

# BCX55-Q series

60 V, 1 A NPN medium power transistors

Rev. 1 — 14 July 2022

Product data sheet

## 1. General description

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

Table 1. Product overview

Type number	Package		NPN complement
	Nexperia	JEITA	
BCX55-Q	SOT89	SC-62	BCX52-Q
BCX55-10-Q			BCX52-10-Q
BCX55-16-Q			BCX52-16-Q

## 2. Features and benefits

- High current
- Three current gain selections
- High power dissipation capability
- Exposed heatsink for excellent thermal and electrical conductivity
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

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

## 4. Quick reference data

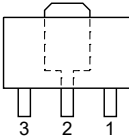
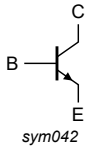
Table 2. Quick reference data

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; $t_p \leq 1$ ms	-	-	2	A	
$h_{FE}$	DC current gain						
	BCX55-Q	$V_{CE} = 2$ V; $I_C = 150$ mA; $T_{amb} = 25$ °C	[1]	63	-	250	
	BCX55-10-Q		[1]	63	-	160	
	BCX55-16-Q		[1]	100	-	250	

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

## 5. Pinning information

Table 3. Pinning

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

## 6. Ordering information

Table 4. Ordering information

Type number	Package		Version
	Name	Description	
BCX55-Q	SC-62	plastic surface-mounted package; exposed die pad for good heat transfer; 3 leads	SOT89
BCX55-10-Q			
BCX55-16-Q			

## 7. Marking

Table 5. Marking

Type number	Marking code
BCX55-Q	BE
BCX55-10-Q	BG
BCX55-16-Q	BM

## 8. Limiting values

**Table 6. Limiting values**

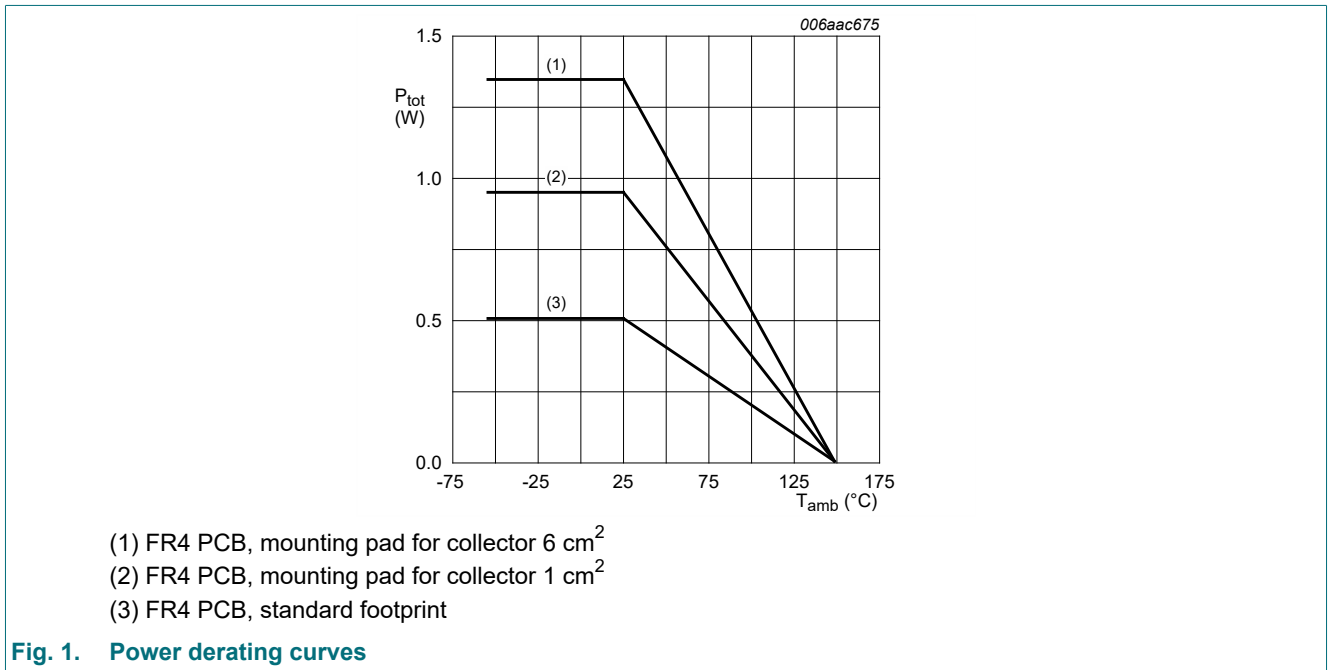
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter	-	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; $t_p \leq 1$ ms	-	2	A
$I_B$	base current		-	0.3	A
$I_{BM}$	peak base current	single pulse; $t_p \leq 1$ ms	-	0.3	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °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 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**

## 9. 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]	-	-	250	K/W
			[2]	-	-	132	K/W
			[3]	-	-	93	K/W
$R_{th(j-sp)}$	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 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>.

