



THE DATASHEET OF BCP56-10TX



BCP56T series

80 V, 1 A NPN medium power transistors

Rev. 3 — 1 July 2022

Product data sheet

1. General description

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

Table 1. Product overview

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

2. Features and benefits

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

3. Applications

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

4. Quick reference data

Table 2. Quick reference data

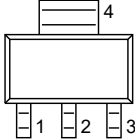
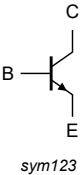
$T_{amb} = 25\text{ °C}$ unless otherwise specified.

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						
	BCP56T	$V_{CE} = 2\text{ V}; I_C = 150\text{ mA}$	[1]	63	-	250	
	BCP56-10T		[1]	63	-	160	
	BCP56-16T		[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		
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BCP56T	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads	SOT223
BCP56-10T			
BCP56-16T			

7. Marking

Table 5. Marking

Type number	Marking code
BCP56T	BCP56T
BCP56-10T	P5610T
BCP56-16T	P5616T

8. Limiting values

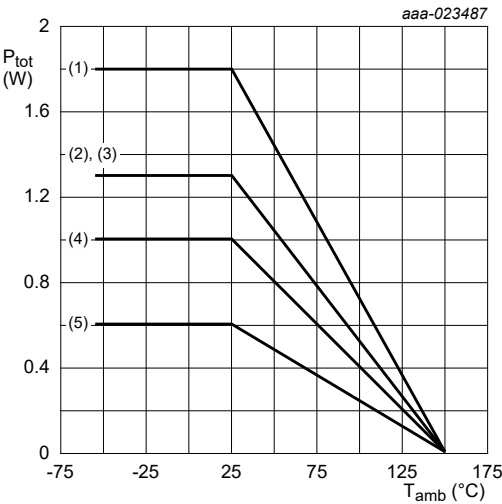
Table 6. Limiting values

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

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

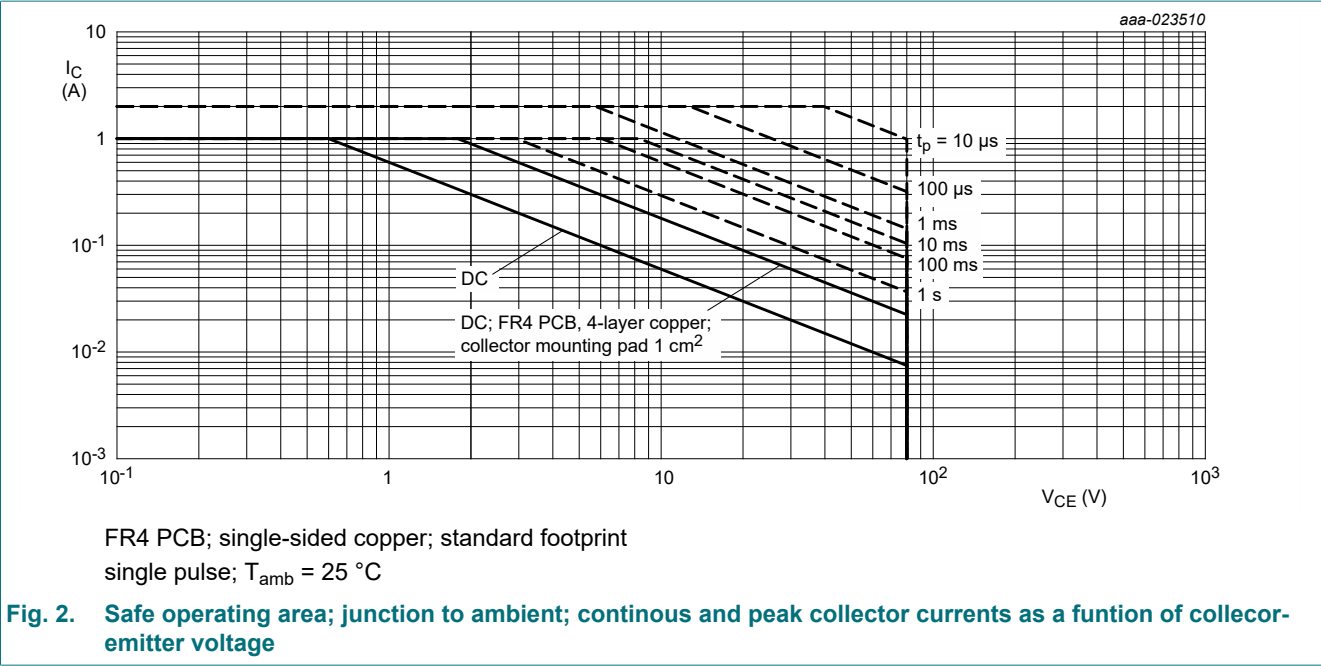
Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	100	V
V_{CEO}	collector-emitter voltage	open base	-	80	V
V_{EBO}	emitter-base voltage	open collector	-	5	V
I_C	collector current		-	1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	2	A
I_B	base current		-	0.2	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]	-	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



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]	-	-	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.

