



# BCX53 series

80 V, 1 A PNP medium power transistors

Rev. 10 — 4 August 2023

Product data sheet

## 1. General description

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

## 2. Features and benefits

- High current
- Three current gain selections
- High power dissipation capability
- Exposed heatsink for excellent thermal and electrical conductivity
- AEC-Q101 qualified

## 3. Applications

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

## 4. Quick reference data

Table 1. Quick reference data

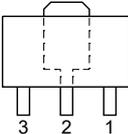
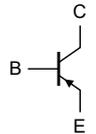
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

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						
	BCX53	$V_{CE} = -2\text{ V}; I_C = -150\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	63	-	250	
	BCX53-10		[1]	63	-	160	
	BCX53-16		[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	E	emitter		 006aaa231
2	C	collector		
3	B	base		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">BCX53</a>	SOT89	plastic, surface-mounted package; 3 leads; 1.5 mm pitch; 4.5 mm x 2.5 mm x 1.5 mm body	<a href="#">SOT89</a>
<a href="#">BCX53-10</a>			
<a href="#">BCX53-16</a>			

## 7. Marking

Table 4. Marking

Type number	Marking code
BCX53	AH
BCX53-10	AK
BCX53-16	AL

## 8. Limiting values

**Table 5. Limiting values**

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

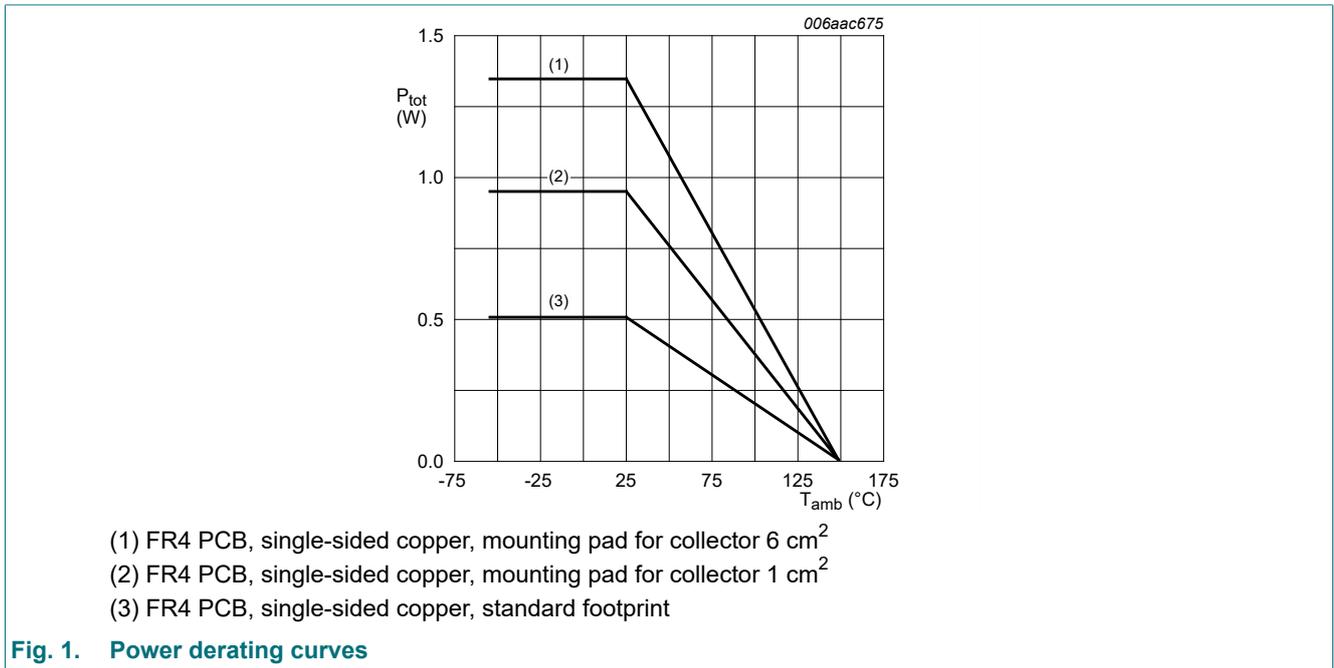
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

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	-	-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		-	-0.3	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]	0.50	W
			[2]	0.95	W
			[3]	1.35	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  $1\text{ cm}^2$ .

