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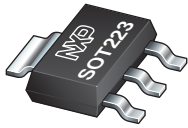
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Kind regards,

Team Nexperia



BCP53T series

80 V, 1 A PNP medium power transistors

Rev. 1 — 5 July 2016

Product data sheet

1. Product profile

1.1 General description

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

Table 1. Product overview

Type number	Package			NPN complement
	NXP	JEITA	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

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



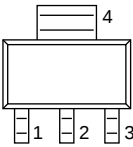
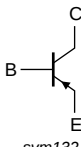
Table 2. Quick reference data ...continued
 $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
h_{FE}	DC current gain	$V_{CE} = -2\text{ V}$; $I_C = -150\text{ mA}$ [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	

[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta = 0.02$

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 codes

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

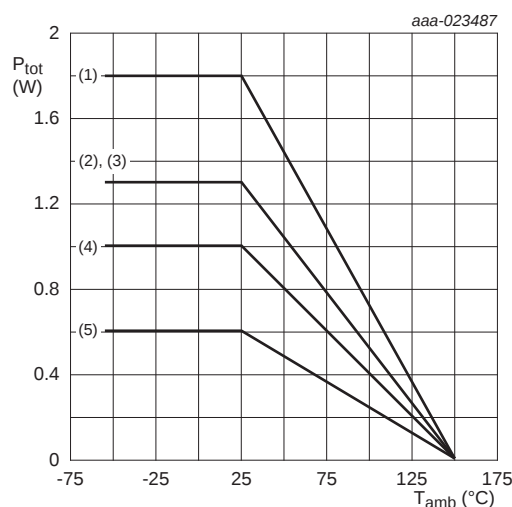
5. Limiting values

Table 6. Limiting values

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

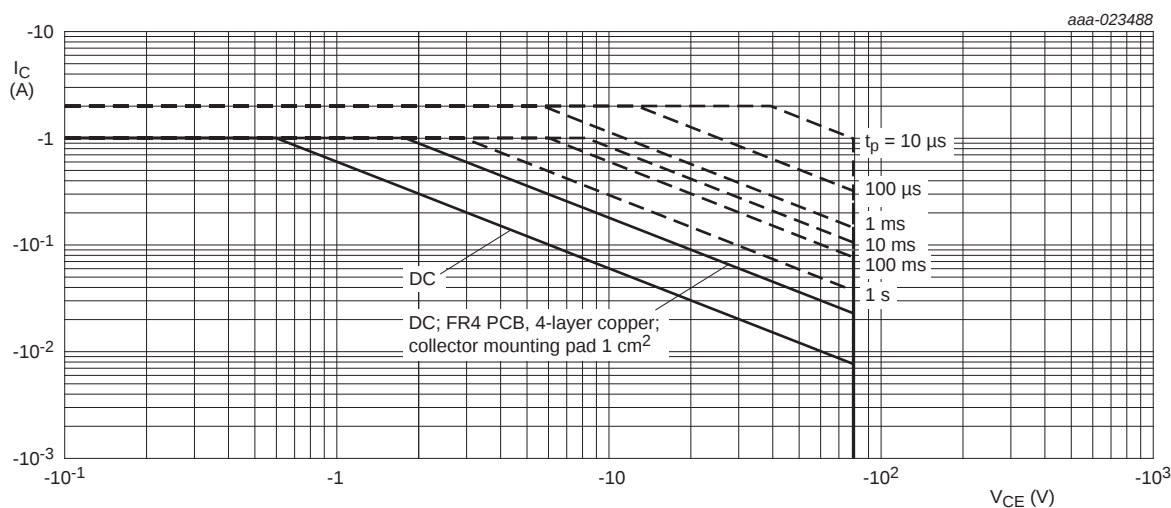
Symbol	Parameter	Conditions	Min	Max	Unit	
V _{CBO}	collector-base voltage	open emitter	-	−100	V	
V _{CEO}	collector-emitter voltage	open base	-	−80	V	
V _{EBO}	emitter-base voltage	open collector	-	−5	V	
I _C	collector current		-	−1	A	
I _{CM}	peak collector current	single pulse; t _p ≤ 1 ms	-	−2	A	
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 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.
- [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 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