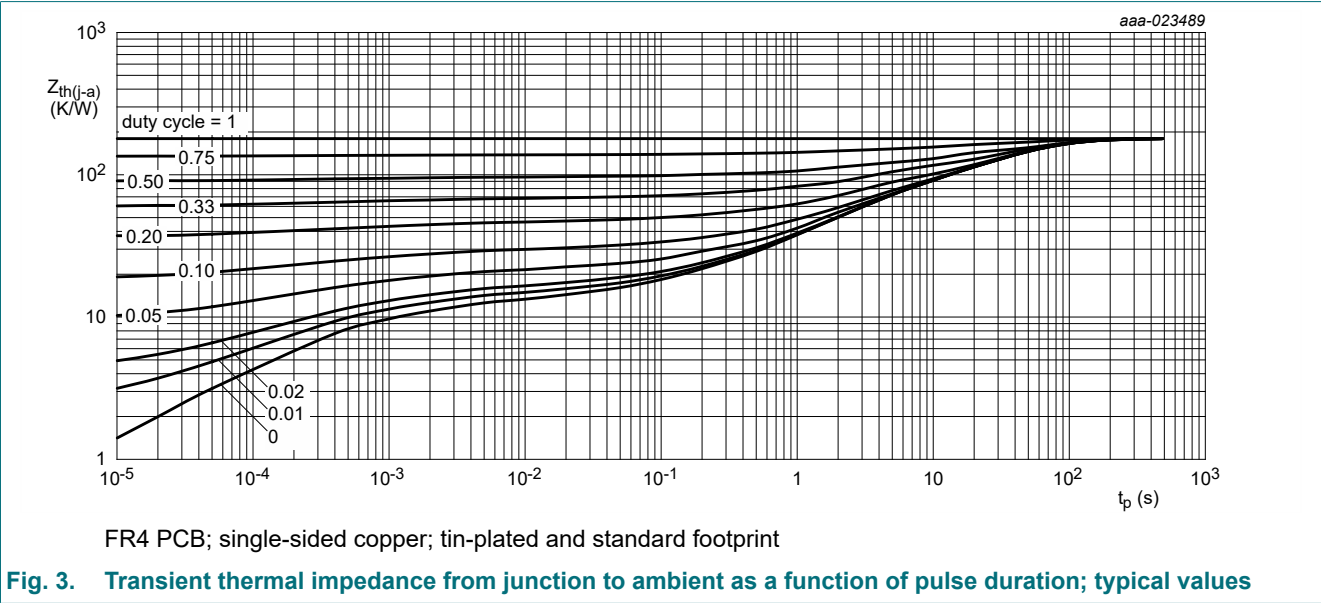
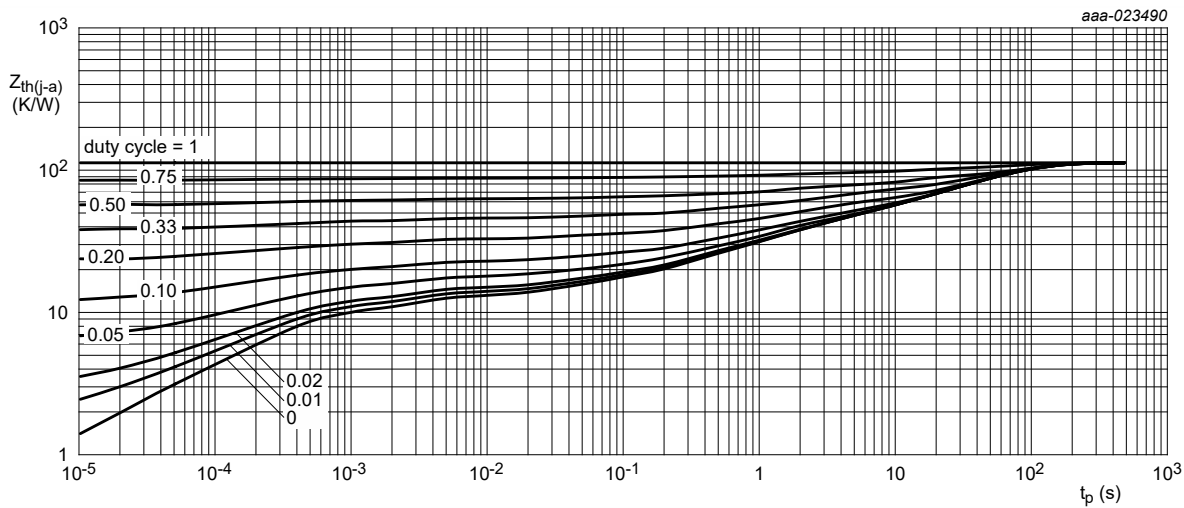
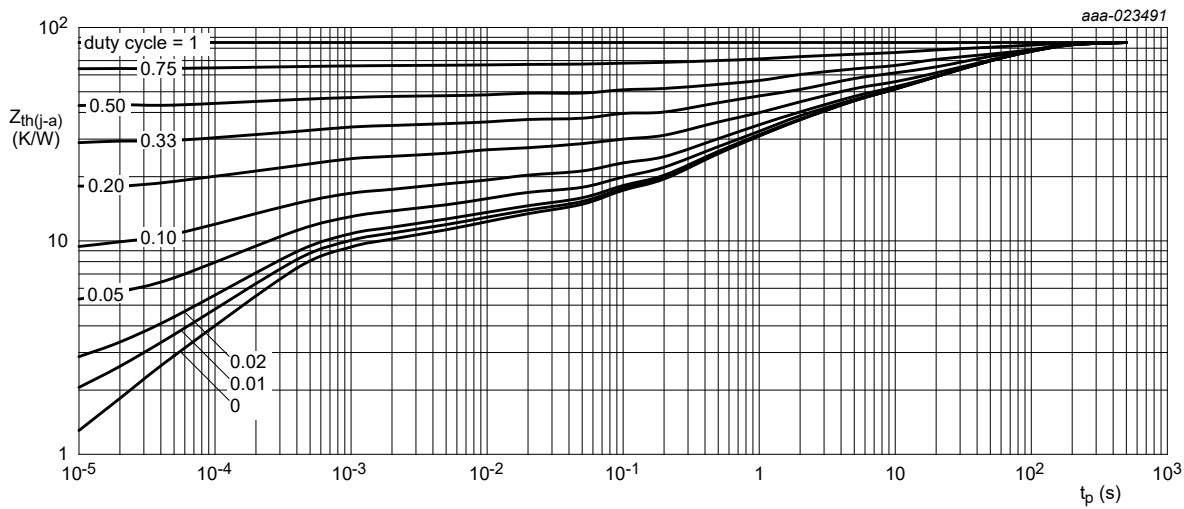