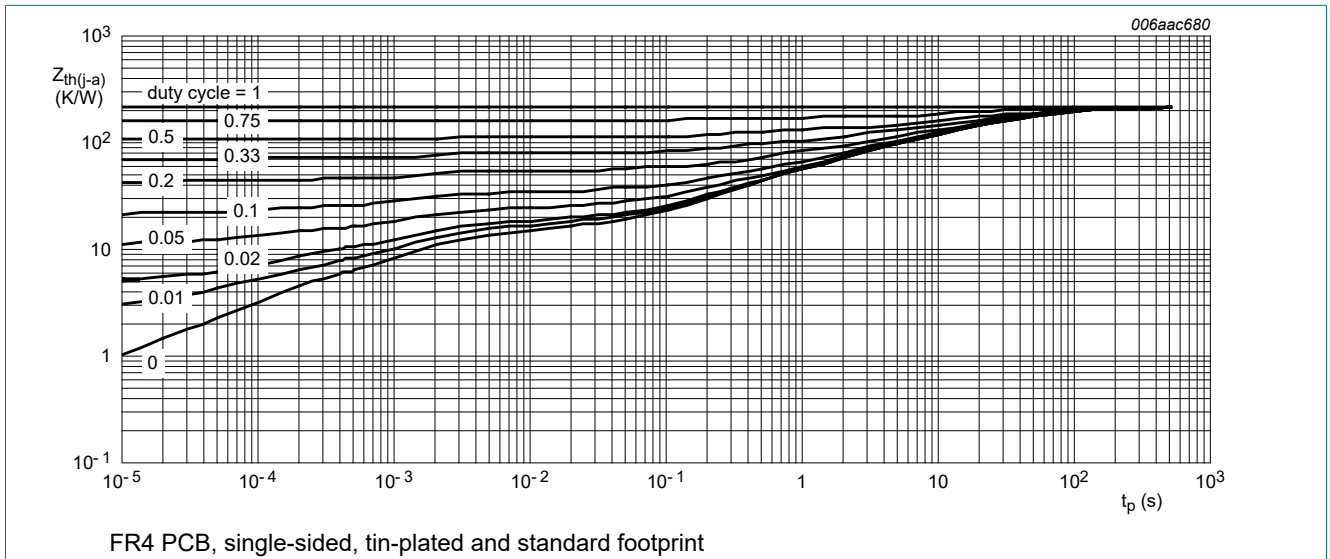


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