Unless otherwise specified:

$T_{amb} = 25\text{ °C}$

Single pulse

FR4 PCB, single-sided copper; standard footprint

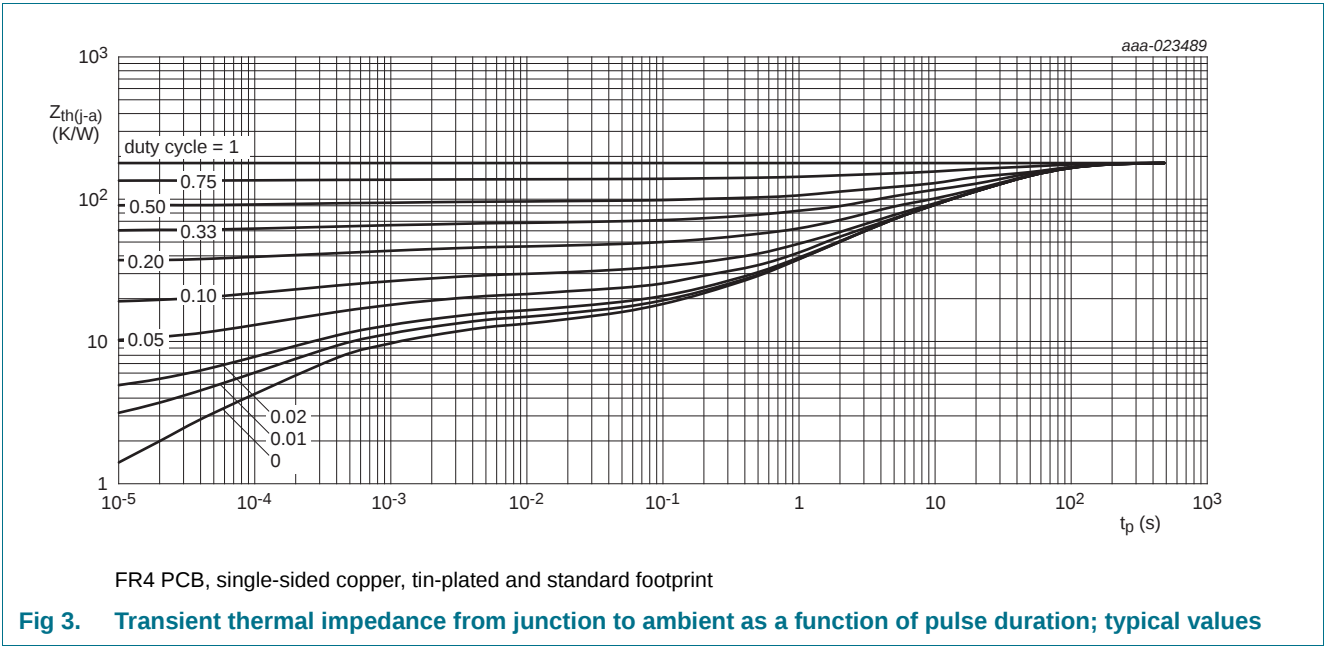
Fig 2. Safe operating area; junction to ambient; continuous and peak collector currents as a function of collector-emitter voltage