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



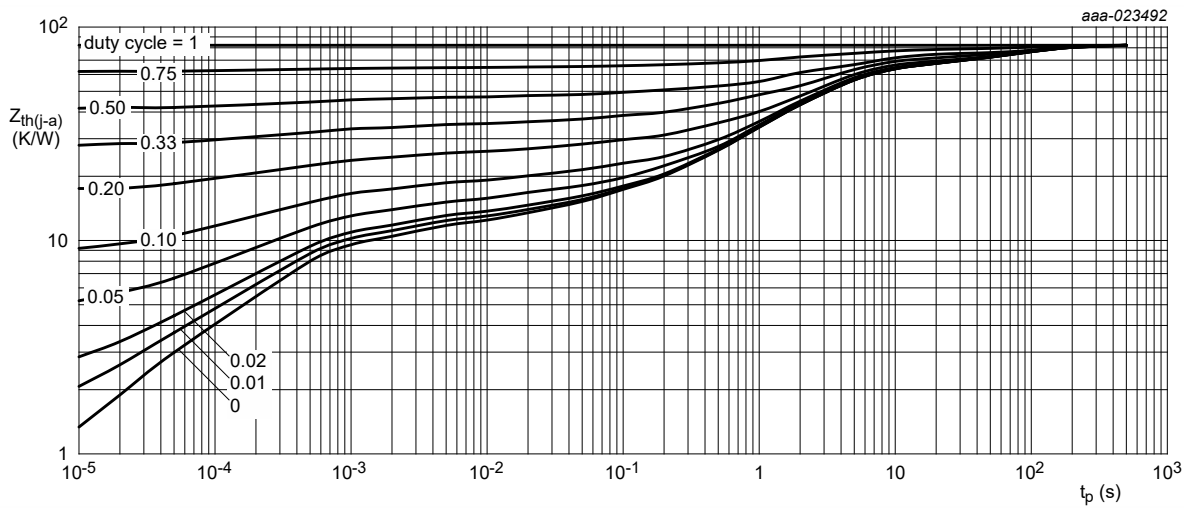
FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm²