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



**Fig. 1. Power derating curves**

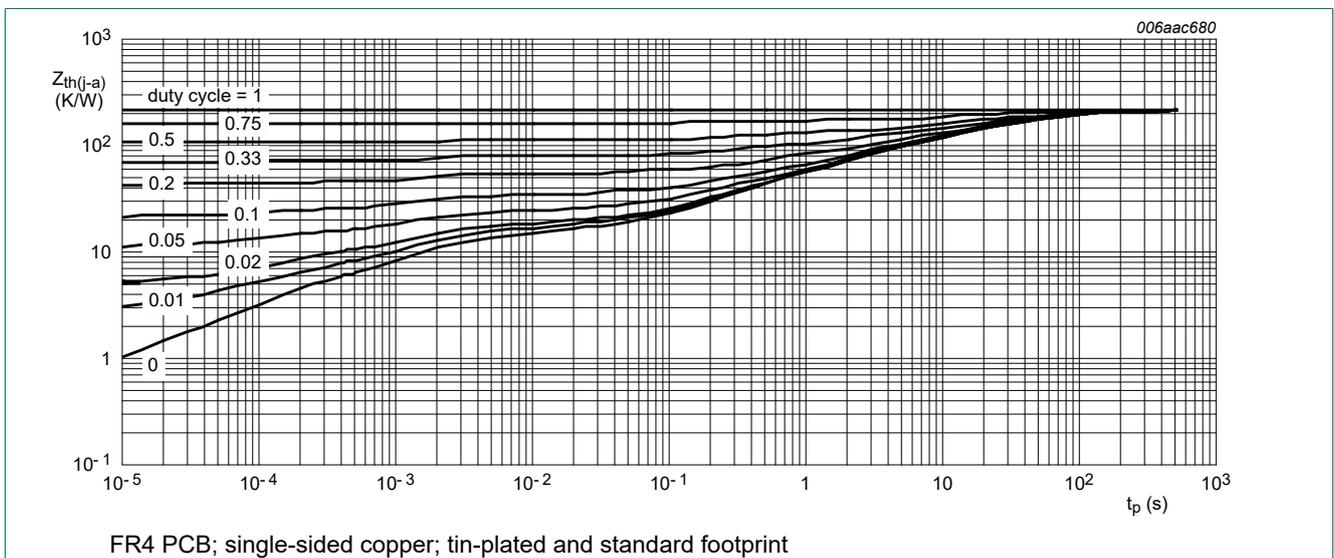
## 9. Thermal characteristics

**Table 6. Thermal characteristics**

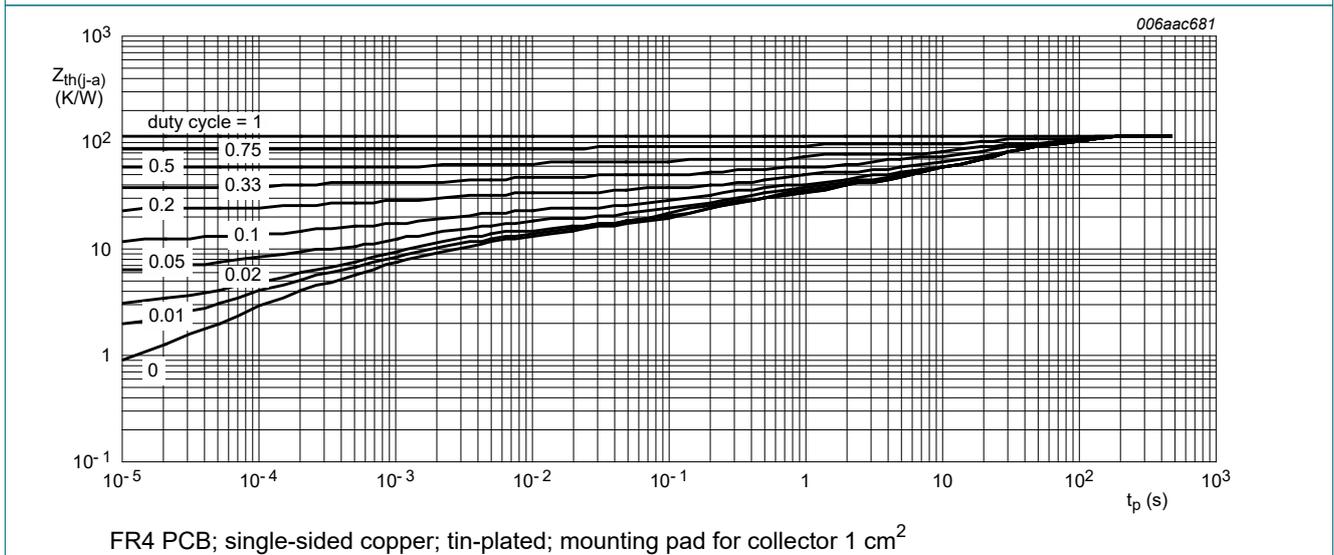
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	250	K/W
			[2]	-	-	132	K/W
			[3]	-	-	93	K/W
$R_{(j-sp)}$	thermal resistance from junction to solder point			-	-	16	K/W

