

# BCX52T series

60 V, 1 A PNP power bipolar transistors

Rev. 1 — 22 August 2019

Product data sheet

## 1. Product profile

### 1.1. General description

PNP power transistors in a medium power SOT89 (SC-62) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		NPN complement
	Nexperia	JEDEC	
BCX52T	SOT89	SC-62	BCX55T
BCX52-10T			BCX55-10T
BCX52-16T			BCX55-16T

### 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.

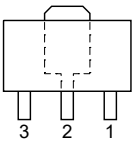
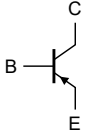
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base	-	-	-60	V
$I_C$	collector current		-	-	-1	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	-	-2	A

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$h_{FE}$	DC current gain						
	BCX52T	$V_{CE} = -2 \text{ V}; I_C = -150 \text{ mA}$	[1]	63	-	250	
	BCX52-10T		[1]	63	-	160	
	BCX52-16T		[1]	100	-	250	

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

## 2. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter		 006aaa231
2	C	collector		
3	B	base		

## 3. Ordering information

Table 4. Ordering information

Type number	Package		Version
	Name	Description	
BCX52T	SC-62	plastic, surface-mounted package; 3 leads; 1.5 mm pitch; 4.5 mm x 2.5 mm x 1.5 mm body	SOT89
BCX52-10T			
BCX52-16T			