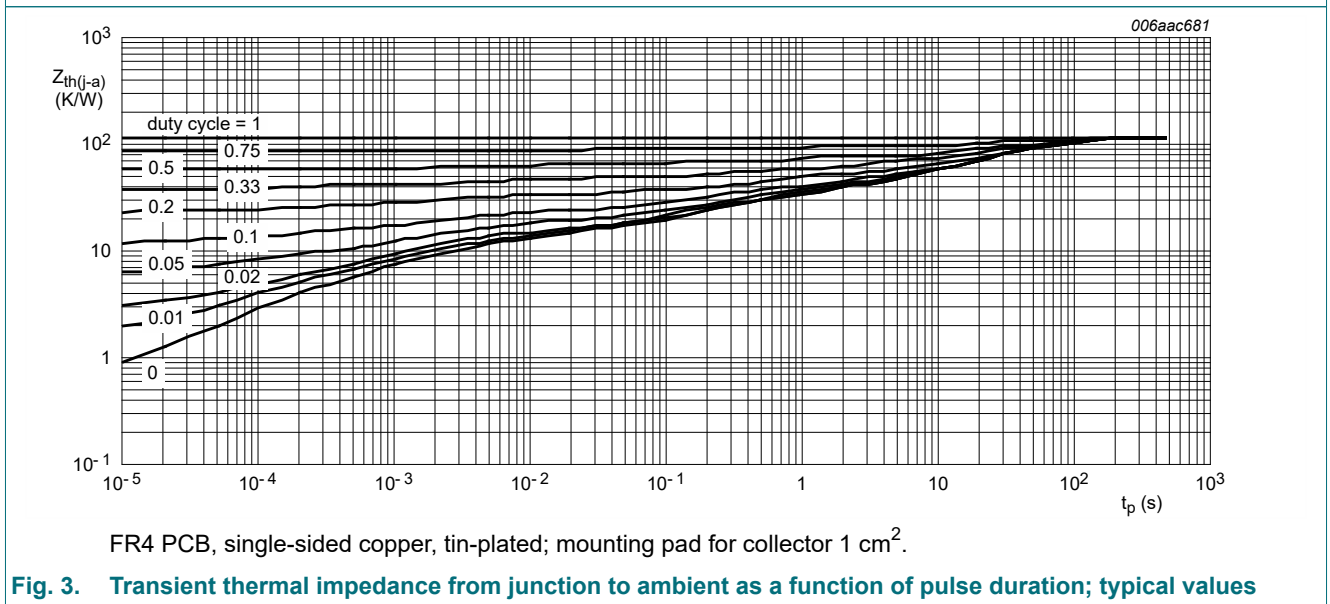
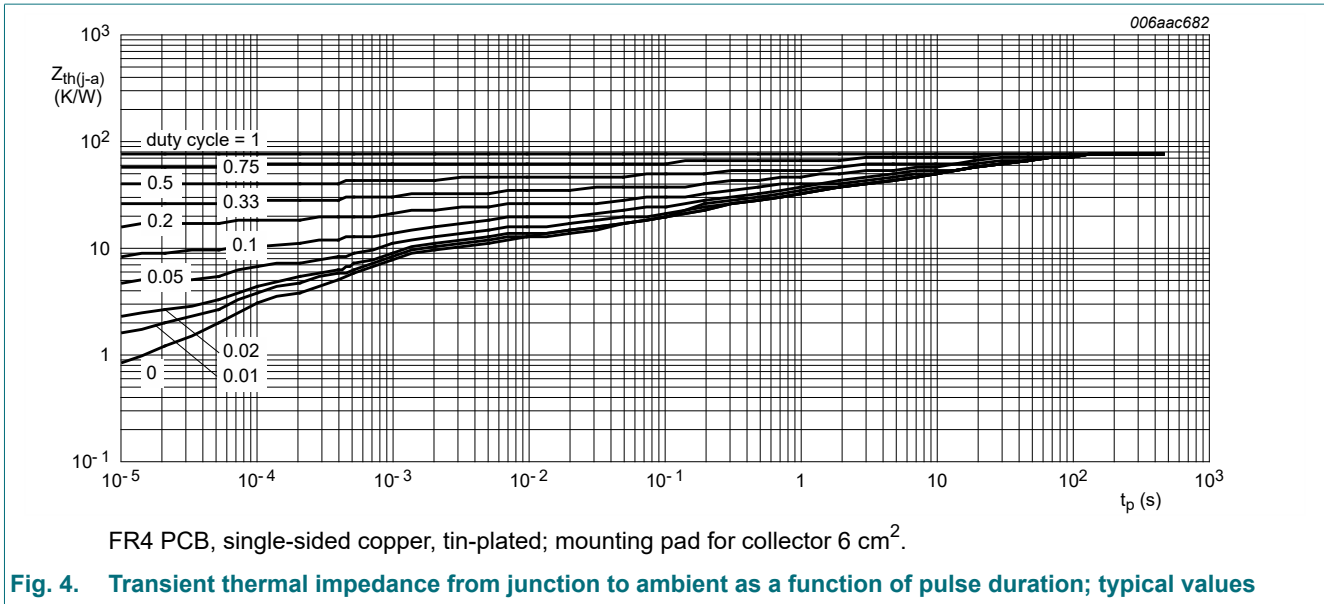


