



# BCP53H-Q series

80 V, 1 A PNP medium power transistors

Rev. 2 — 29 March 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 collector current capability  $I_C$  and  $I_{CM}$
- Three current gain selections
- High power dissipation capability
- High-temperature applications up to 175 °C
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

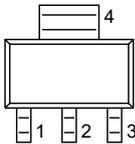
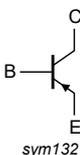
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{CEO}$	collector-emitter voltage	open base	-	-	-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						
	BCP53H-Q	$V_{CE} = -2\text{ V}; I_C = 150\text{ mA}$	[1]	63	-	250	
	BCP53-10H-Q		[1]	63	-	160	
	BCP53-16H-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		
2	C	collector		
3	E	emitter		
4	C	collector		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
<a href="#">BCP53H-Q</a>	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads	<a href="#">SOT223</a>
<a href="#">BCP53-10H-Q</a>			
<a href="#">BCP53-16H-Q</a>			

## 7. Marking

Table 4. Marking

Type number	Marking code
BCP53H-Q	BCP53H
BCP53-10H-Q	P5310H
BCP53-16H-Q	P5316H

## 8. Limiting values

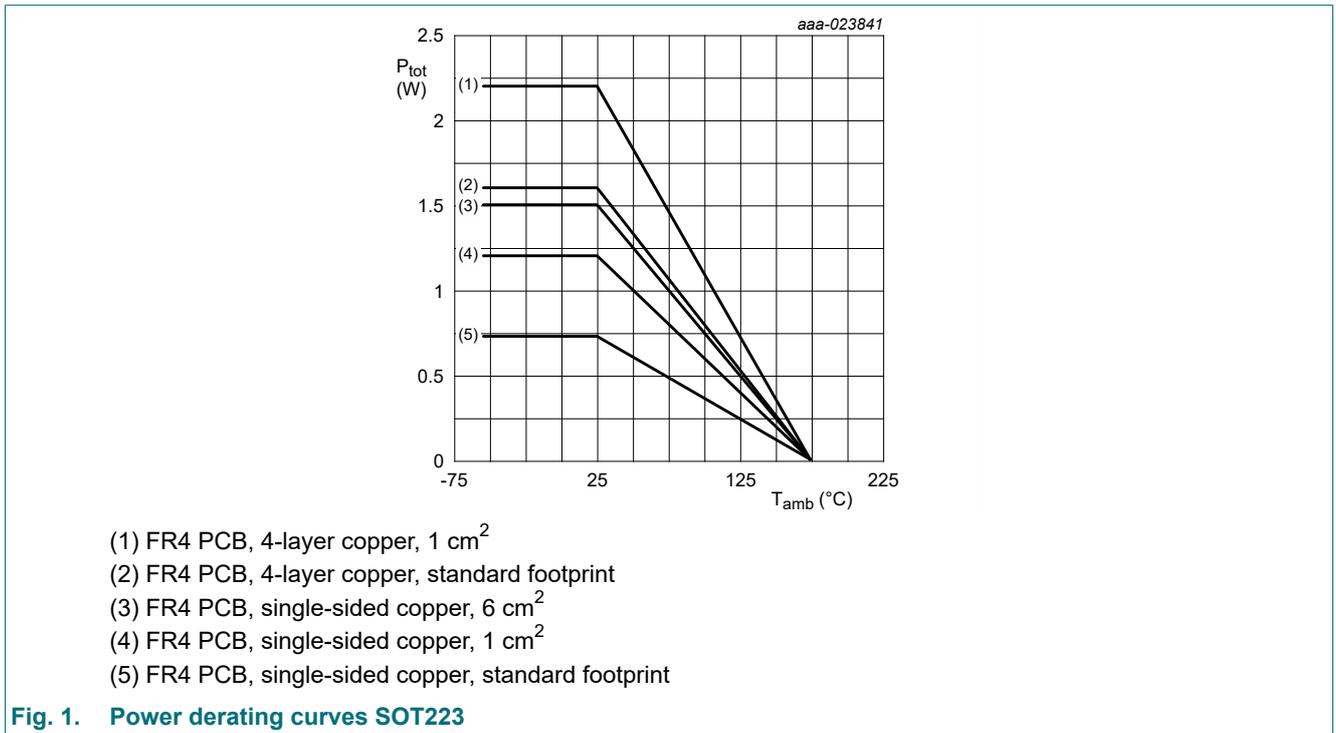
**Table 5. Limiting values**

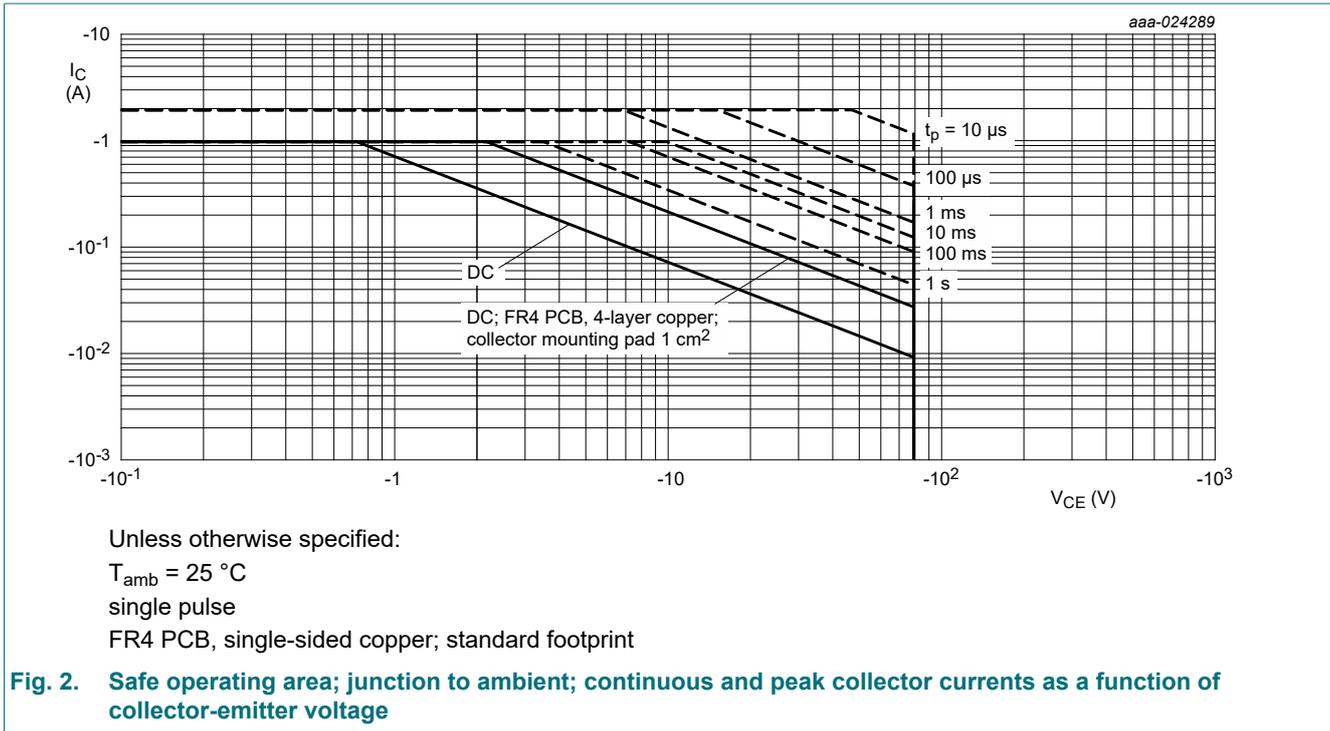
In accordance with the Absolute Maximum Rating System (IEC 60134).

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

Symbol	Parameter	Conditions	Min	Max	Unit	
$V_{CBO}$	collector-base voltage	open emitter	-	-100	V	
$V_{CEO}$	collector-emitter voltage	open base	-	-80	V	
$V_{EBO}$	emitter-base voltage	open collector	-	-7	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		-	-0.2	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]	-	725	mW
			[2]	-	1.2	W
			[3]	-	1.5	W
			[4]	-	1.6	W
			[5]	-	2.2	W
$T_j$	junction temperature		-	175	°C	
$T_{amb}$	ambient temperature		-55	175	°C	
$T_{stg}$	storage temperature		-65	175	°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  $6\text{ cm}^2$ .
- [4] Device mounted on an FR4 PCB, 4-layer copper; tin-plated and standard footprint.
- [5] Device mounted on an FR4 PCB, 4-layer copper; tin-plated; mounting pad for collector  $1\text{ cm}^2$ .





