



BCP53T series

80 V, 1 A PNP medium power transistors

Rev. 2 — 29 April 2019

Product data sheet

1. Product profile

1.1. General description

PNP medium power transistors in a medium power SOT223 (SC73) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		NPN complement
	Nexperia	JEDEC	
BCP53T	SOT223	SC-73	BCP56T
BCP53-10T			BCP56-10T
BCP53-16T			BCP56-16T

1.2. Features and benefits

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

1.3. Applications

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

1.4. Quick reference data

Table 2. Quick reference data

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

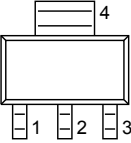
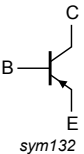
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-80	V
I_C	collector current		-	-	-1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	-	-2	A

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
h _{FE}	DC current gain						
	BCP53T	V _{CE} = -2 V; I _C = -150 mA	[1]	63	-	250	
	BCP53-10T		[1]	63	-	160	
	BCP53-16T		[1]	100	-	250	

[1] pulsed; t_p ≤ 300 μs; δ ≤ 0.02

2. Pinning information

Table 3. Pinning

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

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BCP53T	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads	SOT223
BCP53-10T			
BCP53-16T			

4. Marking

Table 5. Marking

Type number	Marking code
BCP53T	BCP53T
BCP53-10T	P5310T
BCP53-16T	P5316T

5. Limiting values

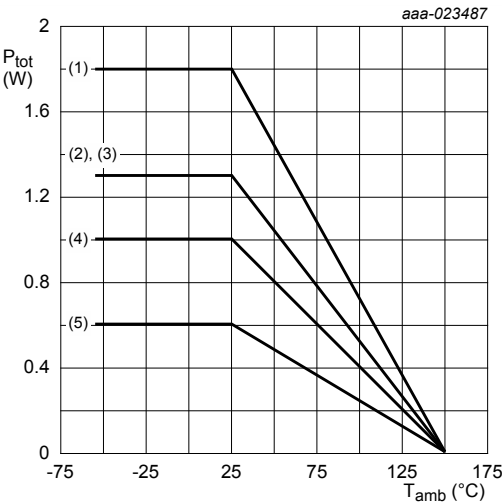
Table 6. Limiting values

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

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

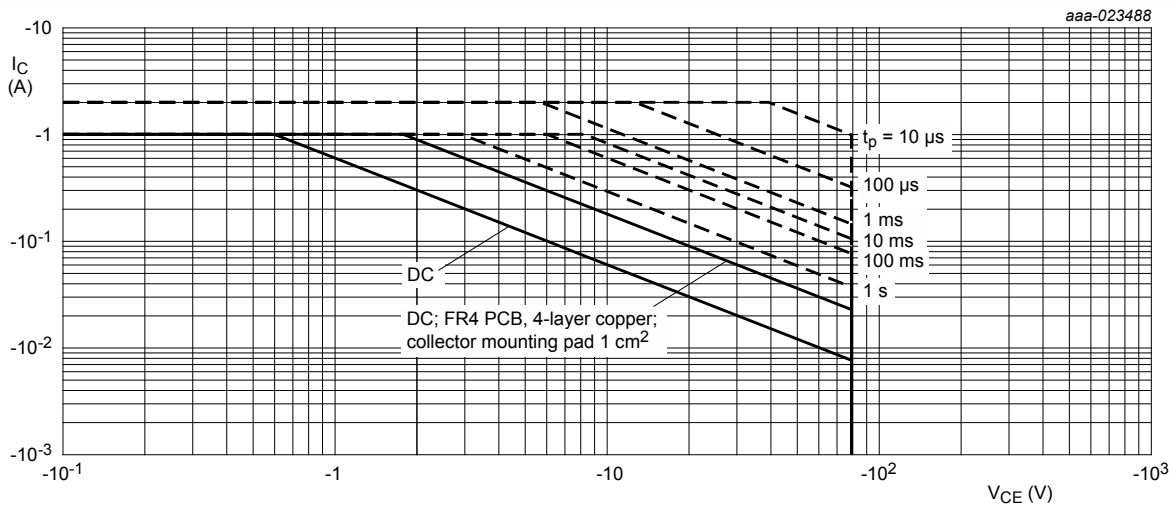
Symbol	Parameter	Conditions	Min	Max	Unit
V _{CBO}	collector-base voltage	open emitter	-	-100	V
V _{CEO}	collector-emitter voltage	open base	-	-80	V
V _{EBO}	emitter-base voltage	open collector	-	-5	V
I _C	collector current		-	-1	A
I _{CM}	peak collector current	single pulse; t _p ≤ 1 ms	-	-2	A
I _B	base current		-	-0.2	A
I _{BM}	peak base current	single pulse; t _p ≤ 1 ms	-	-0.3	A
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C [1]	-	0.6	W
		[2]	-	1	W
		[3]	-	1.3	W
		[4]	-	1.3	W
		[5]	-	1.8	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.
- [4] Device mounted on an FR4 Printed-Circuit-Board (PCB); 4-layer copper; tin-plated and standard footprint.
- [5] Device mounted on an FR4 Printed-Circuit-Board (PCB); 4-layer copper; tin-plated; mounting pad for collector 1 cm².