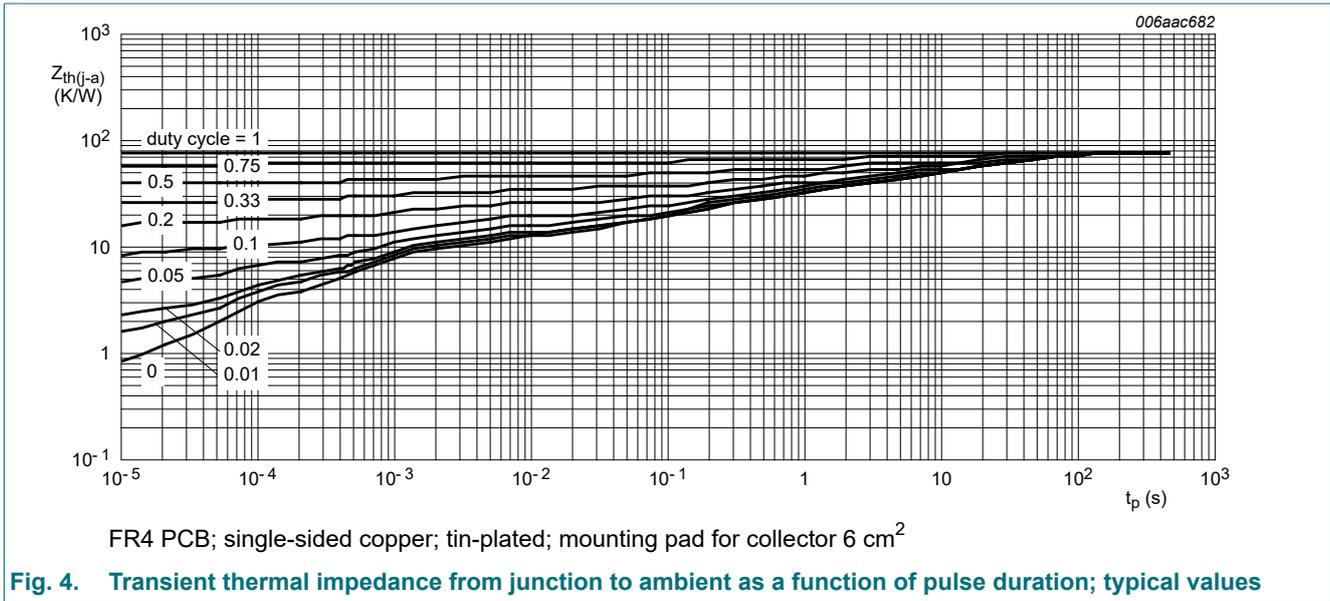
- [1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector  $1\text{ cm}^2$ .
- [3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector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