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

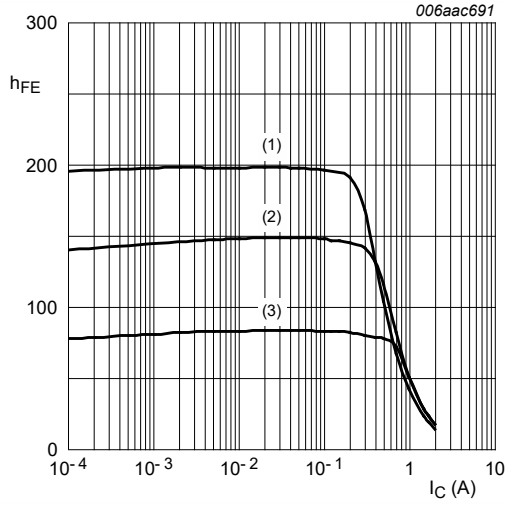


## 10. Characteristics

Table 8. Characteristics

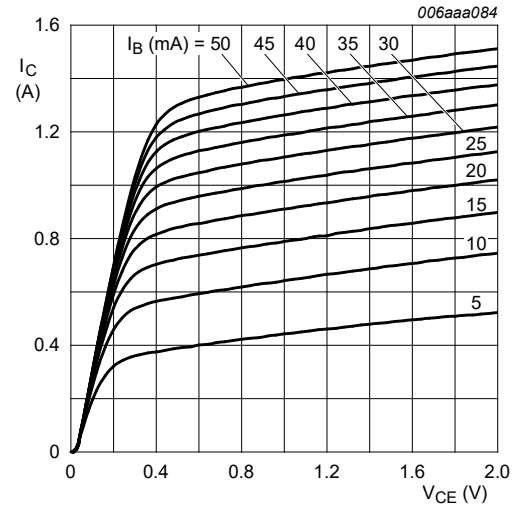
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100 \mu\text{A}; I_E = 0; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		60	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2 \mu\text{A}; I_B = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		60	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_C = 0 \text{ A}; I_E = 100 \mu\text{A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		5	-	-	V
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 30 \text{ V}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	-	100	nA
		$V_{CB} = 30 \text{ V}; I_E = 0 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$		-	-	10	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5 \text{ V}; I_C = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	-	100	nA
$h_{FE}$	DC current gain						
	BCX55-Q	$V_{CE} = 2 \text{ V}; I_C = 5 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	63	-	-	
		$V_{CE} = 2 \text{ V}; I_C = 150 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	63	-	250	
		$V_{CE} = 2 \text{ V}; I_C = 500 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	40	-	-	
	BCX55-10-Q	$V_{CE} = 2 \text{ V}; I_C = 5 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	63	-	-	
		$V_{CE} = 2 \text{ V}; I_C = 150 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	63	-	160	
		$V_{CE} = 2 \text{ V}; I_C = 500 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	40	-	-	
	BCX55-16-Q	$V_{CE} = 2 \text{ V}; I_C = 5 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	63	-	-	
		$V_{CE} = 2 \text{ V}; I_C = 150 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	100	-	250	
		$V_{CE} = 2 \text{ V}; I_C = 500 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	40	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	-	-	0.5	V
$V_{BE}$	base-emitter voltage	$V_{CE} = 2 \text{ V}; I_C = 500 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	-	-	1	V
$C_c$	collector capacitance	$V_{CB} = 10 \text{ V}; I_E = I_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	6	-	pF
$f_T$	transition frequency	$V_{CE} = 5 \text{ V}; I_C = 50 \text{ mA}; f = 100 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		100	180	-	MHz

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



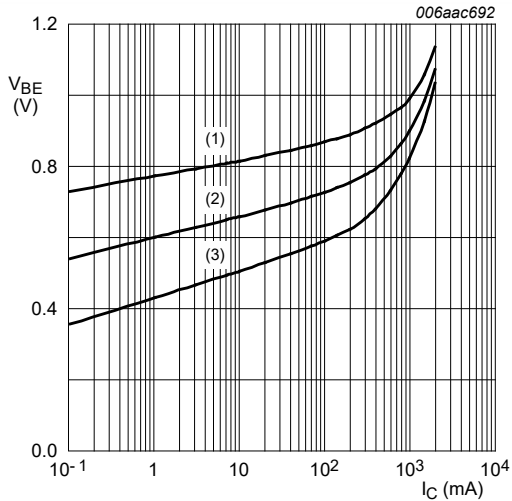
$V_{CE} = 2\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