- (1) FR4 PCB; 4-layer copper; 1 cm²
- (2) FR4 PCB; single-sided copper; 6 cm²
- (3) FR4 PCB; 4-layer copper; standard footprint
- (4) FR4 PCB; single-sided copper; 1 cm²
- (5) FR4 PCB; single-sided copper; standard footprint

Fig. 1. Power derating curves



FR4 PCB; single-sided copper; standard footprint
single pulse; $T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig. 2. Safe operating area; junction to ambient; continous and peak collector currents as a funtion of collec-emitter voltage

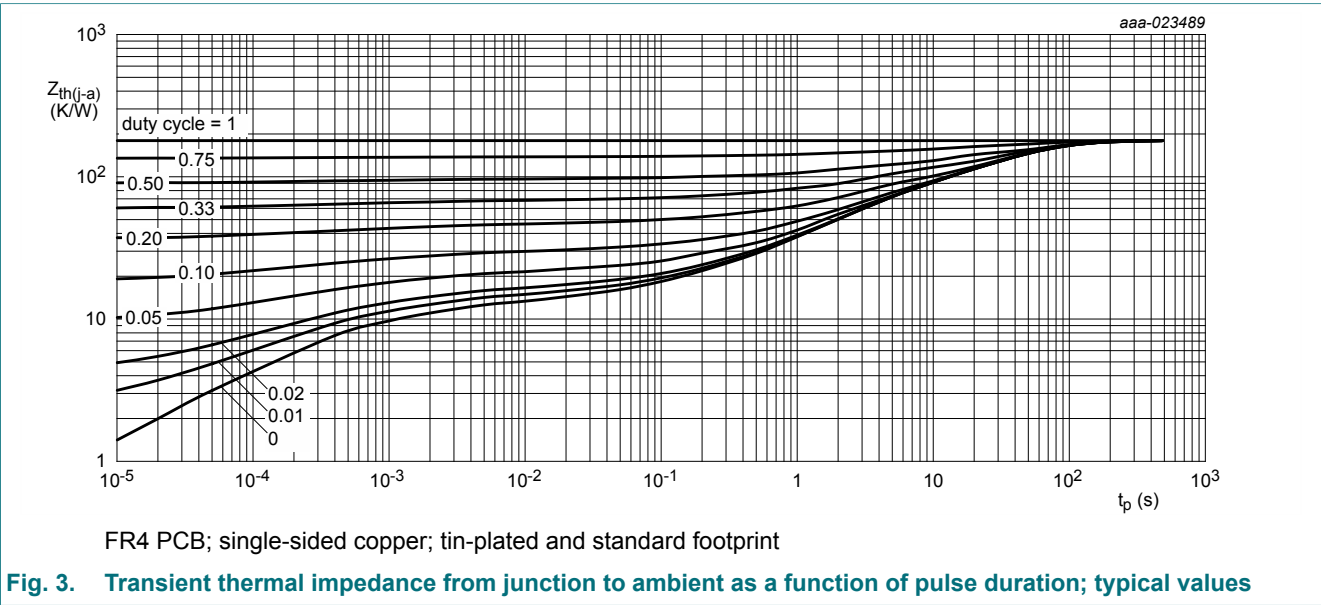
6. Thermal characteristics

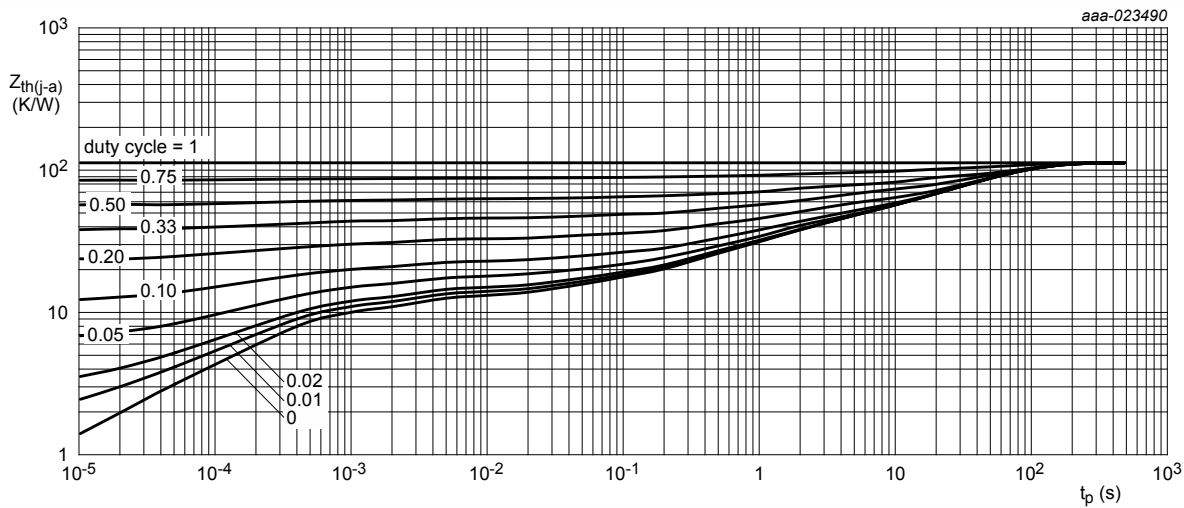
Table 7. Thermal characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	209	K/W