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



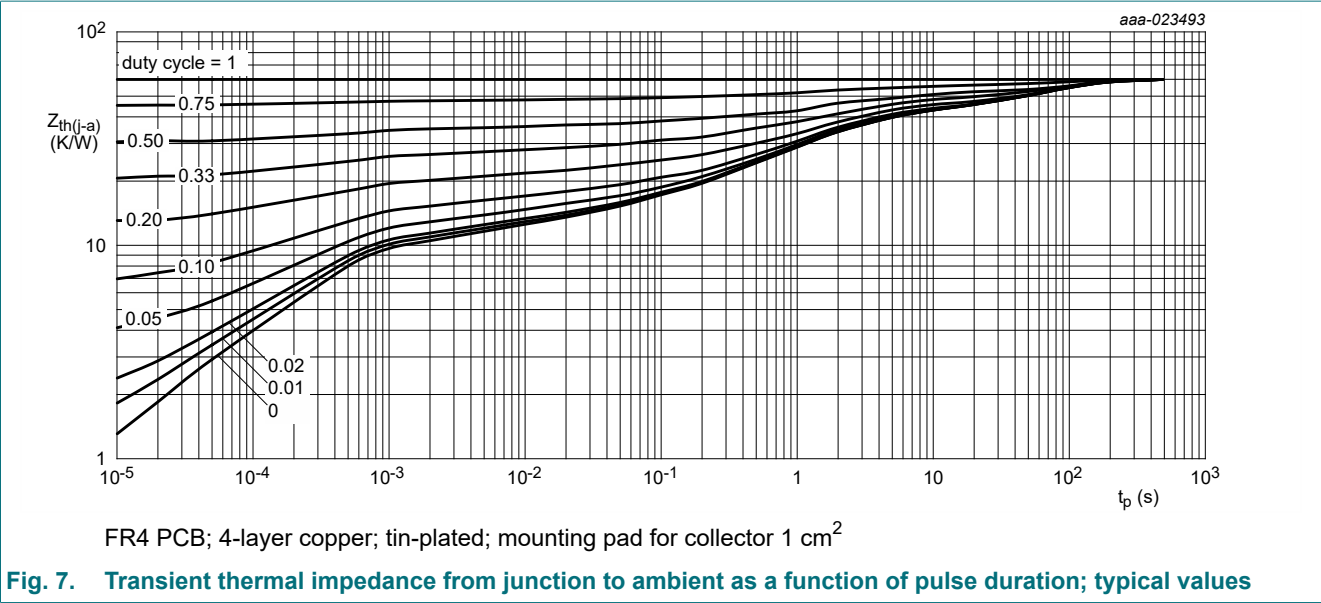
FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm²

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



10. 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	$I_C = 2\text{ mA}$; $I_B = 0\text{ A}$		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						
	BCP56T	$V_{CE} = 2\text{ V}$; $I_C = 5\text{ mA}$	[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	-	-	
	BCP56-10T	$V_{CE} = 2\text{ V}$; $I_C = 5\text{ mA}$	[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	-	-	
	BCP56-16T	$V_{CE} = 2\text{ V}$; $I_C = 5\text{ mA}$	[1]	63	-	-	
		$V_{CE} = 2\text{ V}$; $I_C = 150\text{ mA}$	[1]	100	-	250	
		$V_{CE} = 2\text{ V}$; $I_C = 500\text{ mA}$	[1]	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	$V_{CB} = 10\text{ V}$; $I_E = i_e = 0\text{ A}$; $f = 1\text{ MHz}$		-	4.5	-	pF
f_T	transition frequency	$V_{CE} = 5\text{ V}$; $I_C = 50\text{ mA}$; $f = 100\text{ MHz}$		100	155	-	MHz