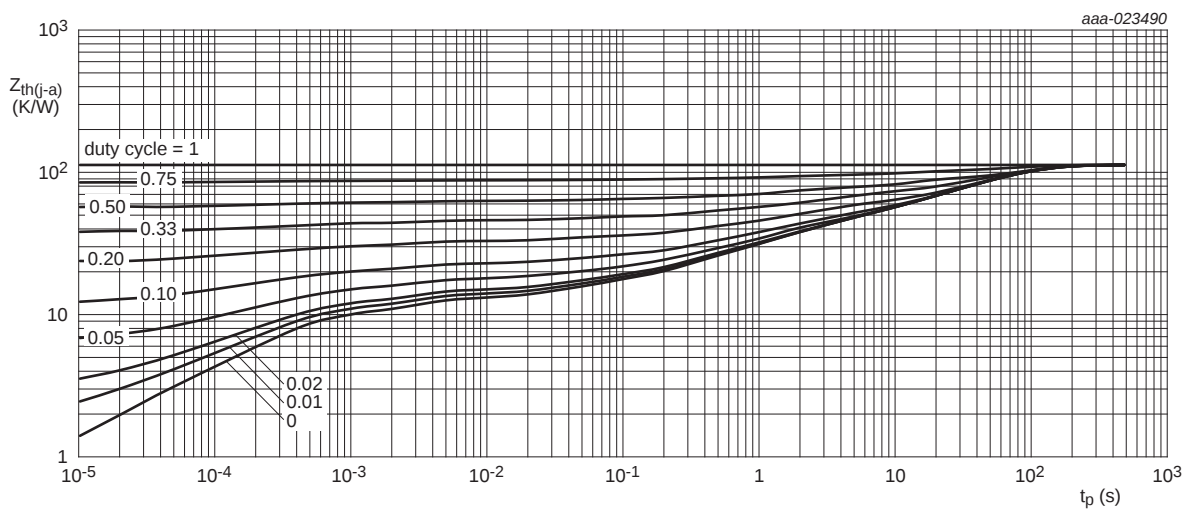
6. Thermal characteristics

Table 7. Thermal characteristics

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
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	18	K/W

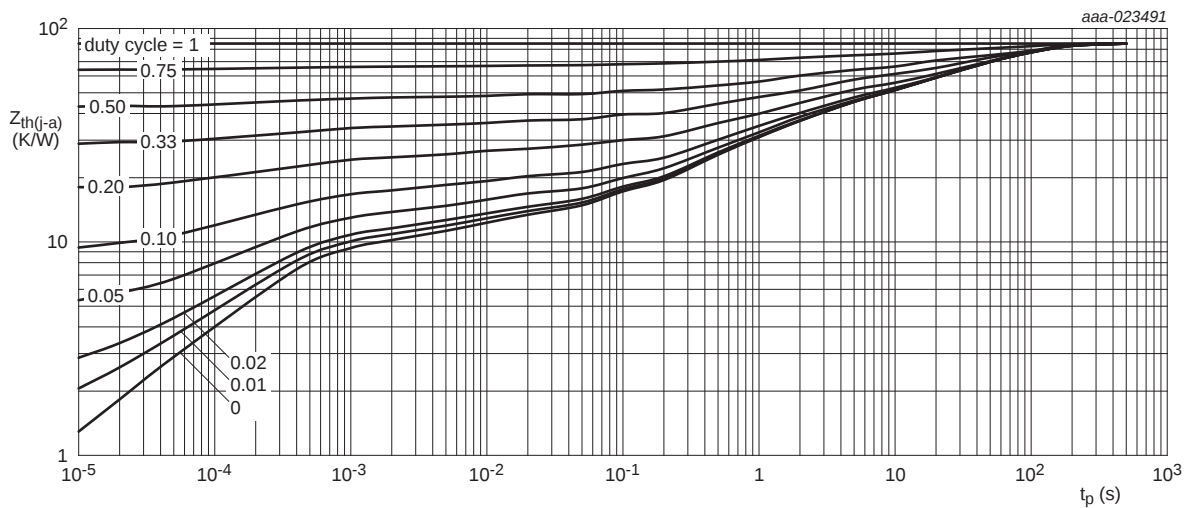
- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 1 cm².
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 6 cm².
- [4] 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 cm².