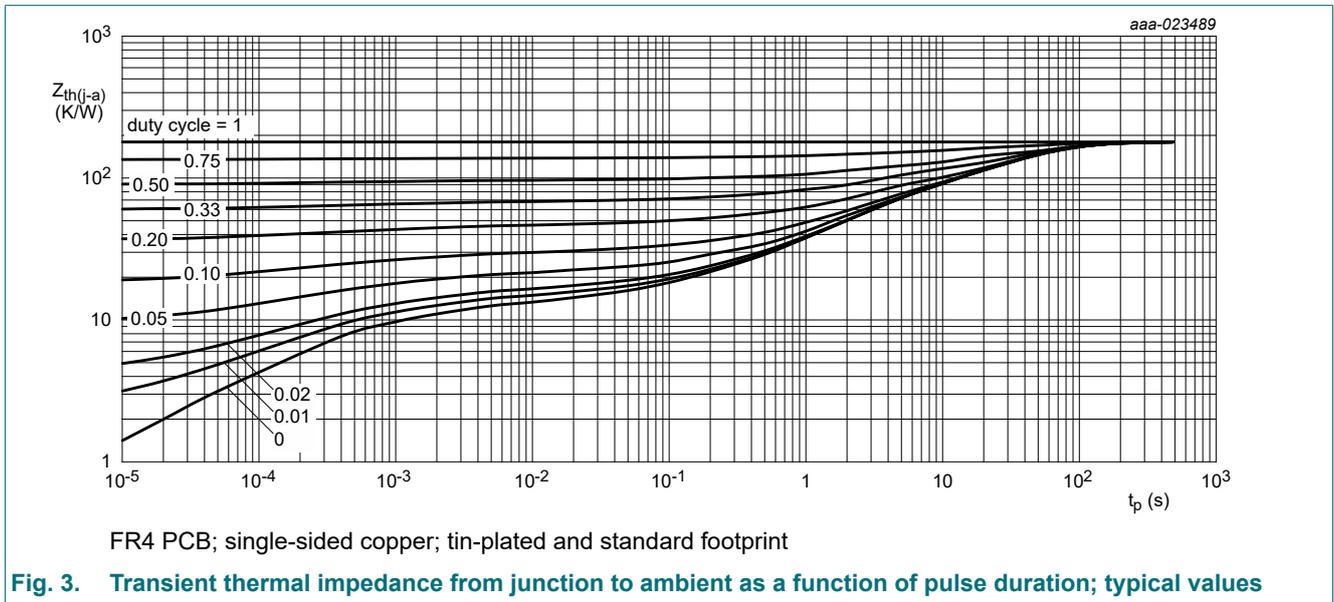
## 9. Thermal characteristics

**Table 6. Thermal characteristics**

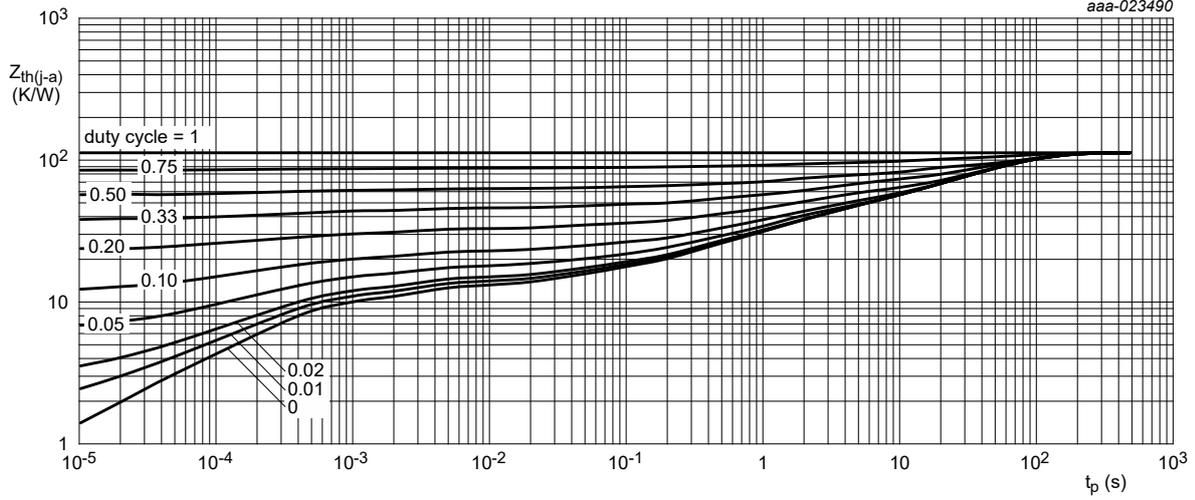
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	207	K/W
			[2]	-	-	125	K/W
			[3]	-	-	100	K/W
			[4]	-	-	94	K/W
			[5]	-	-	69	K/W
$R_{(j-sp)}$	thermal resistance from junction to solder point			-	-	18	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>.
- [4] Device mounted on an FR4 PCB, 4-layer copper; tin-plated and standard footprint.
- [5] Device mounted on an FR4 PCB, 4-layer copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.