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

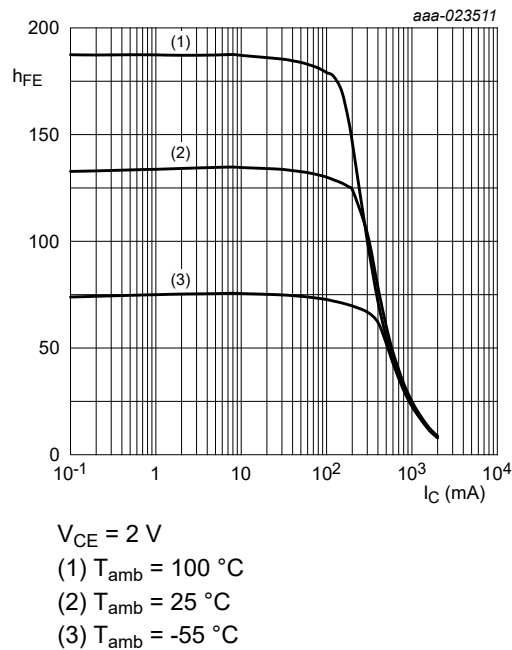


Fig. 8. DC current gain as a function of collector current; typical values

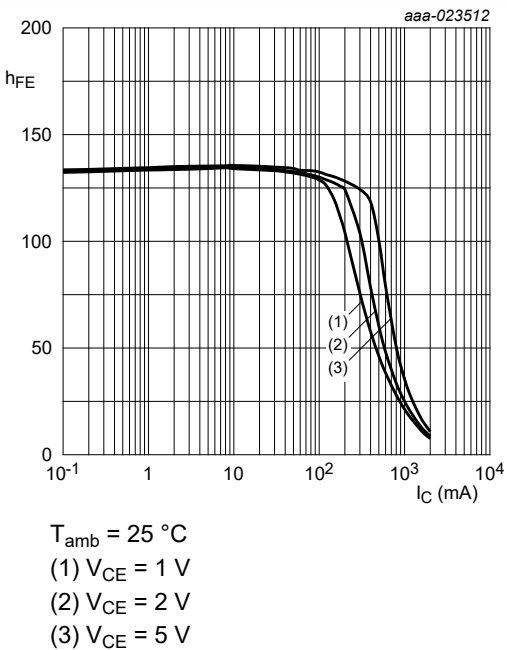


Fig. 9. DC current gain as a function of collector current; typical values

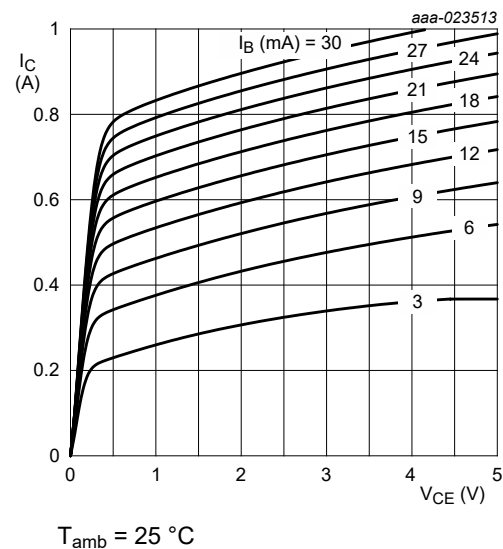


Fig. 10. Collector current as a function of collector-emitter voltage; typical values

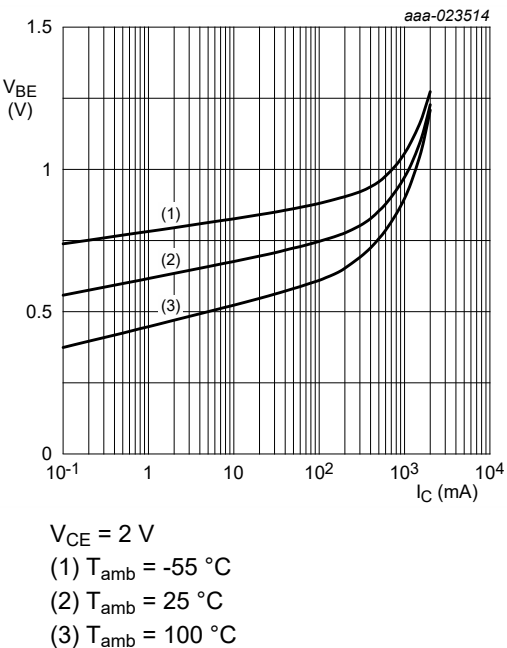


Fig. 11. Base-emitter voltage as a function of collector current; typical values

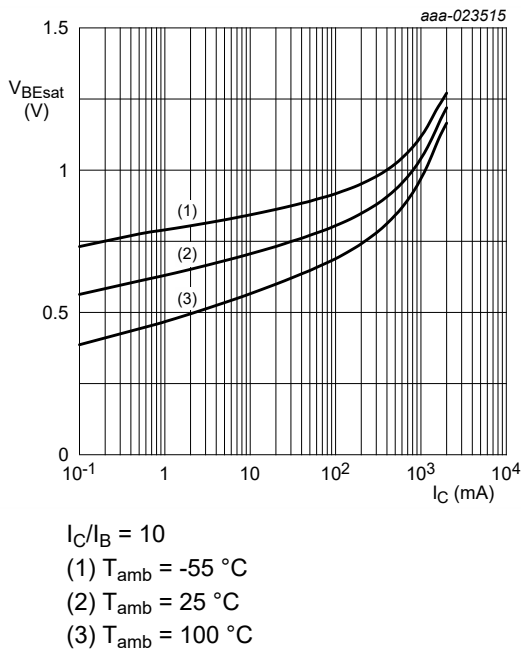


Fig. 12. Base-emitter saturation voltage as a function of collector current; typical values