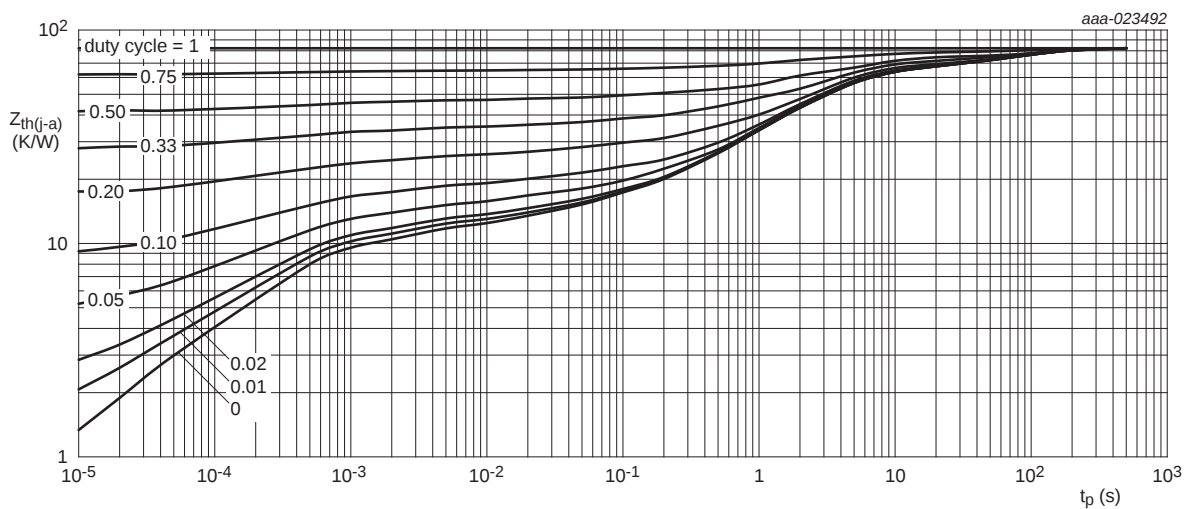
FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 1 cm²

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



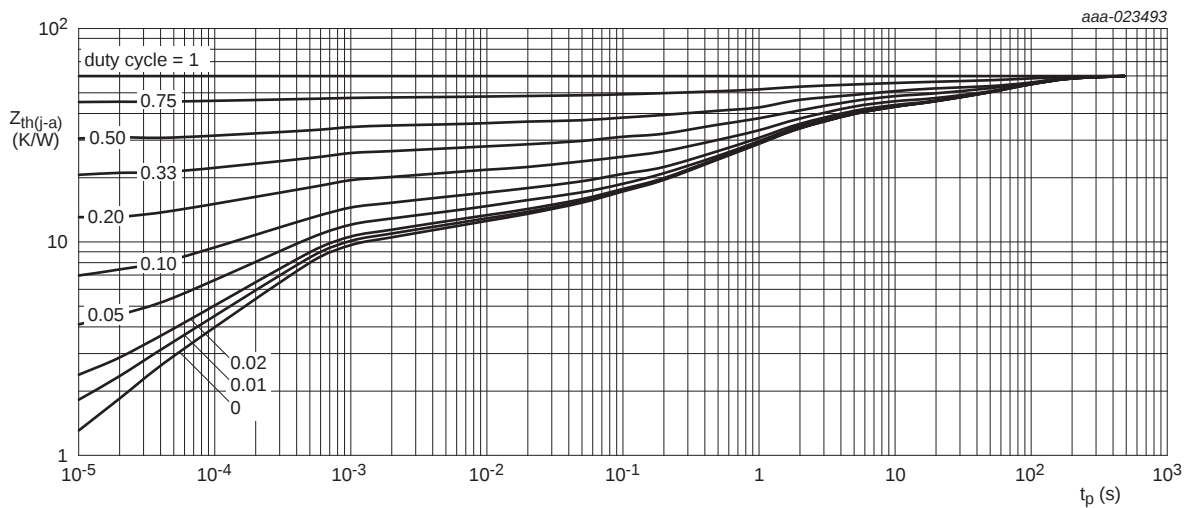
FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 6 cm²

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



FR4 PCB, 4-layer copper, tin-plated; mounting pad for collector 1 cm²

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
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	$V_{CE} = -2\text{ V}; I_C = -5\text{ mA}$	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	-	-	
	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	$V_{CB} = -10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$	-	7	-	pF