			[2]			125	K/W
			[3]			97	K/W
			[4]	-	-	97	K/W
			[5]	-	-	70	K/W
$R_{(j-sp)}$	thermal resistance from junction to solder point			-	-	18	K/W

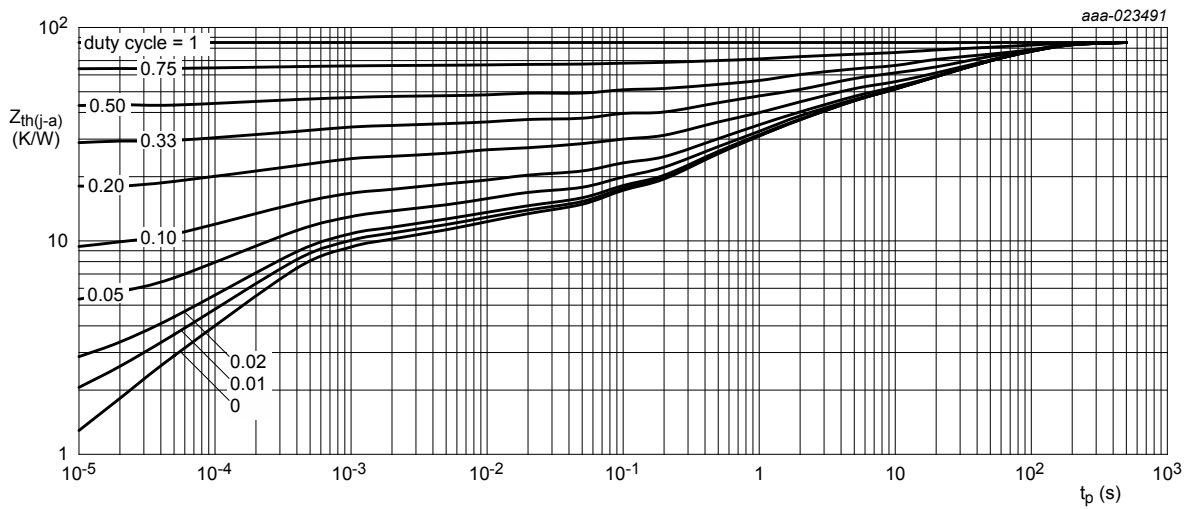
- [1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 1 cm².
[3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 6 cm².
[4] Device mounted on an FR4 Printed-Circuit-Board (PCB); 4-layer copper; tin-plated and standard footprint.
[5] Device mounted on an FR4 Printed-Circuit-Board (PCB); 4-layer copper; tin-plated; mounting pad for collector 1 cm².





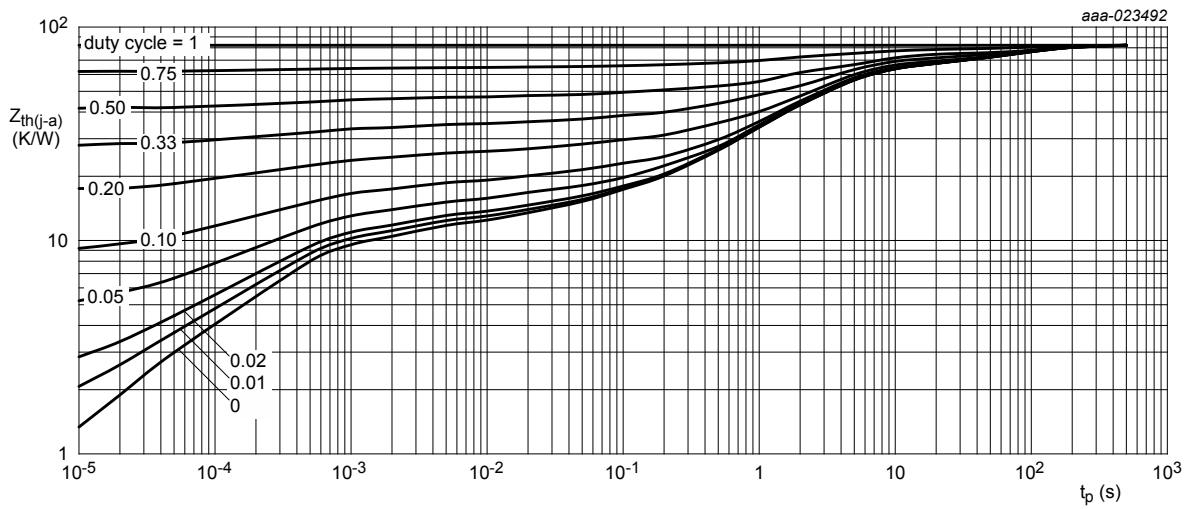
FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm²