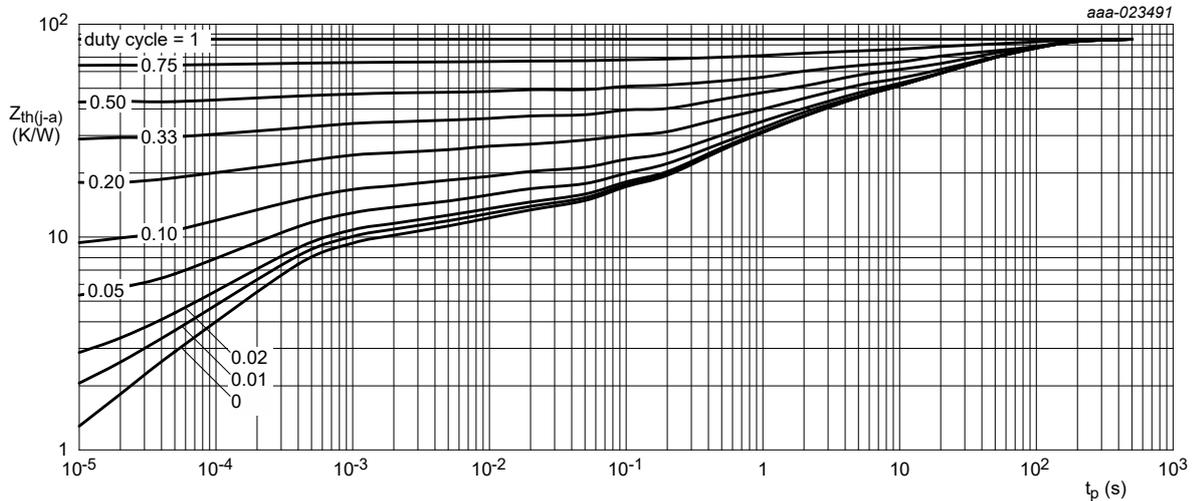


**Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**



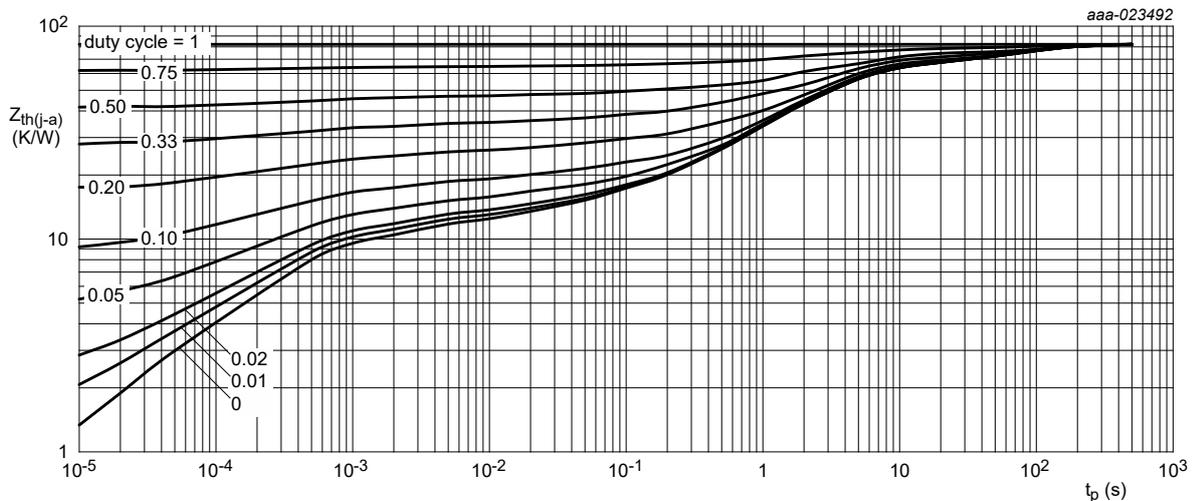
FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>

Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



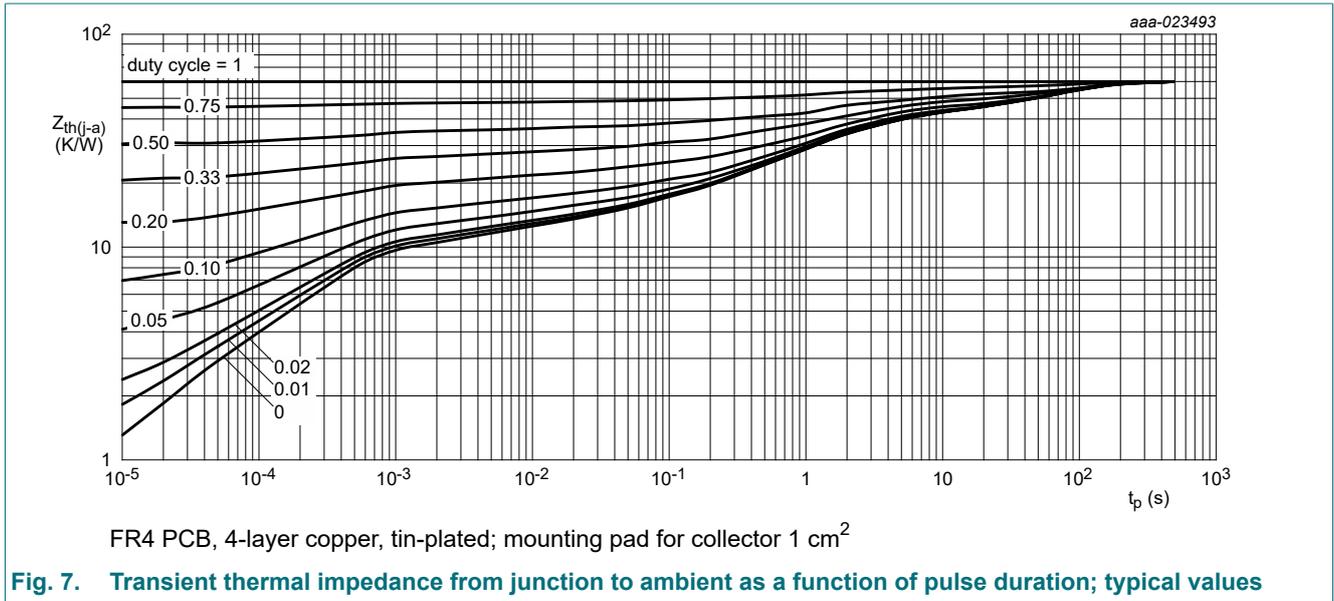
FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm<sup>2</sup>

Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, 4-layer copper, tin-plated and standard footprint.

Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



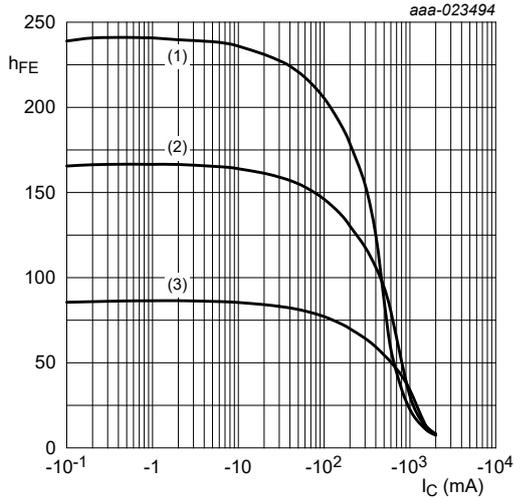
## 10. Characteristics

**Table 7. Characteristics**

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

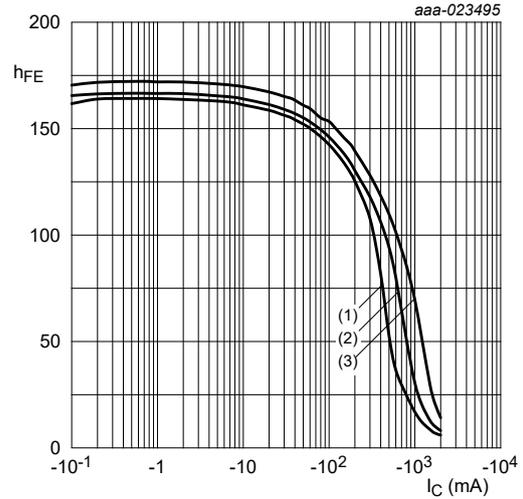
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A	-	-	-100	nA	
		V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A; T <sub>j</sub> = 150 °C	-	-	-10	μA	
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = -5 V; I <sub>C</sub> = 0 A	-	-	-100	nA	
h <sub>FE</sub>	DC current gain						
	BCP53H-Q	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	-	-	
	BCP53-10H-Q	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	-	-	
	BCP53-16H-Q	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]	-	-500	mV	
V <sub>BE</sub>	base-emitter voltage	V <sub>CE</sub> = -2 V; I <sub>C</sub> = -500 mA	[1]	-	-1	V	
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -50 mA; f = 100 MHz		100	140	MHz	
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		7	-	pF	

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



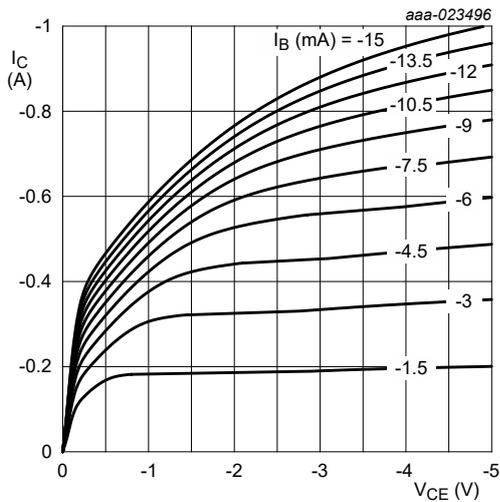
$V_{CE} = -2$  V  
 (1)  $T_{amb} = 100$  °C  
 (2)  $T_{amb} = 25$  °C  
 (3)  $T_{amb} = -55$  °C

Fig. 8. DC current gain as a function of collector current; typical values



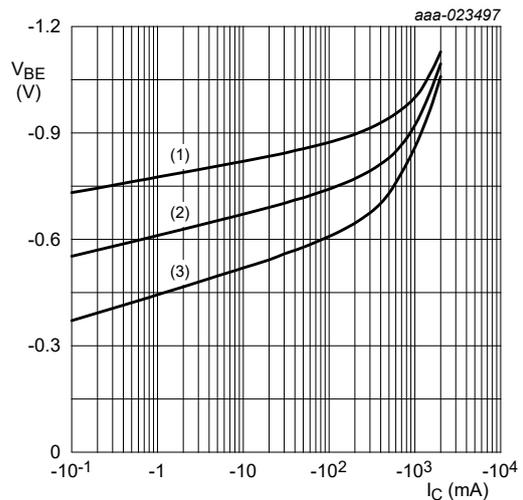
$T_{amb} = 25$  °C  
 (1)  $V_{CE} = -1$  V  
 (2)  $V_{CE} = -2$  V  
 (3)  $V_{CE} = -5$  V