[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta = 0.02$

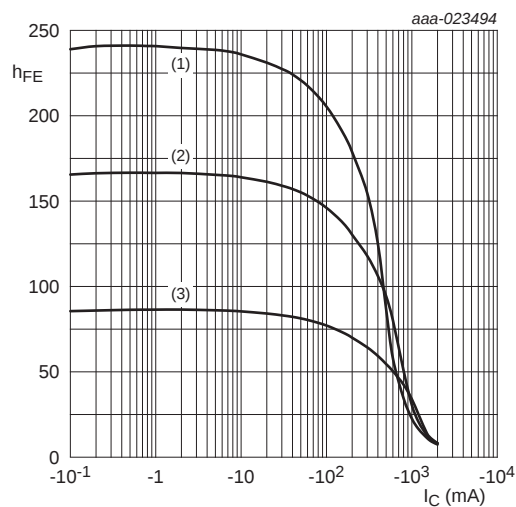


Fig 8. DC current gain as a function of collector current; typical values

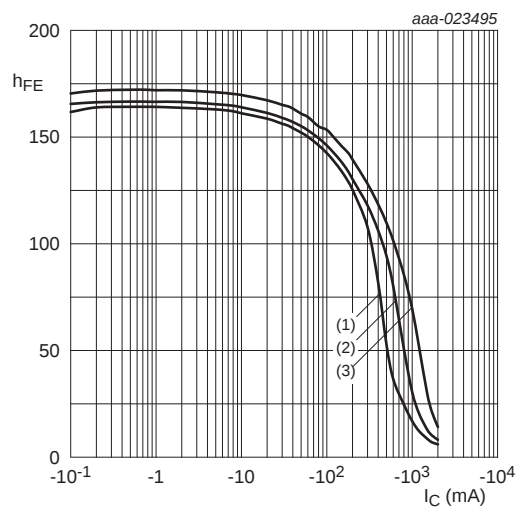


Fig 9. DC current gain as a function of collector current; typical values

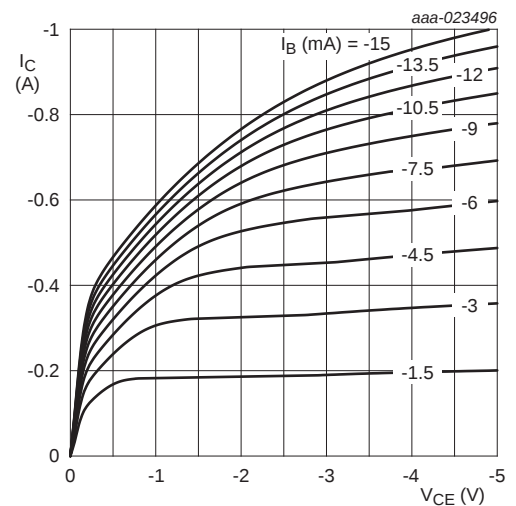


Fig 10. Collector current as a function of collector-emitter voltage; typical values