## 4. Marking

Table 5. Marking

Type number	Marking code
BCX52T	C2
BCX52-10T	C3
BCX52-16T	C4

## 5. Limiting values

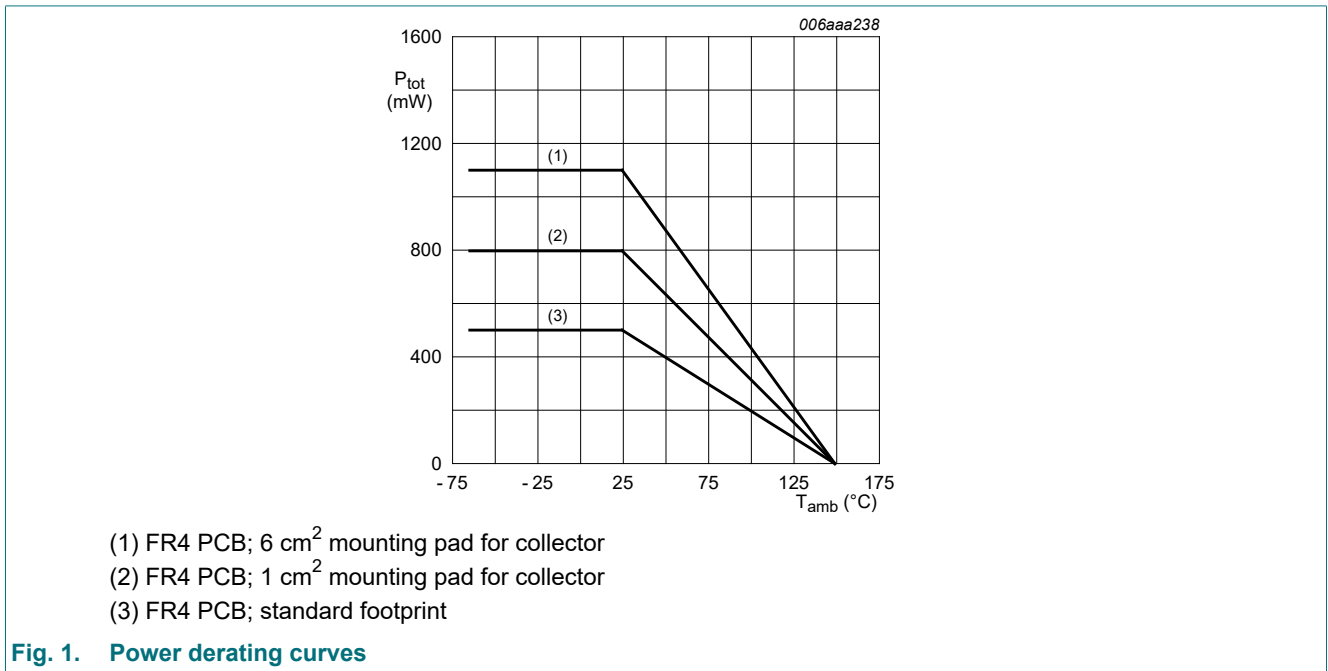
**Table 6. Limiting values**

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	-	-60	V
$V_{CEO}$	collector-emitter voltage	open base	-	-60	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		-	-200	mA
$I_{BM}$	peak base current	single pulse; $t_p \leq 1\text{ ms}$	-	-300	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	500	mW
			[2]	800	mW
			[3]	1100	mW
$T_j$	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 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>.