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 cm²

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

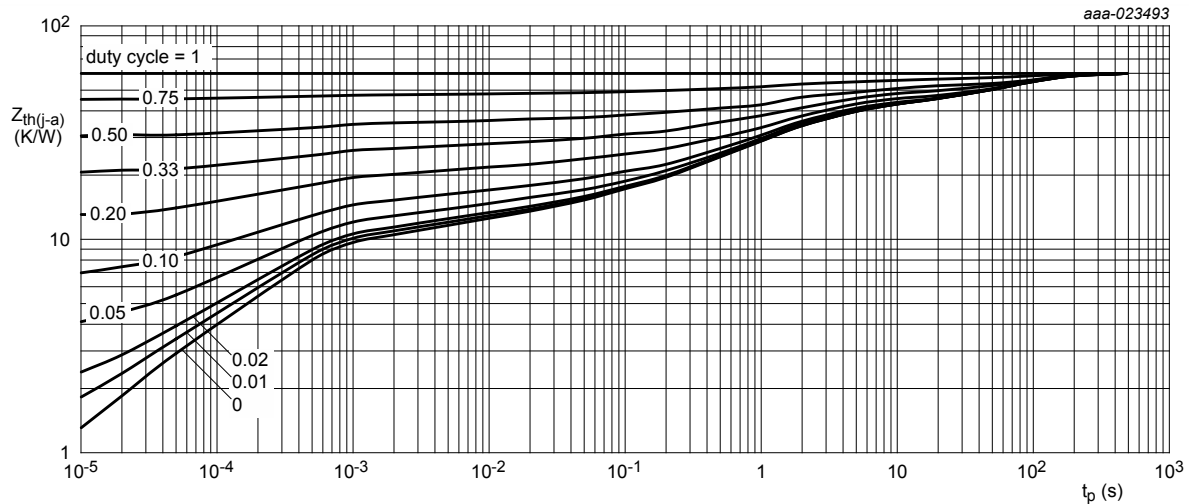


Fig. 7. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 8. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100\text{ }\mu\text{A}$; $I_E = 0\text{ A}$	-100	-		V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -2\text{ mA}$; $I_E = 0\text{ A}$	-80	-		V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = -100\text{ }\mu\text{A}$; $I_C = 0\text{ A}$	-5	-		V
I_{CBO}	collector-base cut-off current	$V_{CB} = -30\text{ V}$; $I_E = 0\text{ A}$	-	-	-100	nA
		$V_{CB} = -30\text{ V}$; $I_E = 0\text{ A}$; $T_j = 150\text{ }^{\circ}\text{C}$	-	-	-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					
	BCP53T, -10T, -16T	$V_{CE} = -2\text{ V}$; $I_C = -5\text{ mA}$		63	-	-
		$V_{CE} = -2\text{ V}$; $I_C = -500\text{ mA}$	[1]	40	-	-
	BCP53T	$V_{CE} = -2\text{ V}$; $I_C = -150\text{ mA}$	[1]	63	-	250
	BCP53-10T	$V_{CE} = -2\text{ V}$; $I_C = -150\text{ mA}$	[1]	63	-	160
	BCP53-16T	$V_{CE} = -2\text{ V}$; $I_C = -150\text{ mA}$	[1]	100	-	250
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
f_T	transition frequency	$V_{CE} = -5\text{ V}$; $I_C = -50\text{ mA}$; $f = 100\text{ MHz}$		100	140	- MHz
C_c	collector capacitance	$V_{CB} = -10\text{ V}$; $I_E = I_C = 0\text{ A}$; $f = 1\text{ MHz}$		-	7	- pF