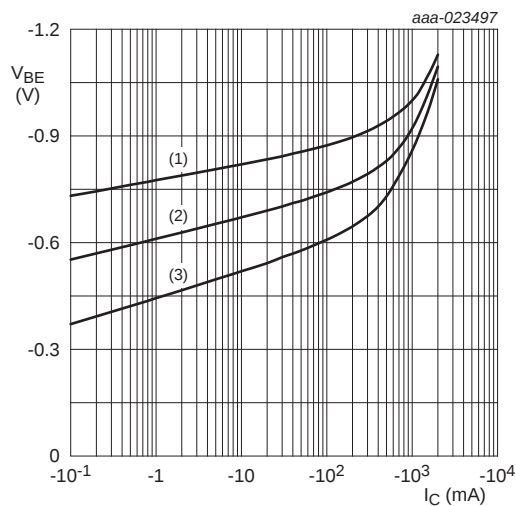
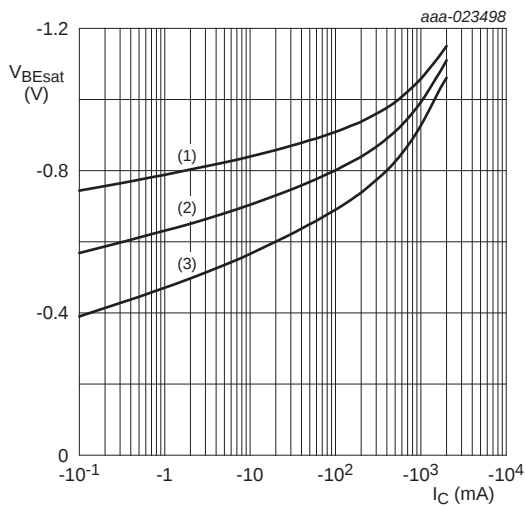
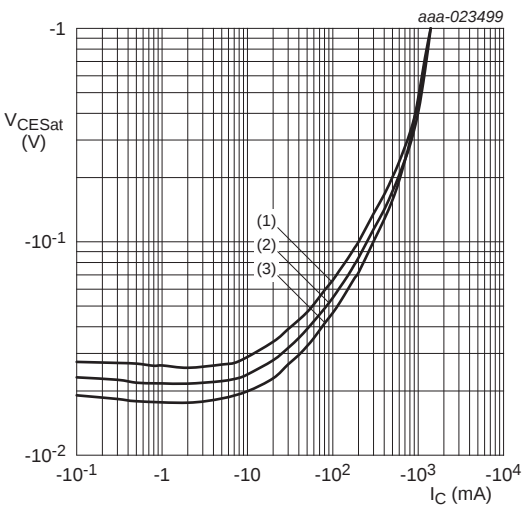


Fig 11. Base-emitter voltage as a function of collector current; typical values



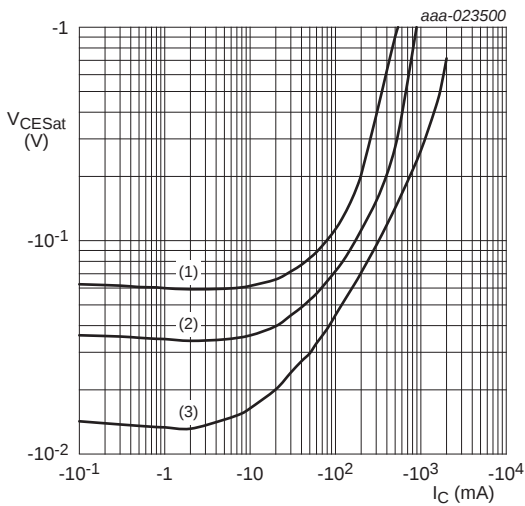
- $I_C/I_B = 10$
- (1) $T_{amb} = -55^\circ\text{C}$
 - (2) $T_{amb} = 25^\circ\text{C}$
 - (3) $T_{amb} = 100^\circ\text{C}$

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



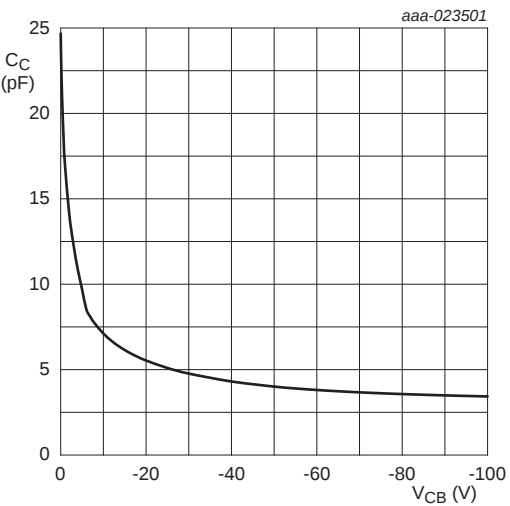
- $I_C/I_B = 10$
- (1) $T_{amb} = 100^\circ\text{C}$
 - (2) $T_{amb} = 25^\circ\text{C}$
 - (3) $T_{amb} = -55^\circ\text{C}$