**Fig. 1. Power derating curves**

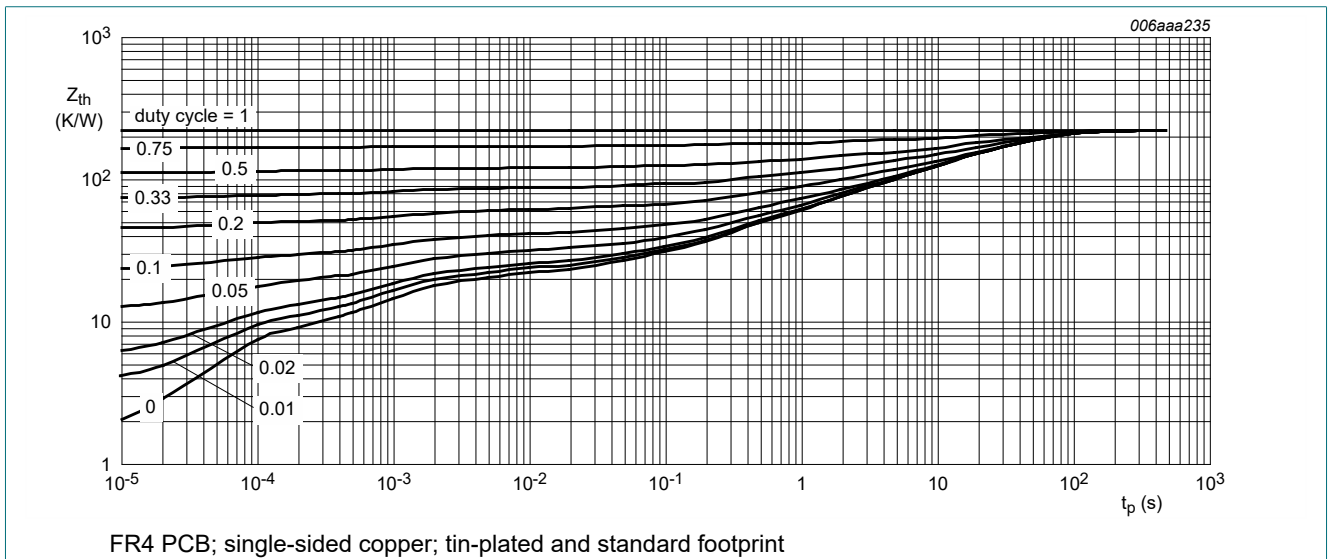
## 6. Thermal characteristics

**Table 7. Thermal characteristics**

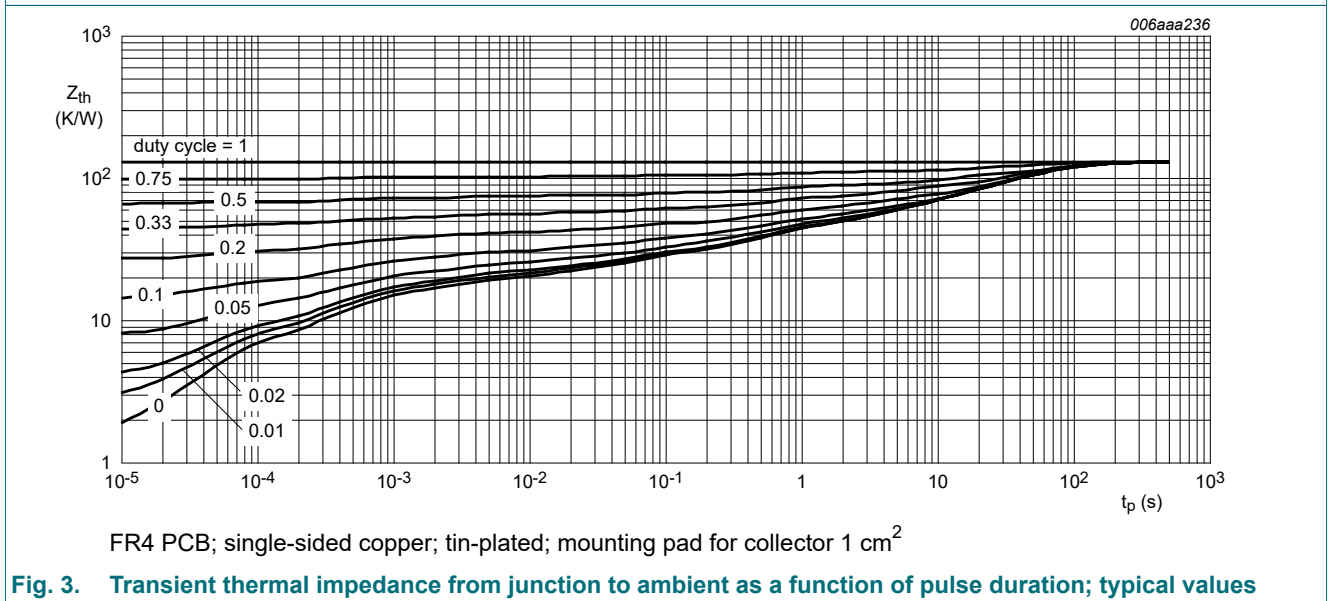
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	250	K/W