**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**

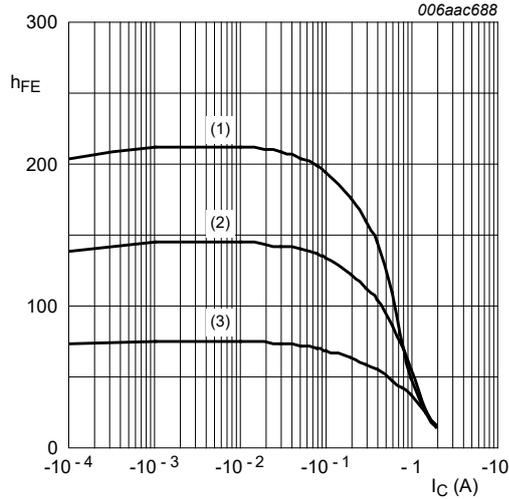


## 10. Characteristics

Table 7. Characteristics

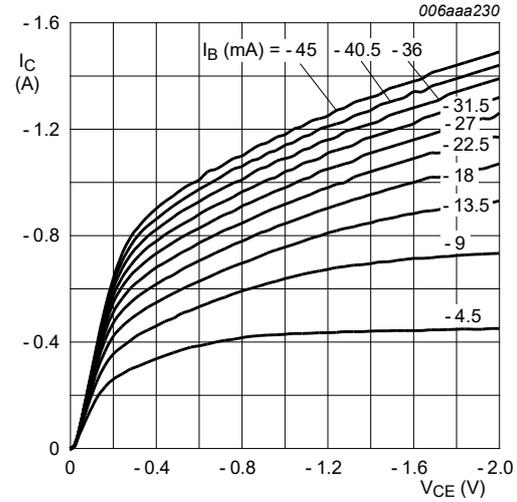
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -30\text{ V}; I_E = 0\text{ A}$ $T_{amb} = 25\text{ °C}$	-	-	-100	nA	
		$V_{CB} = -30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$	-	-	-10	$\mu\text{A}$	
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$ $T_{amb} = 25\text{ °C}$	-	-	-100	nA	
$h_{FE}$	DC current gain						
	BCX53	$V_{CE} = -2\text{ V}; I_C = -5\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	63	-	-	
		$V_{CE} = -2\text{ V}; I_C = -150\text{ mA}$ $T_{amb} = 25\text{ °C}$		63	-	250	
		$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$ $T_{amb} = 25\text{ °C}$		40	-	-	
	BCX53-10	$V_{CE} = -2\text{ V}; I_C = -5\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	63	-	-	
		$V_{CE} = -2\text{ V}; I_C = -150\text{ mA}$ $T_{amb} = 25\text{ °C}$		63	-	160	
		$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$ $T_{amb} = 25\text{ °C}$		40	-	-	
	BCX53-16	$V_{CE} = -2\text{ V}; I_C = -5\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	63	-	-	
		$V_{CE} = -2\text{ V}; I_C = -150\text{ mA}$ $T_{amb} = 25\text{ °C}$		100	-	250	
		$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$ $T_{amb} = 25\text{ °C}$		40	-	-	
	$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -500\text{ mA}; I_B = -50\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	-	-	-0.5 V
	$V_{BE}$	base-emitter voltage	$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	-	-	-1 V
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$ $T_{amb} = 25\text{ °C}$	-	15	-	pF	
$f_T$	transition frequency	$V_{CE} = -5\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}$ $T_{amb} = 25\text{ °C}$	-	145	-	MHz	

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



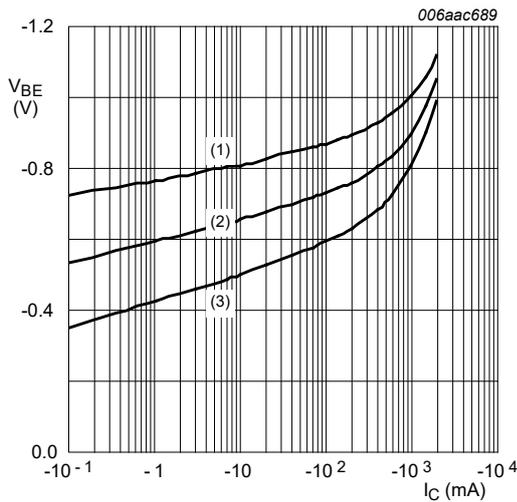
$V_{CE} = -2\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



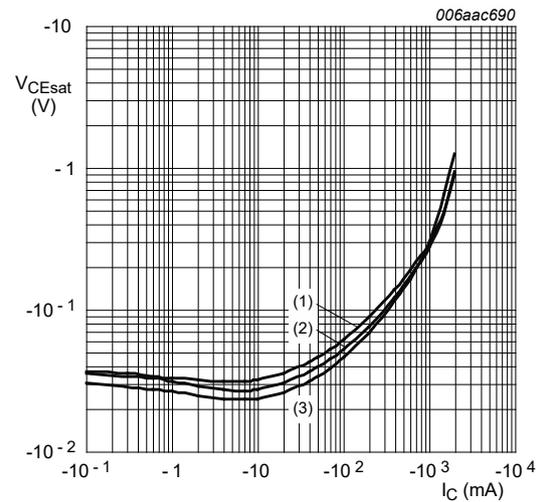
$T_{amb} = 25\text{ °C}$

Fig. 6. 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. 7. Base-emitter 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. 8. Collector-emitter saturation voltage as a function of collector current; typical values