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

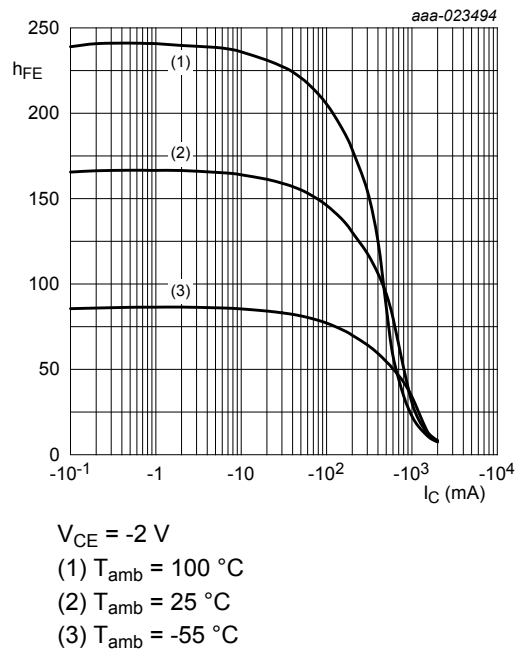


Fig. 8. DC current gain as a function of collector current; typical values

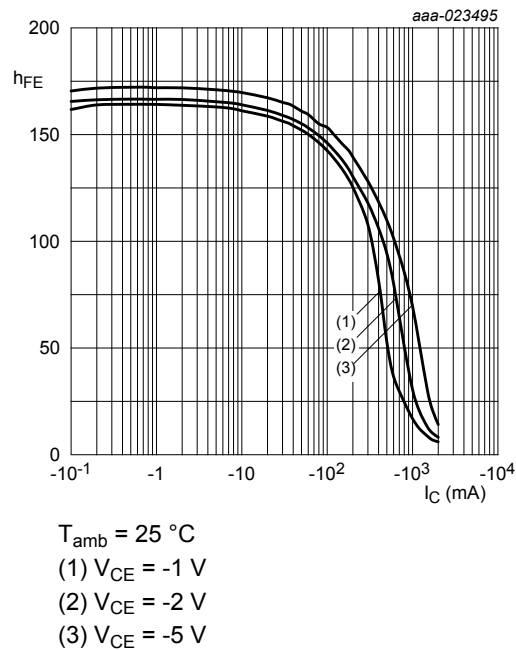


Fig. 9. DC current gain as a function of collector current; typical values

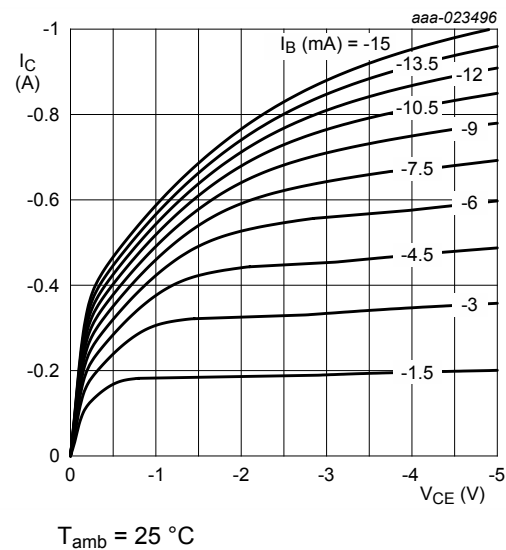


Fig. 10. Collector current as a function of collector-emitter voltage; typical values