			[2]	-	-	157	K/W
			[3]	-	-	114	K/W

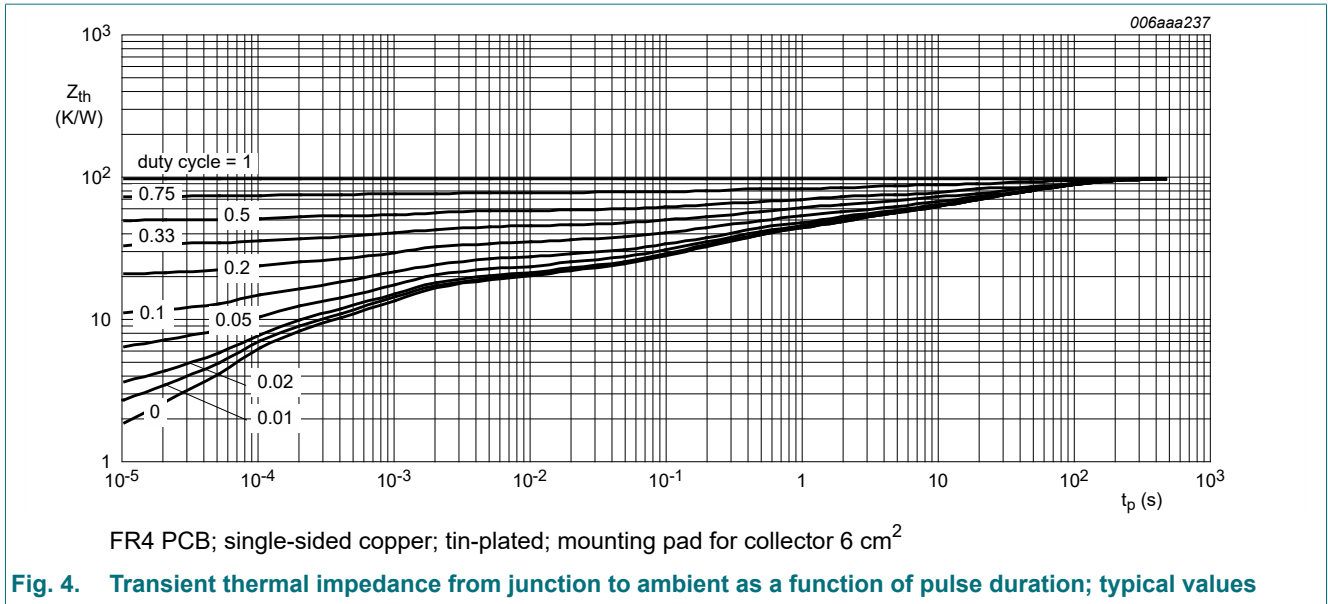
- [1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector  $1\text{ cm}^2$ .
- [3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector  $6\text{ cm}^2$ .