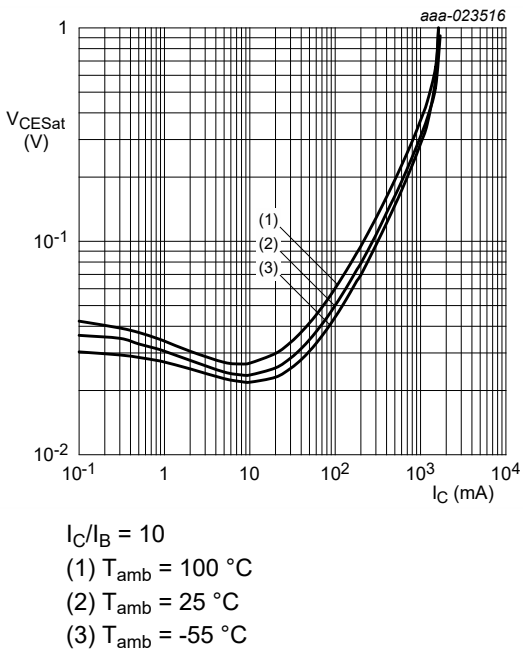


Fig. 13. Collector-emitter saturation voltage as a function of collector current; typical values

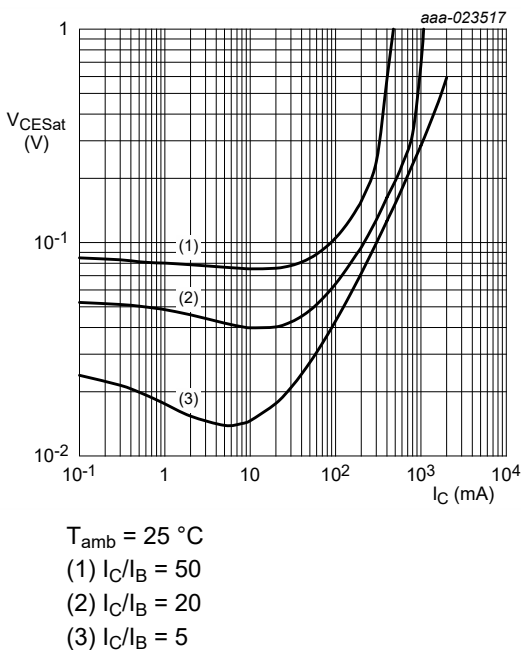


Fig. 14. Collector-emitter saturation voltage as a function of collector current; typical values

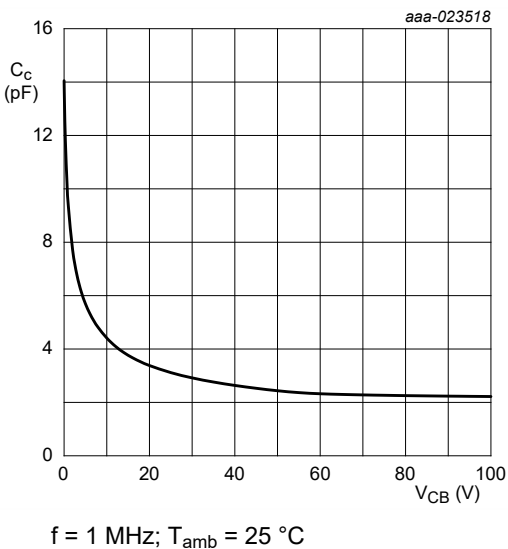


Fig. 15. Collector capacitance as a function of collector-base voltage; typical values

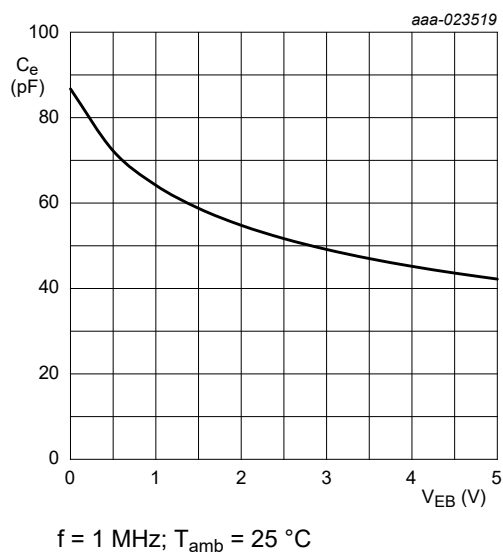


Fig. 16. Emitter capacitance as a function of emitter-base voltage; typical values