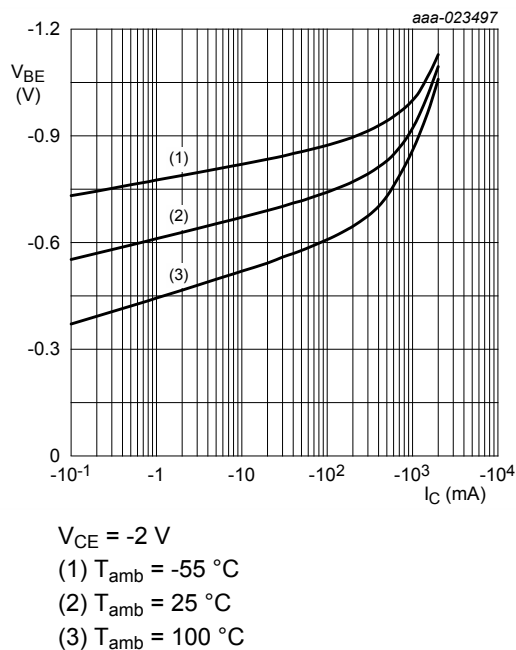


Fig. 11. Base-emitter voltage as a function of collector current; typical values

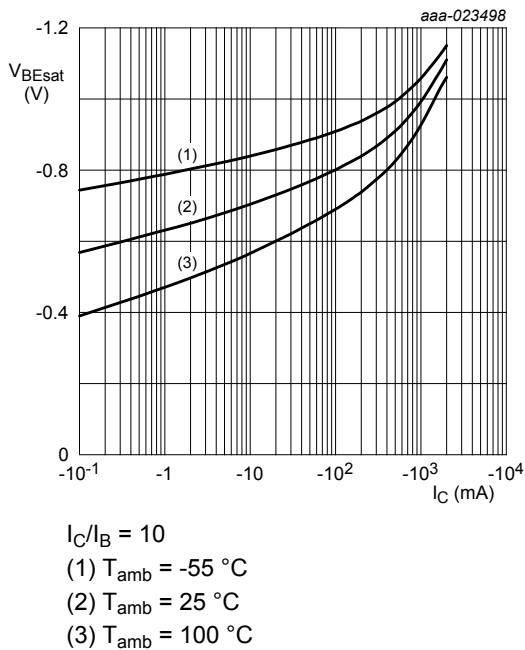


Fig. 12. Base-emitter saturation voltage as a function of collector current; typical values

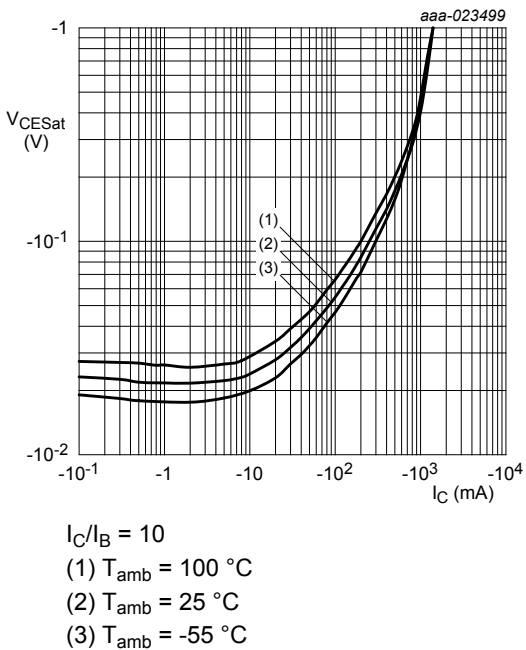


Fig. 13. Collector-emitter saturation voltage as a function of collector current; typical values

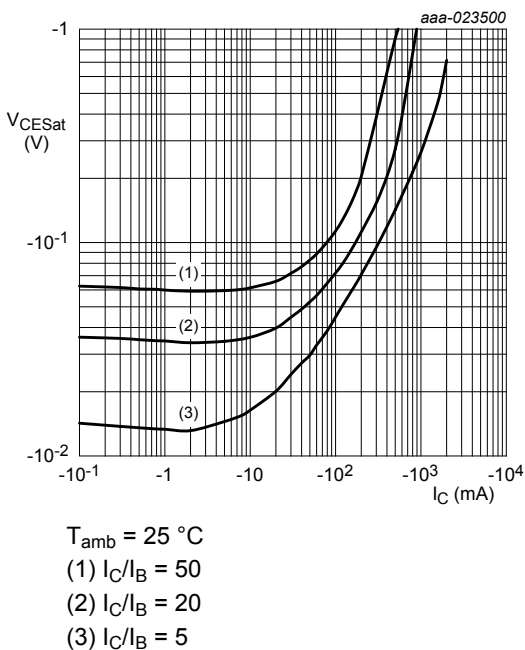


Fig. 14. Collector-emitter saturation voltage as a function of collector current; typical values

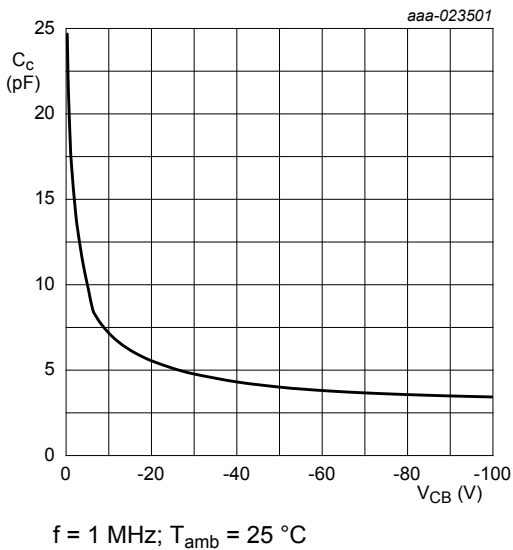
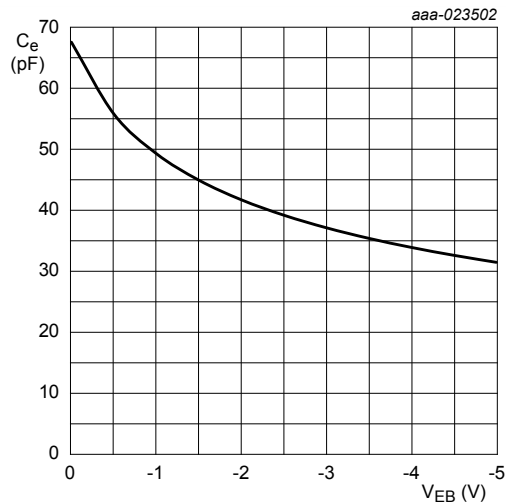
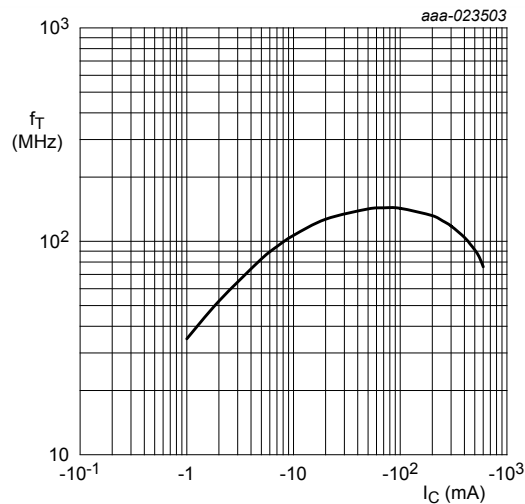