Fig. 9. DC current gain as a function of collector current; typical values



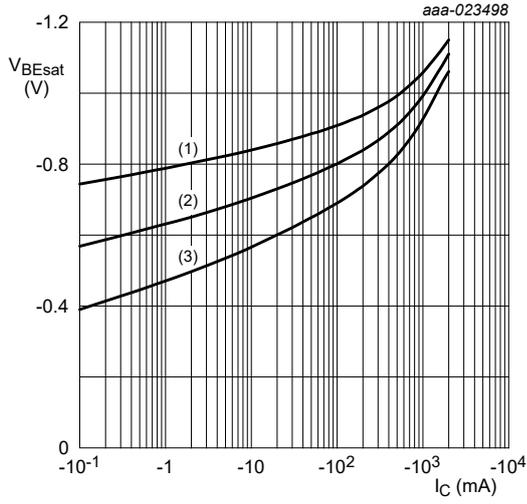
$T_{amb} = 25$  °C

Fig. 10. Collector current as a function of collector-emitter voltage; typical values



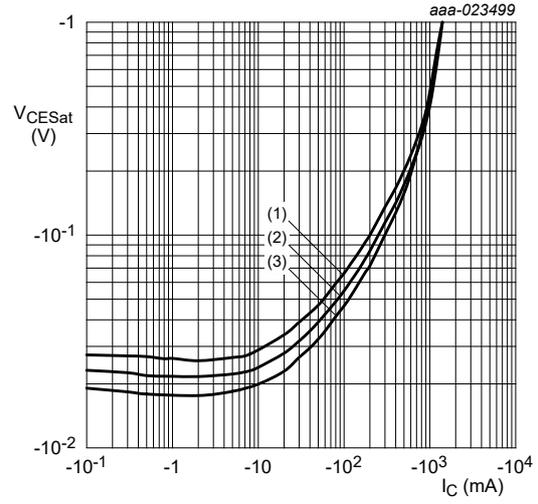
$V_{CE} = -2$  V  
 (1)  $T_{amb} = -55$  °C  
 (2)  $T_{amb} = 25$  °C  
 (3)  $T_{amb} = 100$  °C

Fig. 11. Base-emitter voltage as a function of collector current; typical values



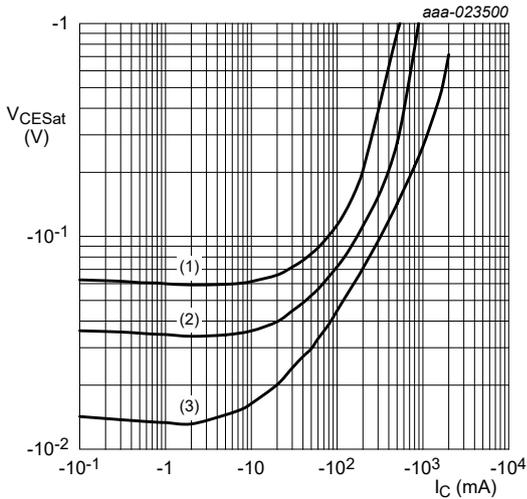
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

Fig. 12. Base-emitter saturation voltage as a function of collector current; typical values



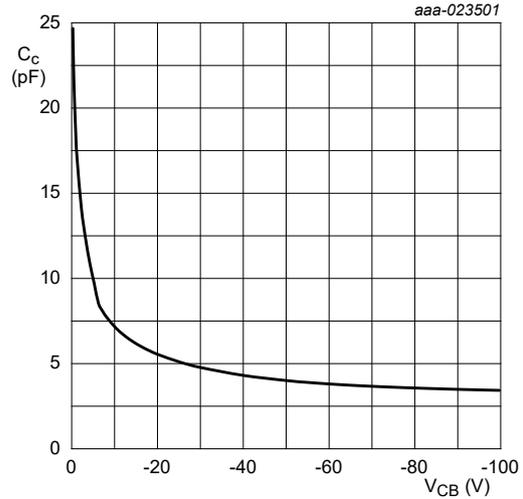
$I_C/I_B = 10$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

Fig. 13. Collector-emitter saturation voltage as a function of collector current; typical values