**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**



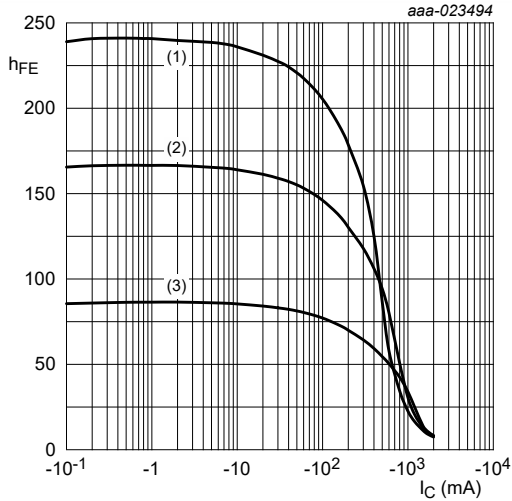
## 7. Characteristics

**Table 8. Characteristics**

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

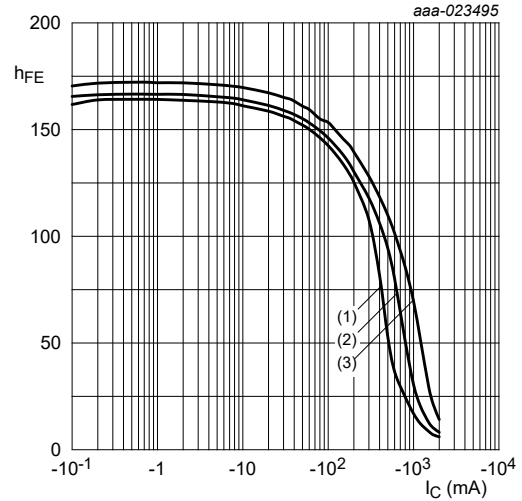
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>(BR)CBO</sub>	collector-base breakdown voltage	I <sub>C</sub> = -100 μA; I <sub>E</sub> = 0 A	-60	-		V
V <sub>(BR)CEO</sub>	collector-emitter breakdown voltage	I <sub>C</sub> = -2 mA; I <sub>E</sub> = 0 A	-60	-		V
V <sub>(BR)EBO</sub>	emitter-base breakdown voltage	I <sub>E</sub> = -100 μA; I <sub>C</sub> = 0 A	-5	-		V
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					
	BCX52T, -10T, -16T	V <sub>CE</sub> = -2 V; I <sub>C</sub> = -5 mA		63	-	-
		V <sub>CE</sub> = -2 V; I <sub>C</sub> = -500 mA	[1]	40	-	-
	BCX52T	V <sub>CE</sub> = -2 V; I <sub>C</sub> = -150 mA	[1]	63	-	250
	BCX52-10T	V <sub>CE</sub> = -2 V; I <sub>C</sub> = -150 mA	[1]	63	-	160
	BCX52-16T	V <sub>CE</sub> = -2 V; I <sub>C</sub> = -150 mA	[1]	100	-	250
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA	[1]	-	-	-500
V <sub>BE</sub>	base-emitter voltage	V <sub>CE</sub> = -2 V; I <sub>C</sub> = -500 mA	[1]	-	-	-1
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -50 mA; f = 100 MHz		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