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



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



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

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

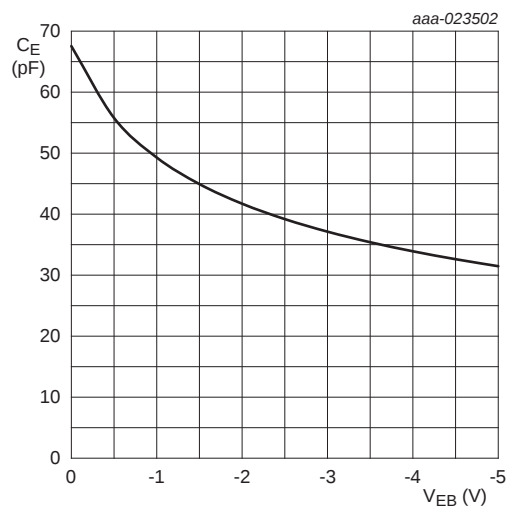


Fig 16. Emitter capacitance as a function of emitter-base voltage; typical values

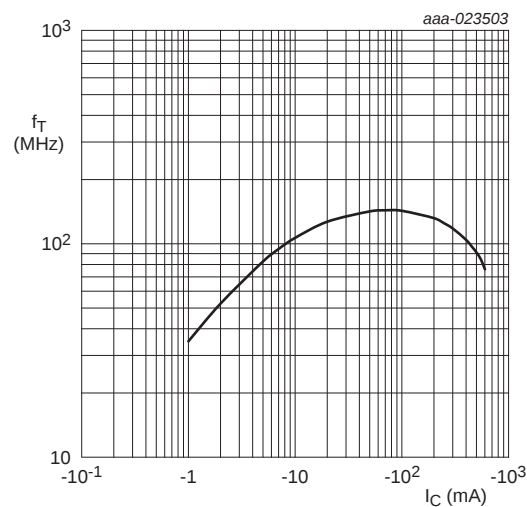


Fig 17. Transition frequency as a function of collector current; typical values

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

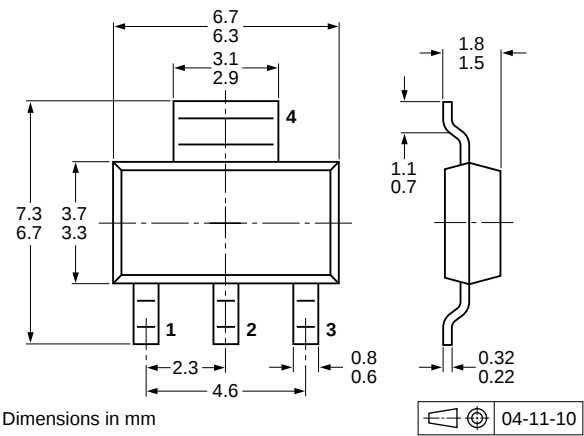


Fig 18. Package outline SOT223 (SC-73)