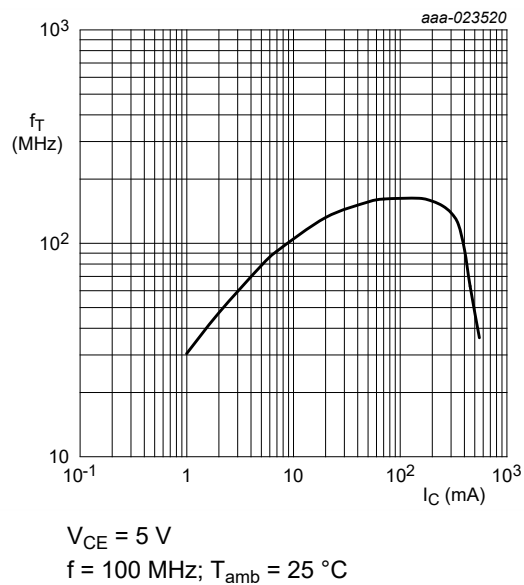


Fig. 17. Transition frequency as a function of collector current; typical values

11. Package outline

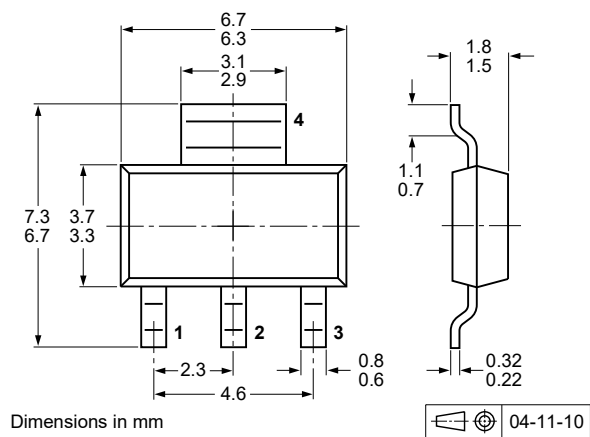


Fig. 18. Package outline SOT223 (SC-73)