Fig. 15. Collector capacitance as a function of collector-base voltage; typical values



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

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

8. Test information

8.1. 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.

9. Package outline

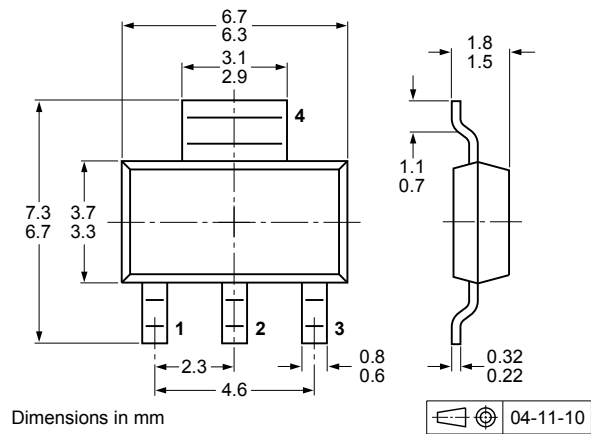


Fig. 18. Package outline SOT223 (SC-73)

10. Soldering

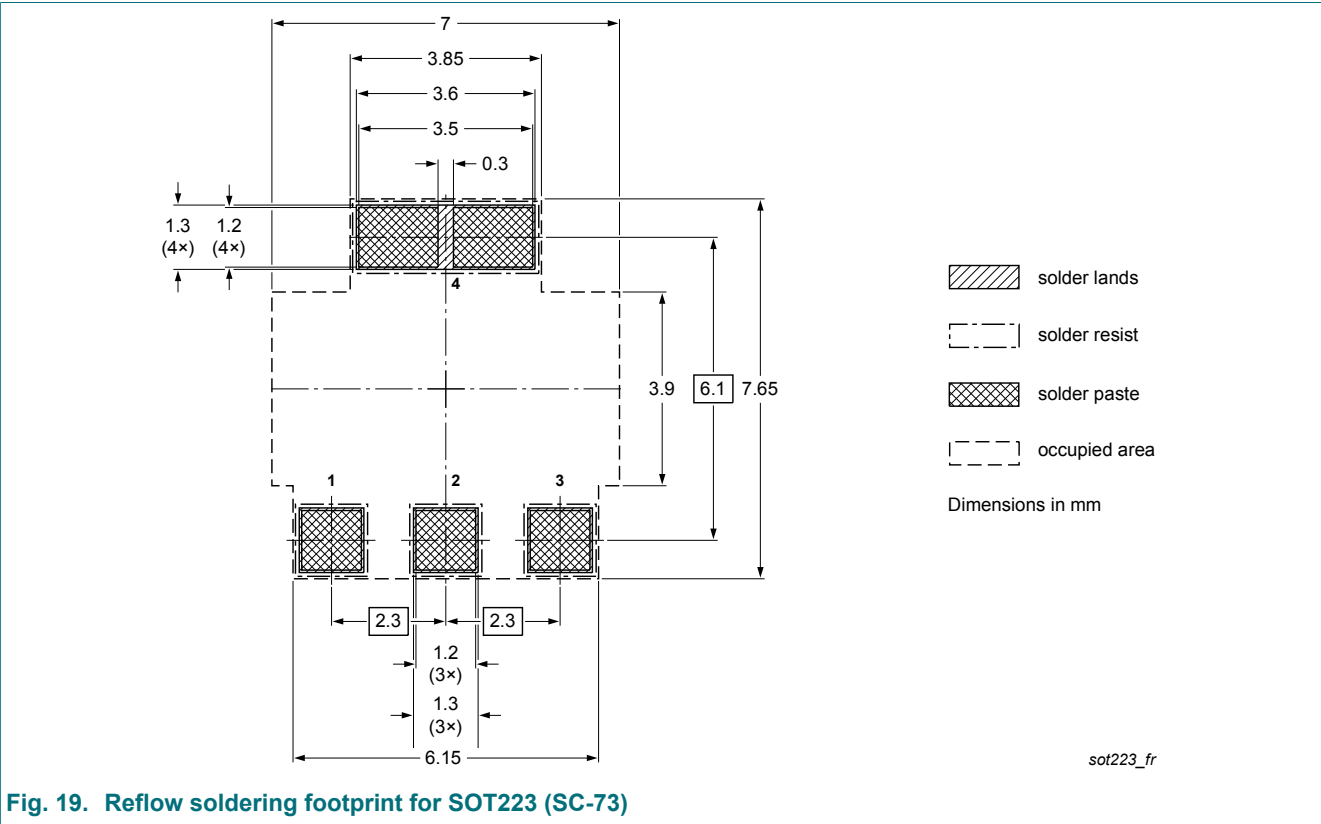


Fig. 19. Reflow soldering footprint for SOT223 (SC-73)

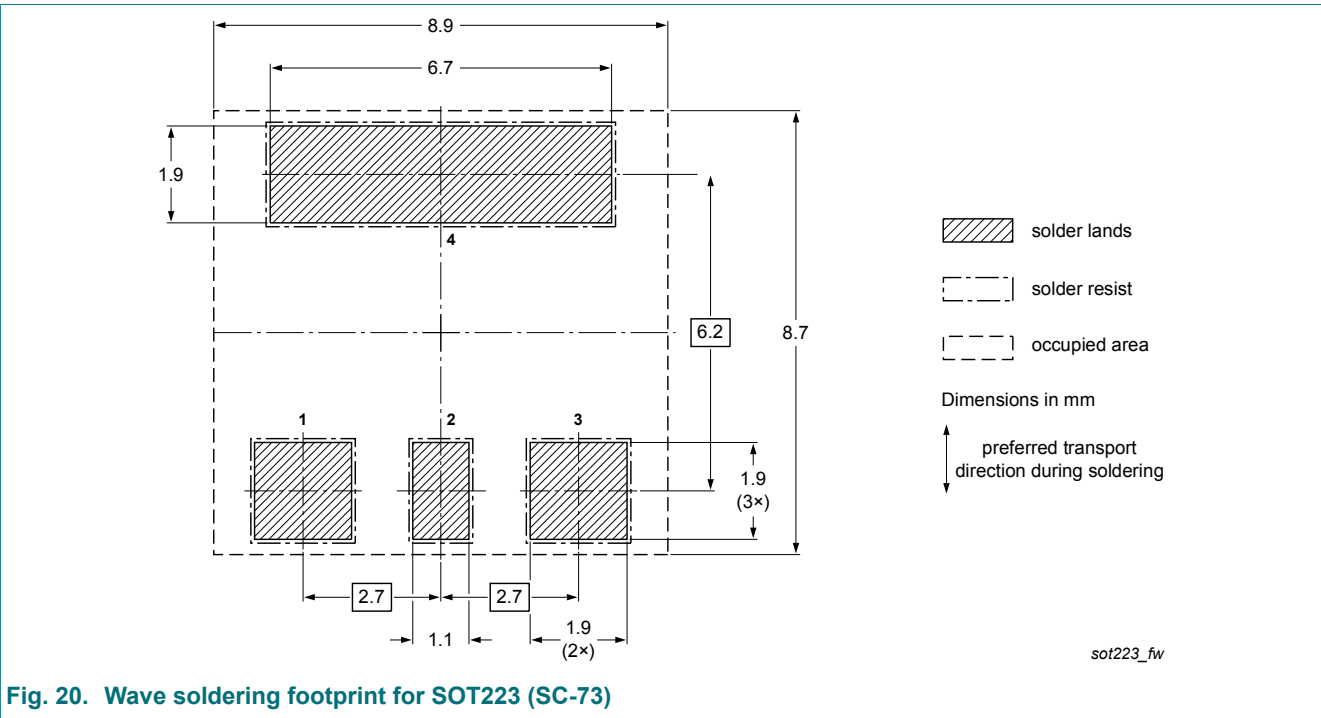


Fig. 20. Wave soldering footprint for SOT223 (SC-73)

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP53T_SER v.2	20190429	Product data sheet	-	BCP53T_SER v.1
Modifications:	- Characteristics: breakdown voltages added - The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. - Legal texts have been adapted to the new company name where appropriate.			
BCP53T_SER v.1	20160705	Product data sheet	-	-

12. 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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