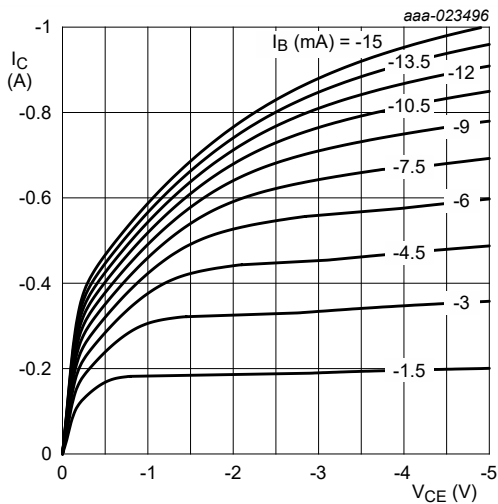
$V_{CE} = -2\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



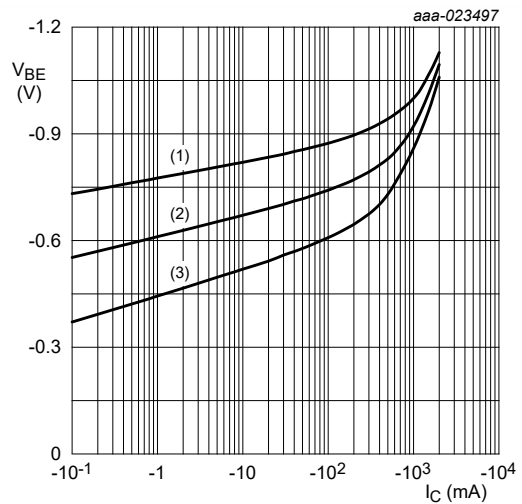
$T_{amb} = 25\text{ °C}$   
 (1)  $V_{CE} = -1\text{ V}$   
 (2)  $V_{CE} = -2\text{ V}$   
 (3)  $V_{CE} = -5\text{ V}$

**Fig. 6. DC current gain as a function of collector current; typical values**



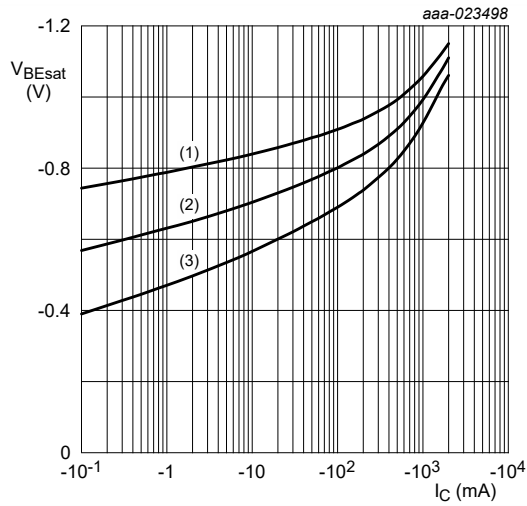
$T_{amb} = 25\text{ °C}$

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



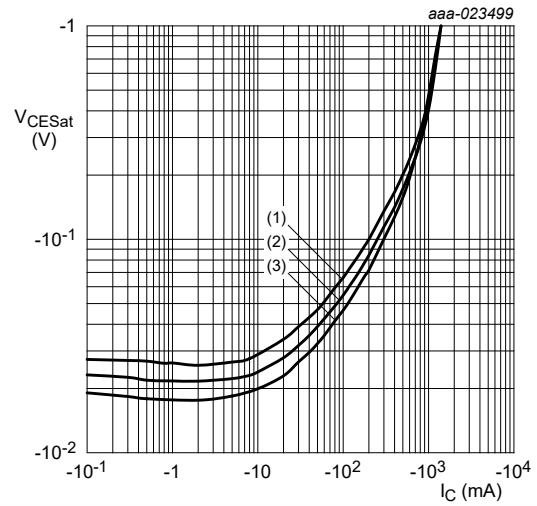
$V_{CE} = -2\text{ V}$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