10. Soldering

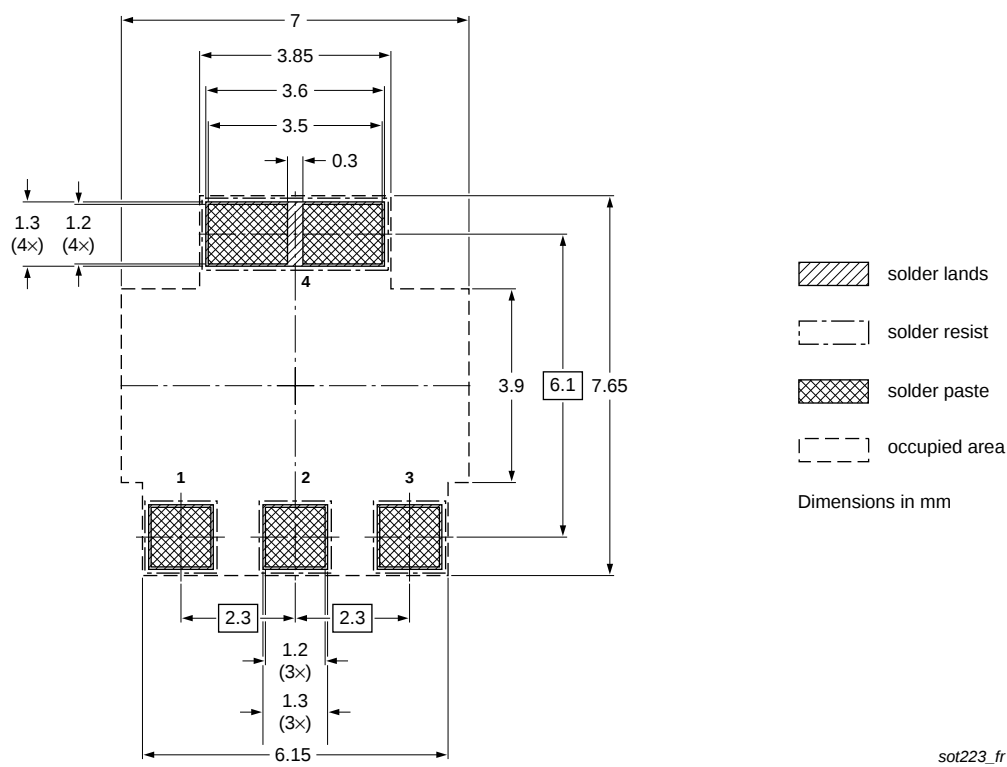


Fig 19. Reflow soldering footprint SOT223 (SC-73)

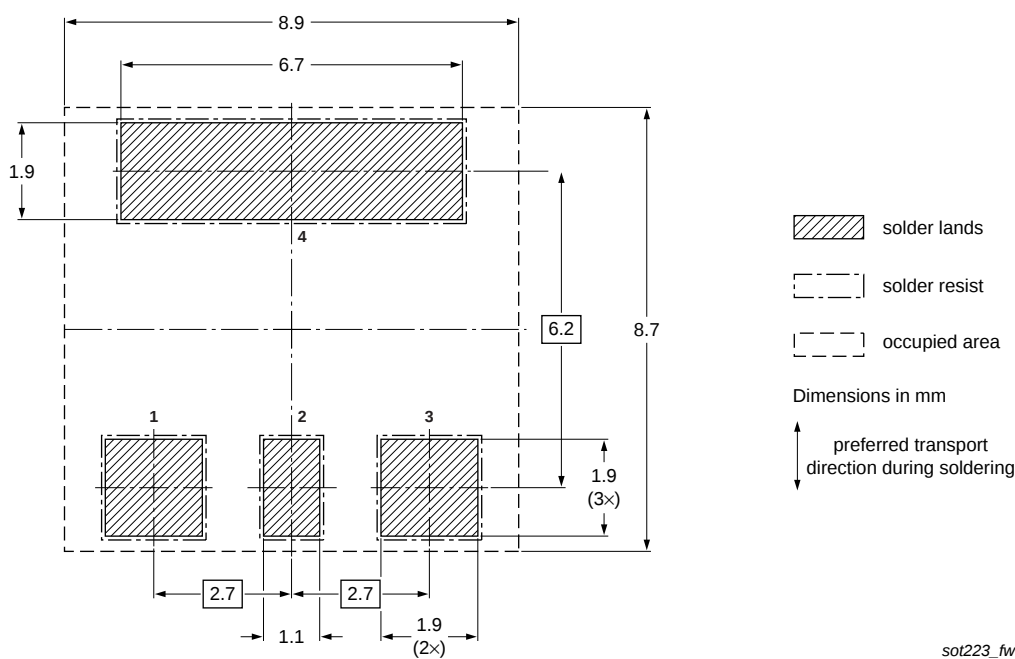


Fig 20. Wave soldering footprint SOT223 (SC-73)

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP53T_SER v.1	20160705	Product data sheet	-	-

12. Legal information

12.1 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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14. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
3	Ordering information	2
4	Marking	2
5	Limiting values	3
6	Thermal characteristics	5
7	Characteristics	8
8	Test information	11
8.1	Quality information	11
9	Package outline	11
10	Soldering	12
11	Revision history	13
12	Legal information	14
12.1	Data sheet status	14
12.2	Definitions	14
12.3	Disclaimers	14
12.4	Trademarks	15
13	Contact information	15
14	Contents	16

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