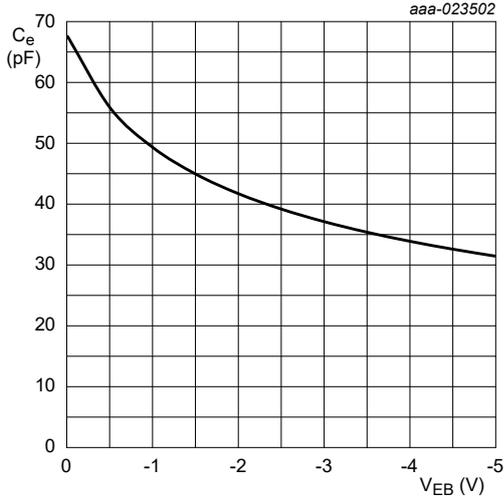
$T_{amb} = 25\text{ °C}$   
 (1)  $I_C/I_B = 50$   
 (2)  $I_C/I_B = 20$   
 (3)  $I_C/I_B = 5$

Fig. 14. Collector-emitter saturation voltage as a function of collector current; typical values



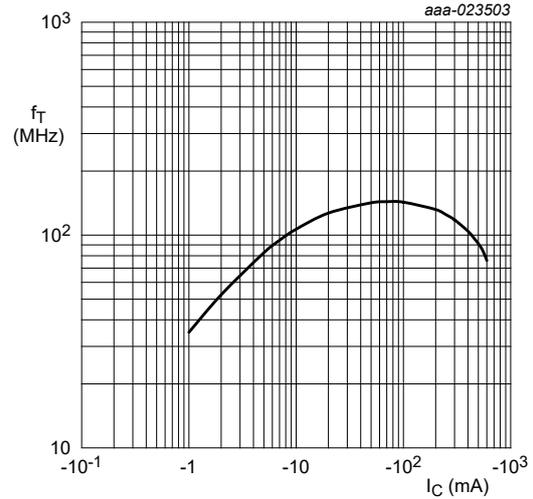
$f = 1\text{ MHz}$   
 $T_{amb} = 25\text{ °C}$

Fig. 15. Collector capacitance as a function of collector-base voltage; typical values



$f = 1 \text{ MHz}$   
 $T_{amb} = 25 \text{ }^\circ\text{C}$

Fig. 16. Emitter capacitance as a function of emitter-base voltage; typical values



$V_{CE} = -5 \text{ V}$   
 $f = 100 \text{ MHz}$   
 $T_{amb} = 25 \text{ }^\circ\text{C}$