## 11. Test information

### 11.1. 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.

## 12. Package outline

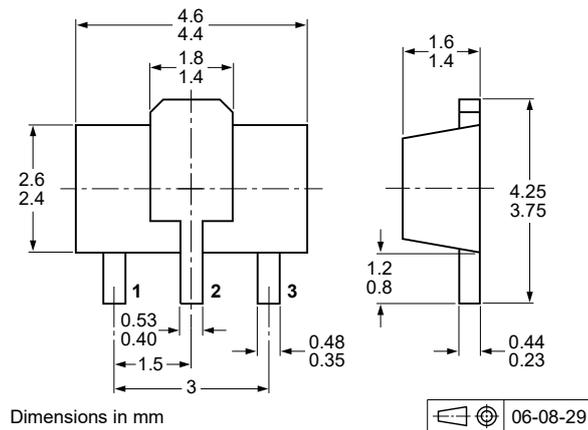


Fig. 9. Package outline SOT89

13. Soldering

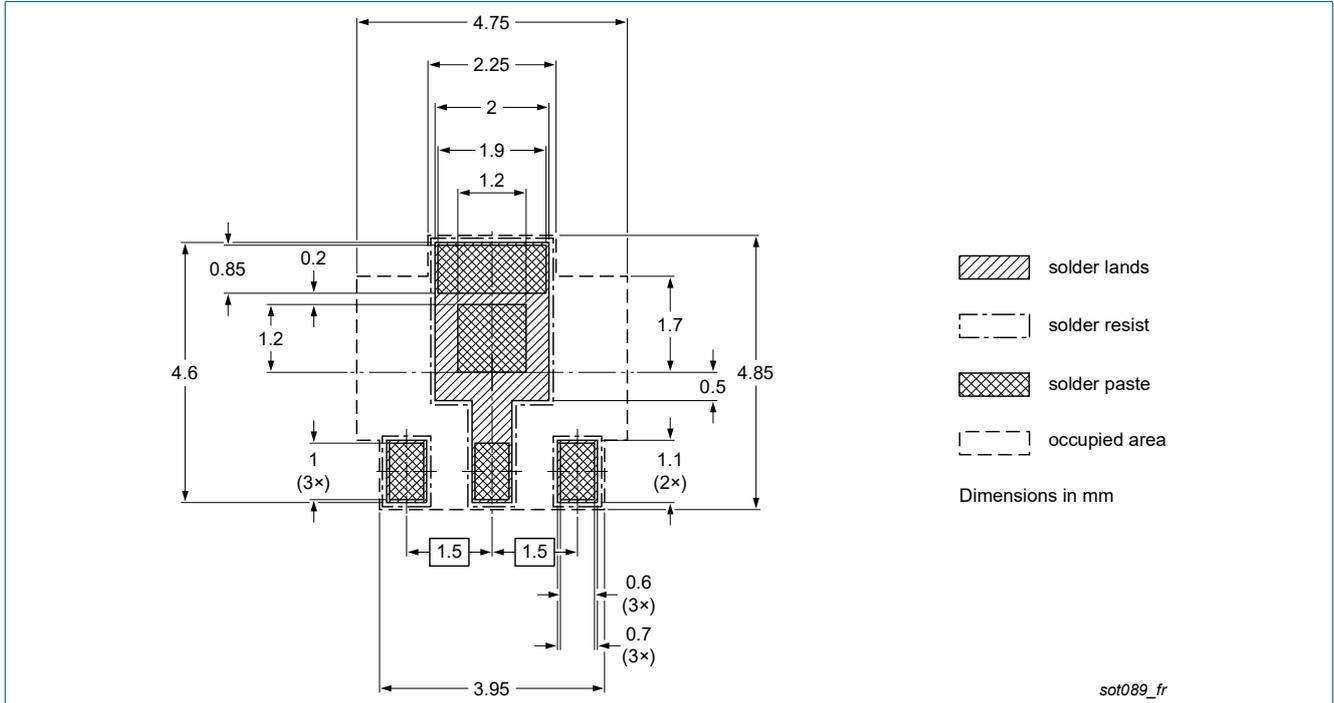


Fig. 10. Reflow soldering footprint for SOT89

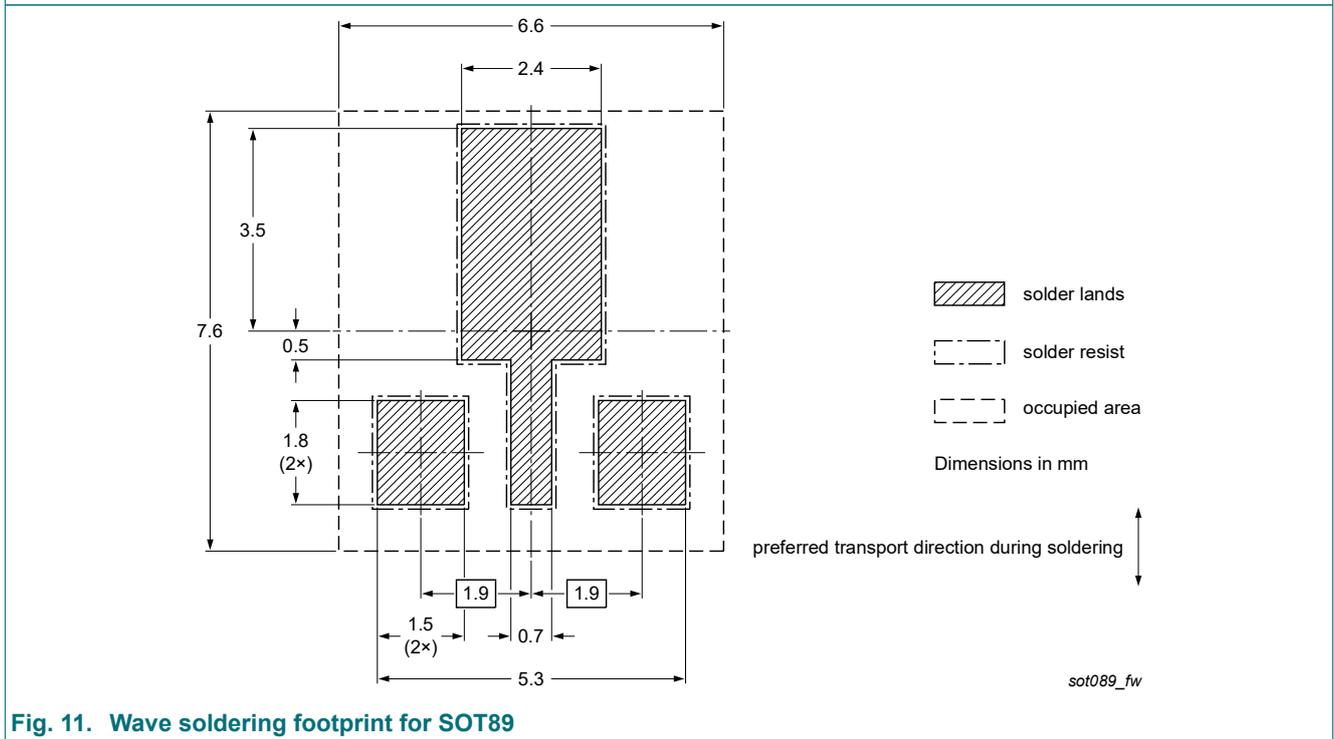


Fig. 11. Wave soldering footprint for SOT89

## 14. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCX53_SER v.10	20230804	Product data sheet	-	BCP53_BCX53_BC53PA v.9
Modifications:	<ul style="list-style-type: none"> <li>Data sheet separated into 3 data sheets</li> <li>Section "Packing information" removed</li> </ul>			
BCP53_BCX53_BC53PA v.9	20220106	Product data sheet	-	BC640_BCP53_BCX53 v.8
BC640_BCP53_BCX53 v.8	20111021	Product data sheet	-	BC640_BCP53_BCX53 v.7
BC640_BCP53_BCX53 v.7	20070604	Product data sheet	-	BC640_BCP53_BCX53 v.6
BC640_BCP53_BCX53 v.6	20050225	Product data sheet	CPCN200405 029	BC636_638_640 v.5 BCP51_52_53 v.5 BCX51_52_53 v.4
BC636_638_640 v.5	20011010	Product specification	-	BCX51_52_53 v.5
BCX51_52_53 v.5	20030206	Product specification	-	BCX51_52_53 v.4
BCX51_52_53 v.4	20011010	Product specification	-	BCX54_55_56 v.3

## 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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