12. Soldering

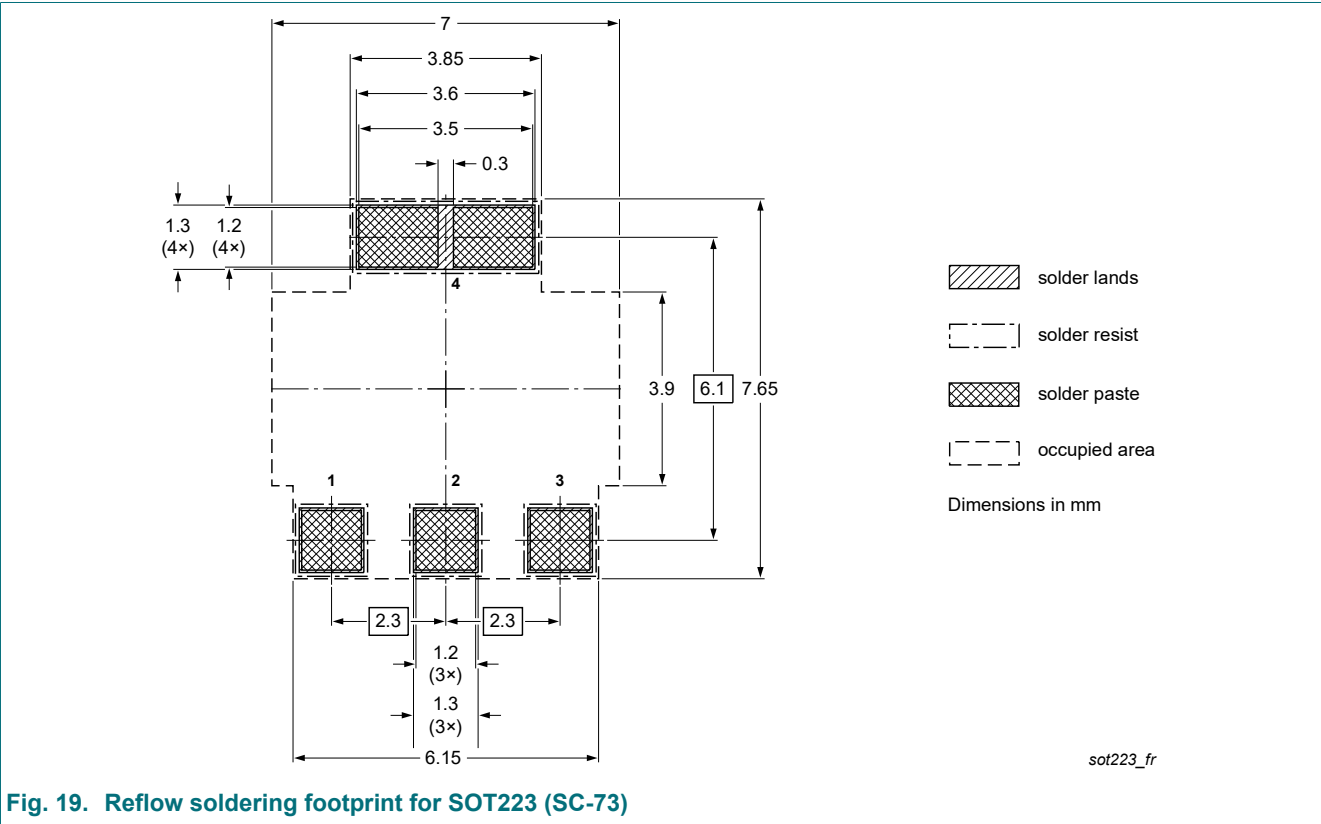


Fig. 19. Reflow soldering footprint for SOT223 (SC-73)

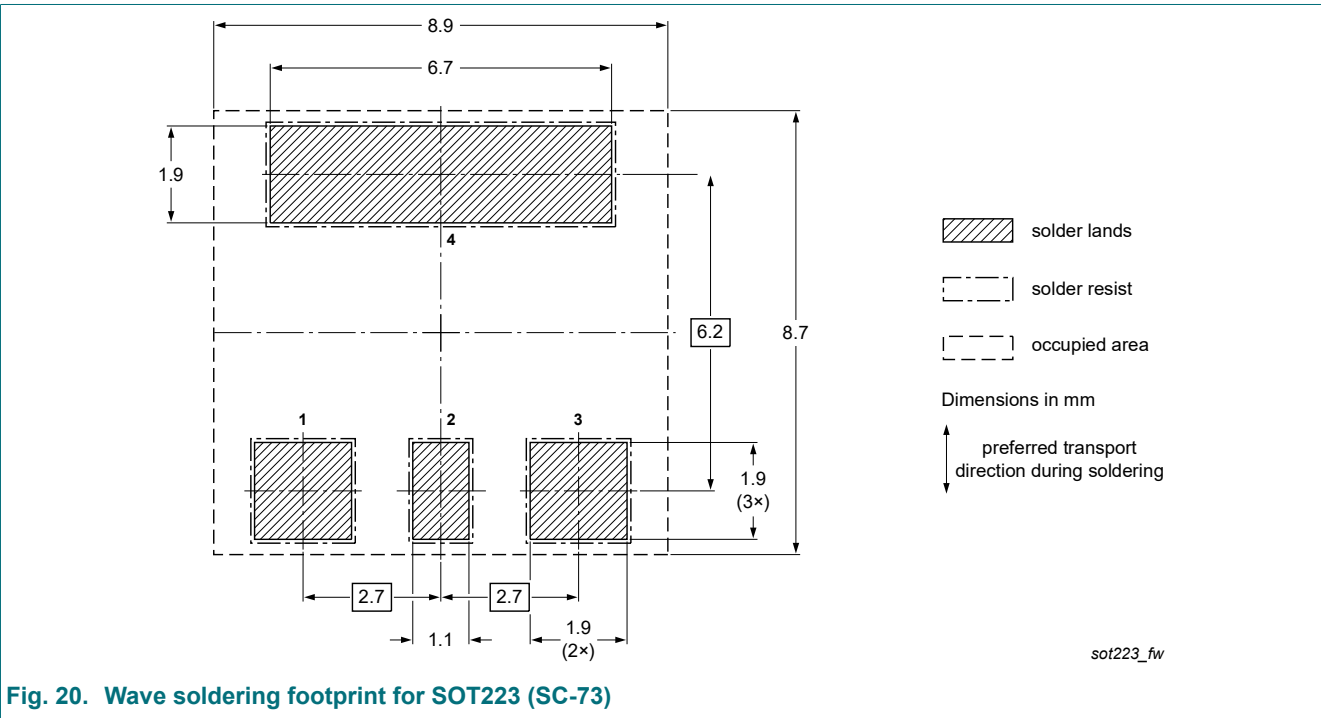


Fig. 20. Wave soldering footprint for SOT223 (SC-73)

13. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP56T_SER v.3	20220701	Product data sheet	-	BCP56T_SER v.2
Modifications:	Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
BCP56T_SER v.2	20190429	Product data sheet	-	BCP56T_SER v.1
BCP56T_SER v.1	20160705	Product data sheet	-	-

14. 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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Date of release: 1 July 2022

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