Fig. 17. Transition frequency as a function of collector current; typical values

## 11. Test information

### 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

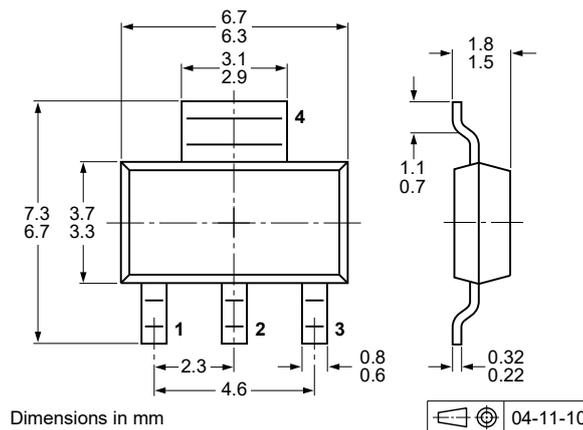
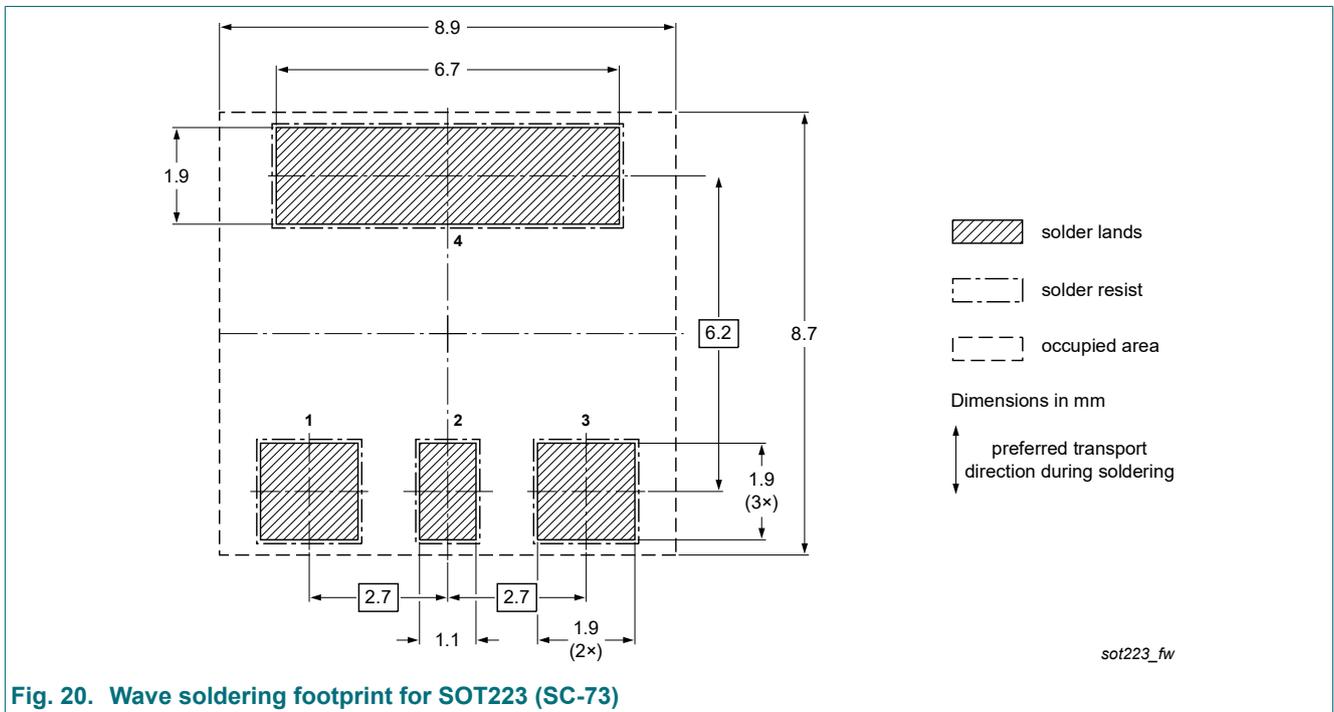
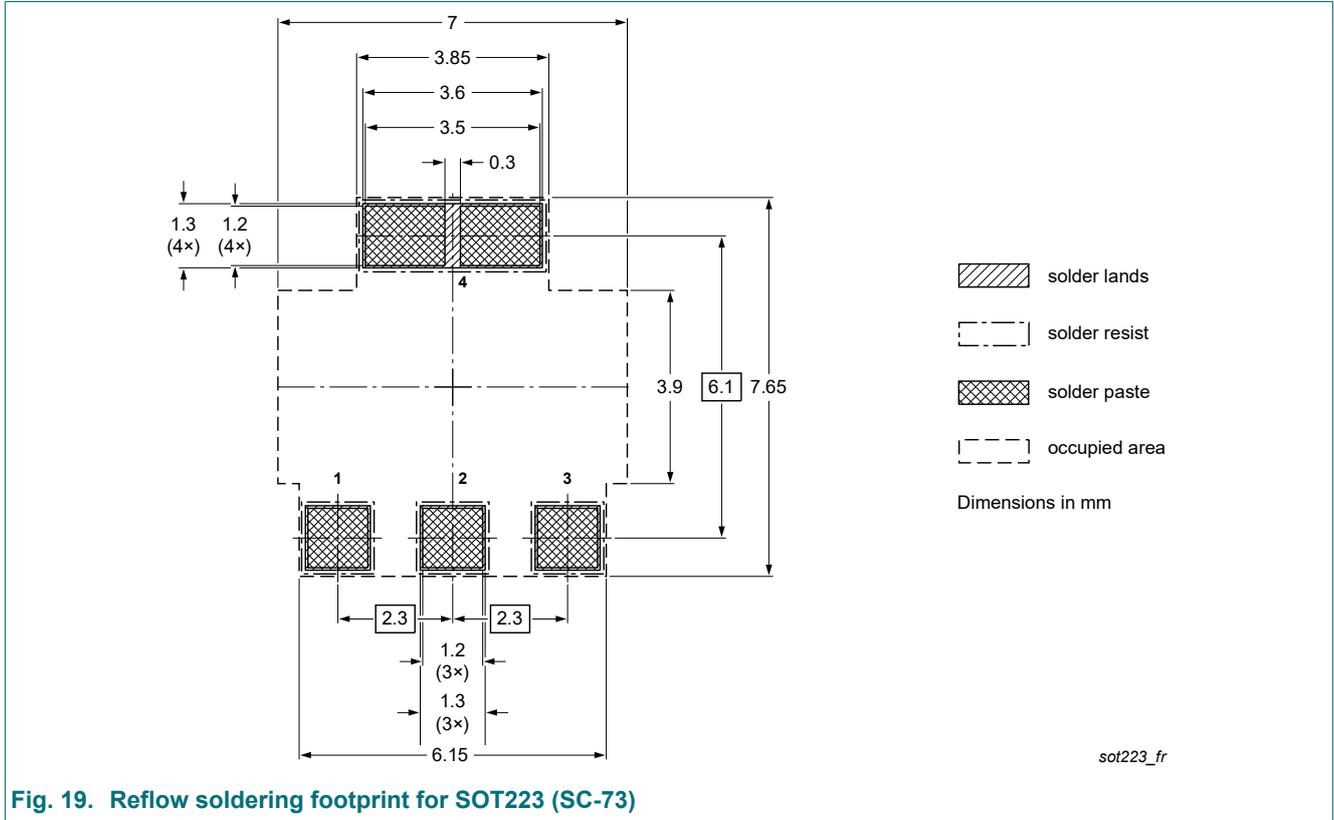


Fig. 18. Package outline SOT223 (SC-73)

13. Soldering



## 14. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP53H-Q_SER v.1	20230329	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".
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