**Fig. 8. Base-emitter voltage as a function of collector current; typical values**



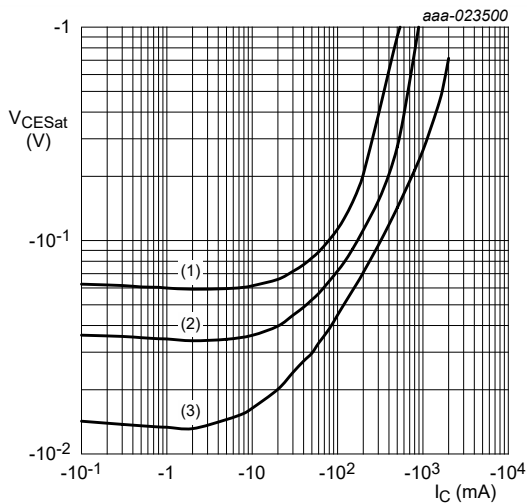
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

Fig. 9. Base-emitter saturation voltage as a function of collector current; typical values



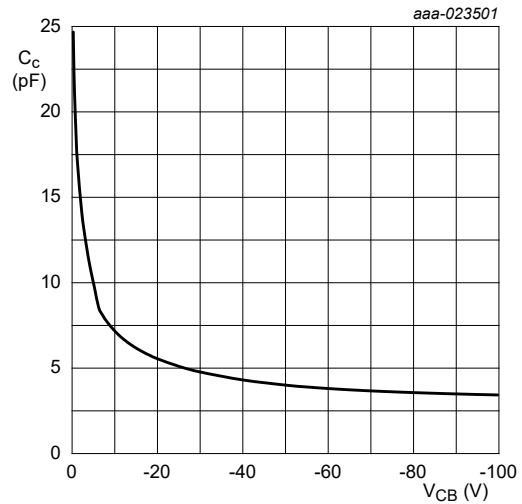
$I_C/I_B = 10$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



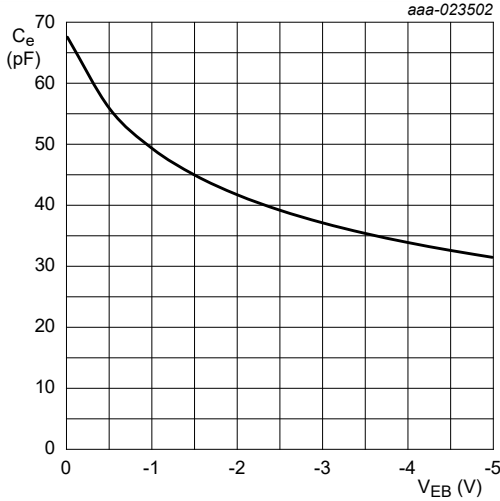
$T_{amb} = 25\text{ °C}$   
 (1)  $I_C/I_B = 50$   
 (2)  $I_C/I_B = 20$   
 (3)  $I_C/I_B = 5$

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



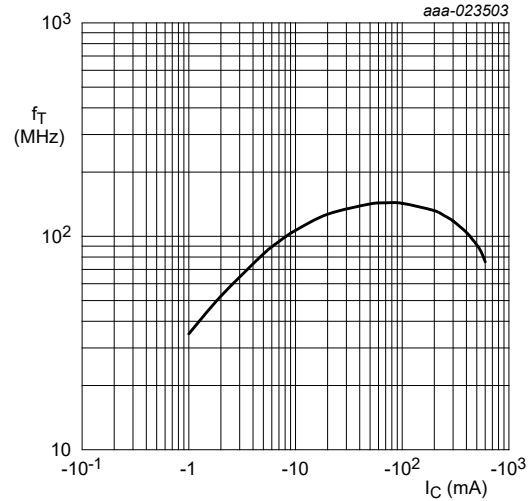
$f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$

