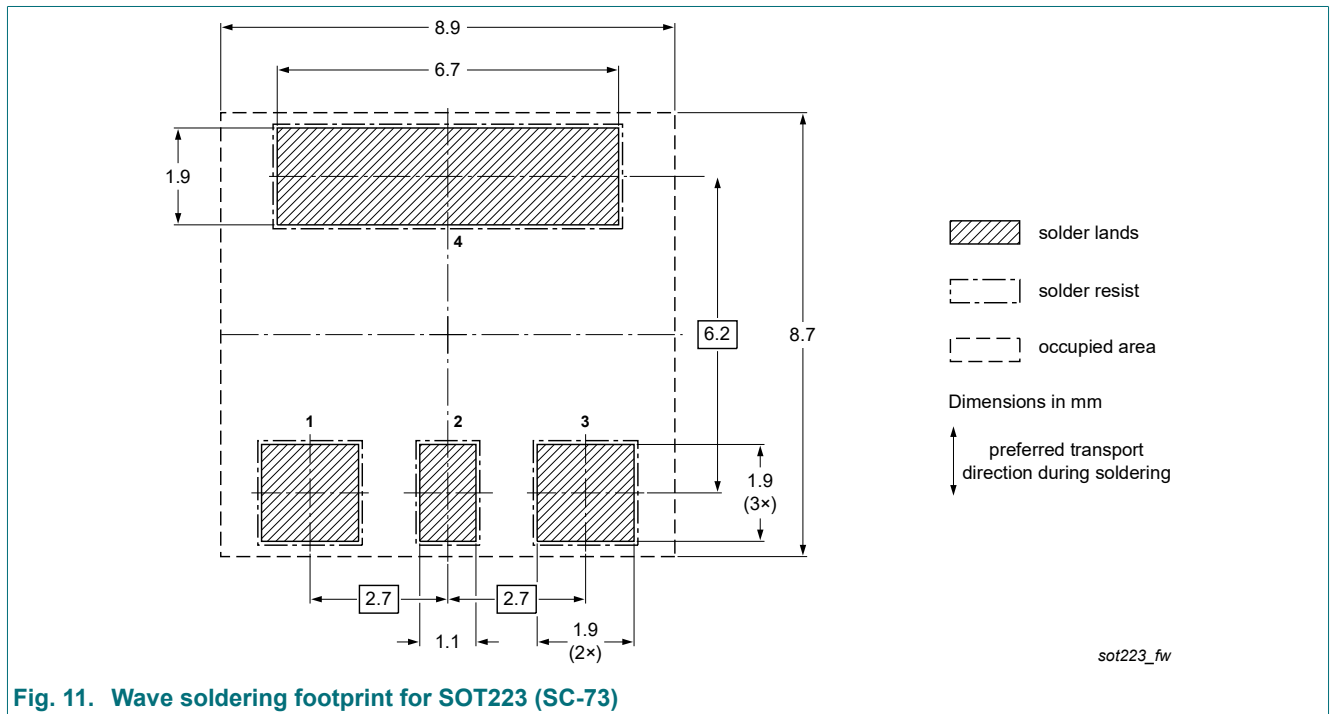
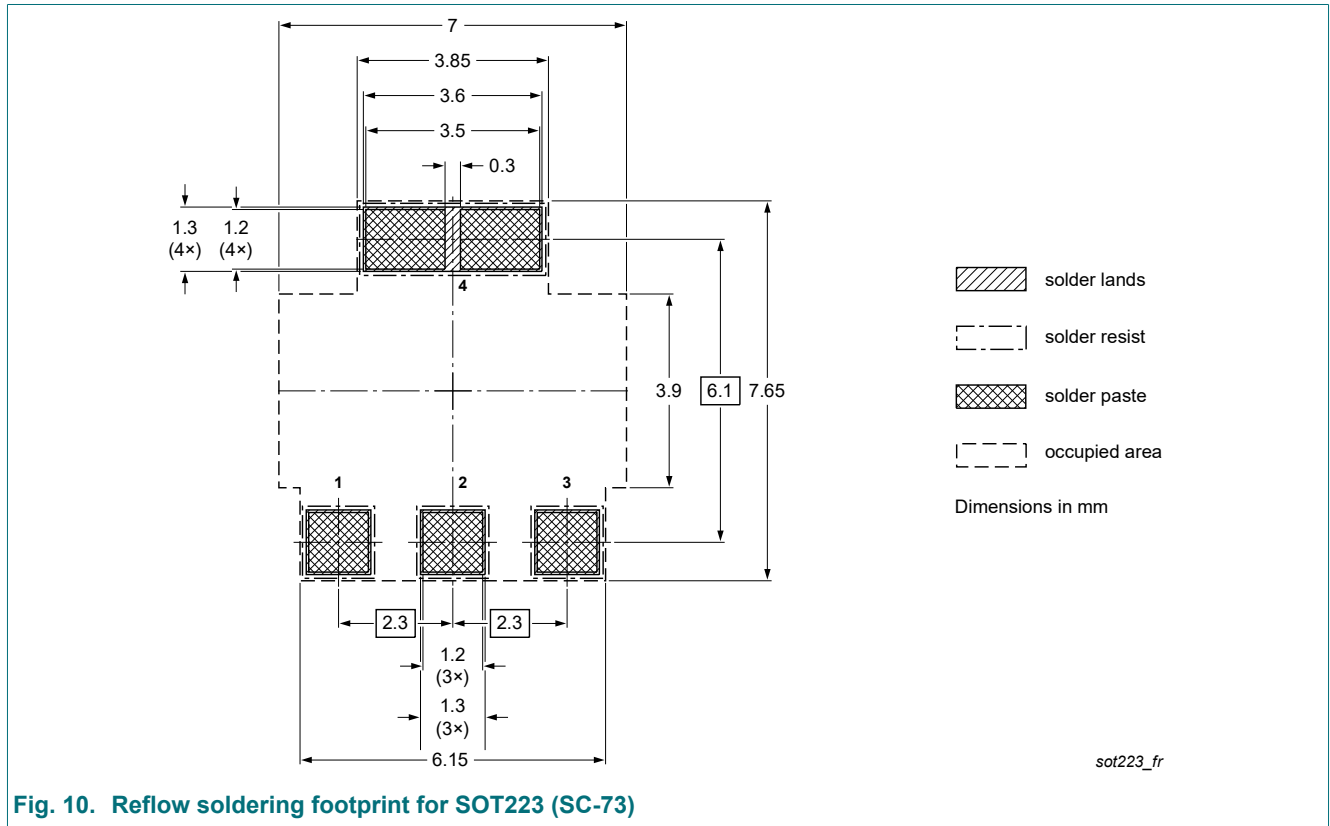
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

## 12. Package outline





### 13. Soldering



## 14. Revision history

**Table 9. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP56-Q_SER v.2	20220624	Product data sheet	-	BCP56-Q_SER v.1
Modifications:	• Characteristics at $V_{(BR)CEO}$ : Conditions corrected			
BCP56-Q_SER v.1	20210623	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.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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For more information, please visit: <http://www.nexperia.com>

For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)

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