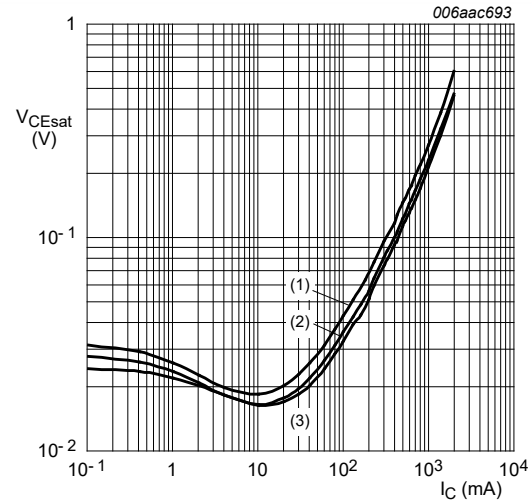
$T_{amb} = 25\text{ °C}$

**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

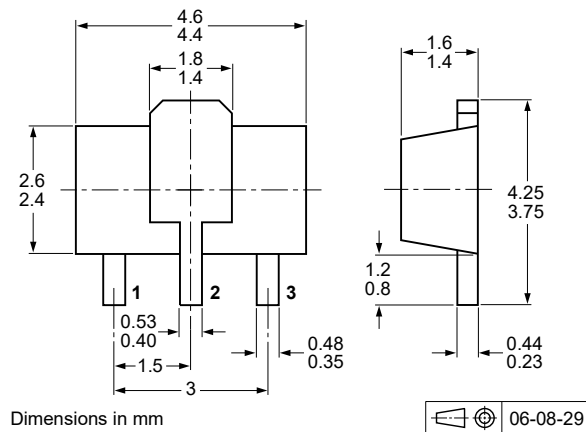


Fig. 9. Package outline SOT89 (SC-62)