Fig. 12. Collector capacitance as a function of collector-base voltage; typical values



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

**Fig. 13. Emitter capacitance as a function of emitter-base voltage; typical values**



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

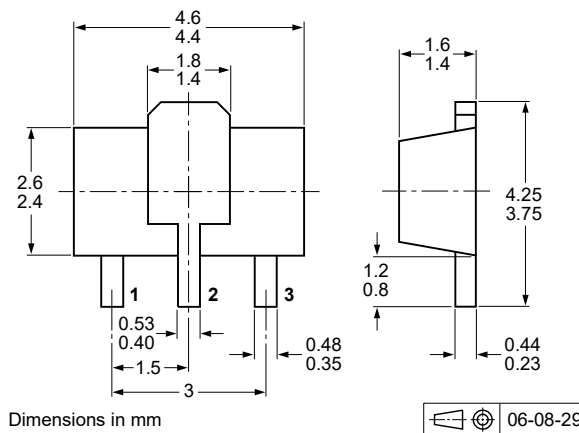
**Fig. 14. Transition frequency as a function of collector current; typical values**

## 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.

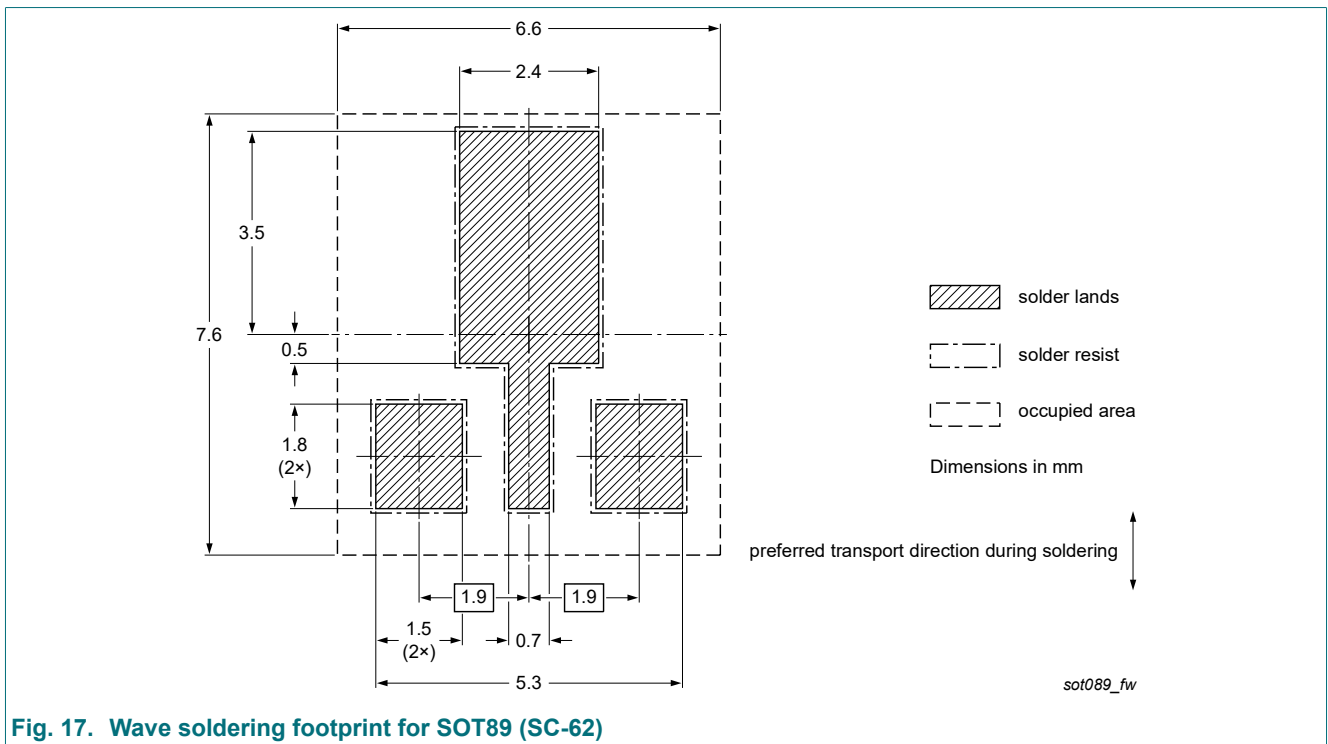
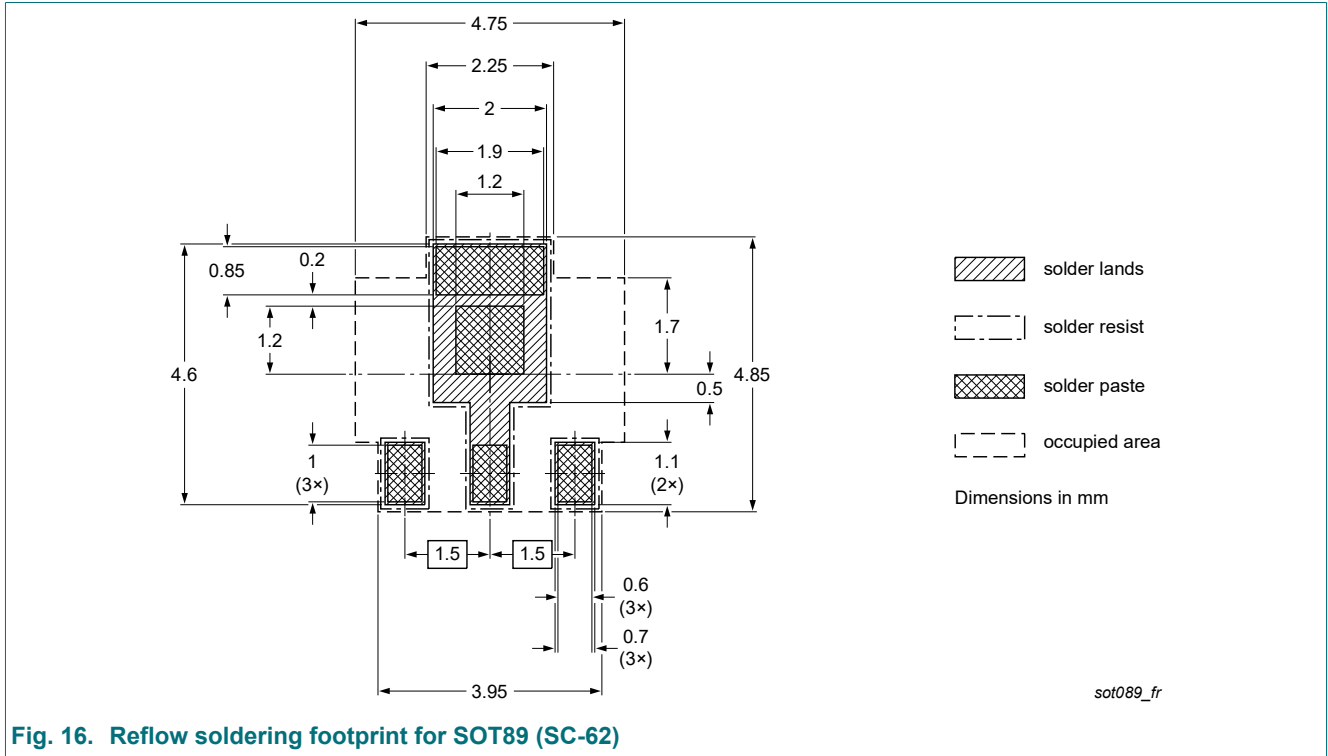
## 9. Package outline



**Fig. 15. Package outline SOT89 (SC-62)**



10. Soldering



## 11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCX52T_SER v.1	20190822	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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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