### 13. Soldering

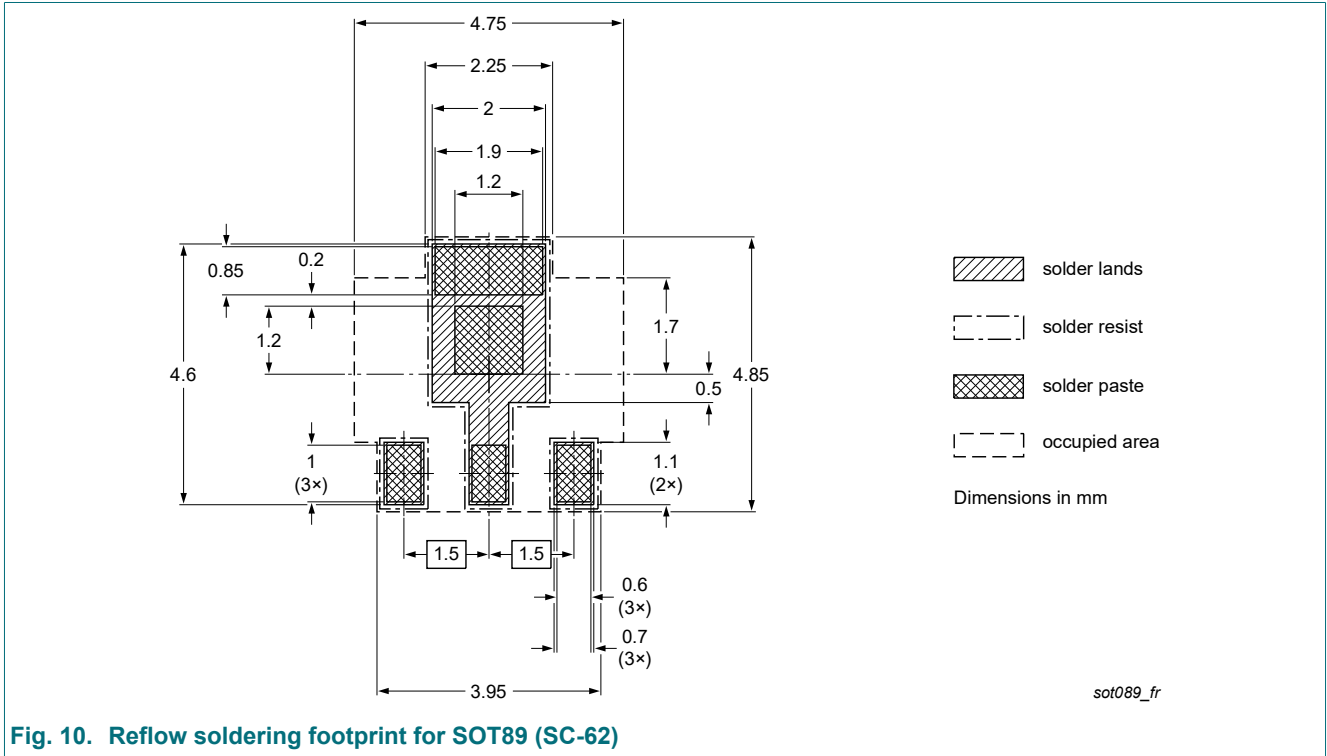


Fig. 10. Reflow soldering footprint for SOT89 (SC-62)

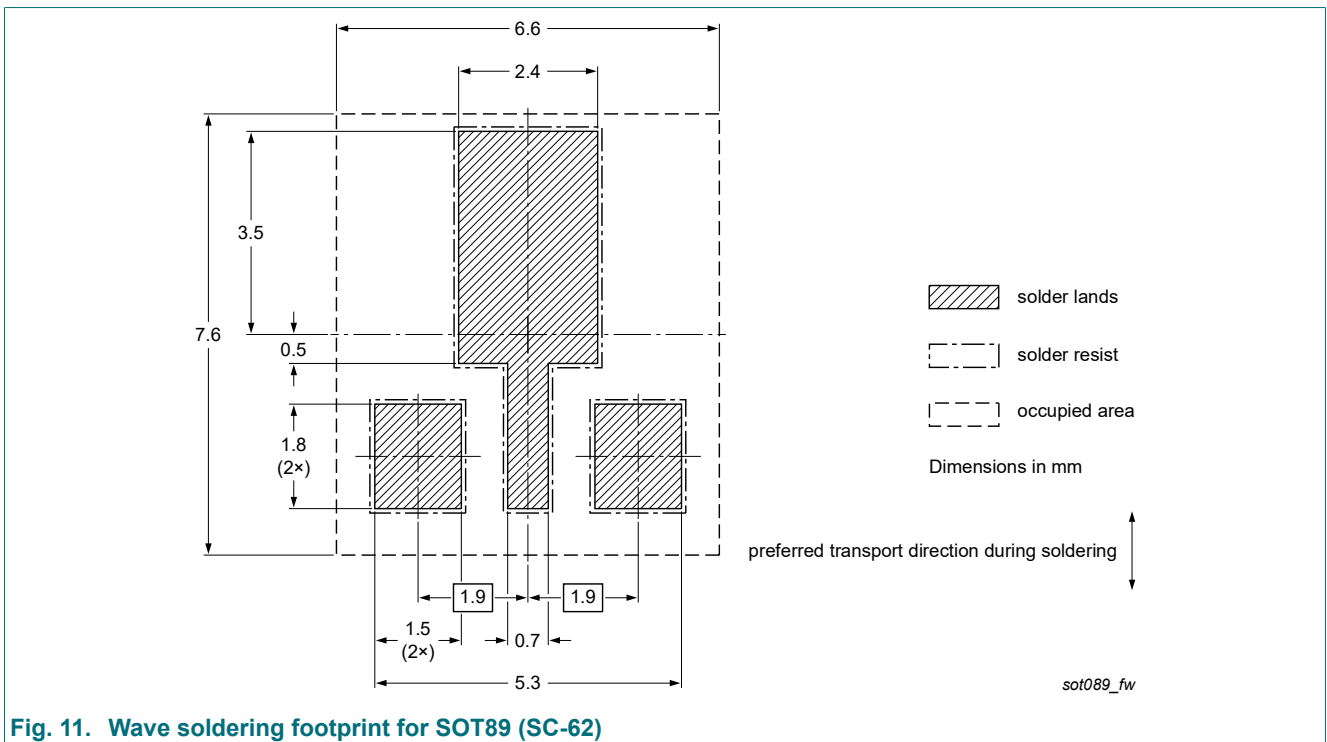


Fig. 11. Wave soldering footprint for SOT89 (SC-62)

## 14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BCX55-Q_SER v.1	20220714	Product data sheet	-	-

## 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.
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## Contents

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1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	3
9. Thermal characteristics.....	4
10. Characteristics.....	6
11. Test information.....	8
11.1. Quality information.....	8
12. Package outline.....	8
13. Soldering.....	9
14. Revision history.....	10
15. Legal information.....	11

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