



BCX54 series

45 V, 1 A NPN medium power transistors

Rev. 10 — 1 April 2023

Product data sheet

1. General description

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

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
- Low-side switches
- Battery-driven devices
- Power management
- Amplifiers

4. Quick reference data

Table 1. Quick reference data

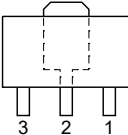
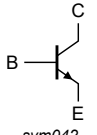
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	45	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						
	BCX54	$V_{CE} = 2\text{ V}; I_C = 150\text{ mA}$	[1]	63	-	250	
	BCX54-10		[1]	63	-	160	
	BCX54-16		[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		
2	C	collector		
3	B	base		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BCX54	SC-62	plastic surface-mounted package; exposed die pad for good heat transfer; 3 leads	SOT89
BCX54-10			
BCX54-16			

7. Marking

Table 4. Marking

Type number	Marking code
BCX54	BA
BCX54-10	BC
BCX54-16	BD

8. Limiting values

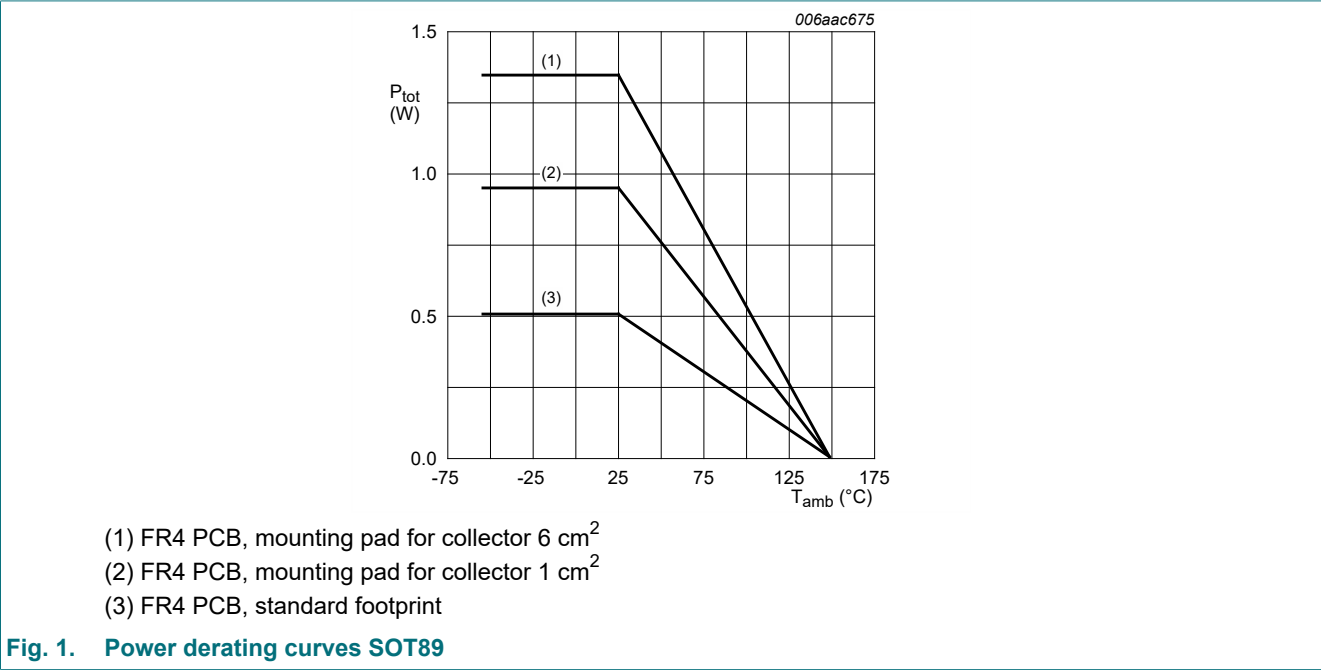
Table 5. Limiting values

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

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	45	V
V_{CEO}	collector-emitter voltage	open base	-	45	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	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$ [1]	-	0.50	W
		[2]	-	0.95	W
		[3]	-	1.35	W
T_j	junction temperature		-	150	$^{\circ}\text{C}$
T_{amb}	ambient temperature		-55	150	$^{\circ}\text{C}$
T_{stg}	storage temperature		-65	150	$^{\circ}\text{C}$

- [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 cm^2 .
[3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 6 cm^2 .



9. Thermal characteristics

Table 6. 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]	-	-	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 cm².
[3] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 6 cm².

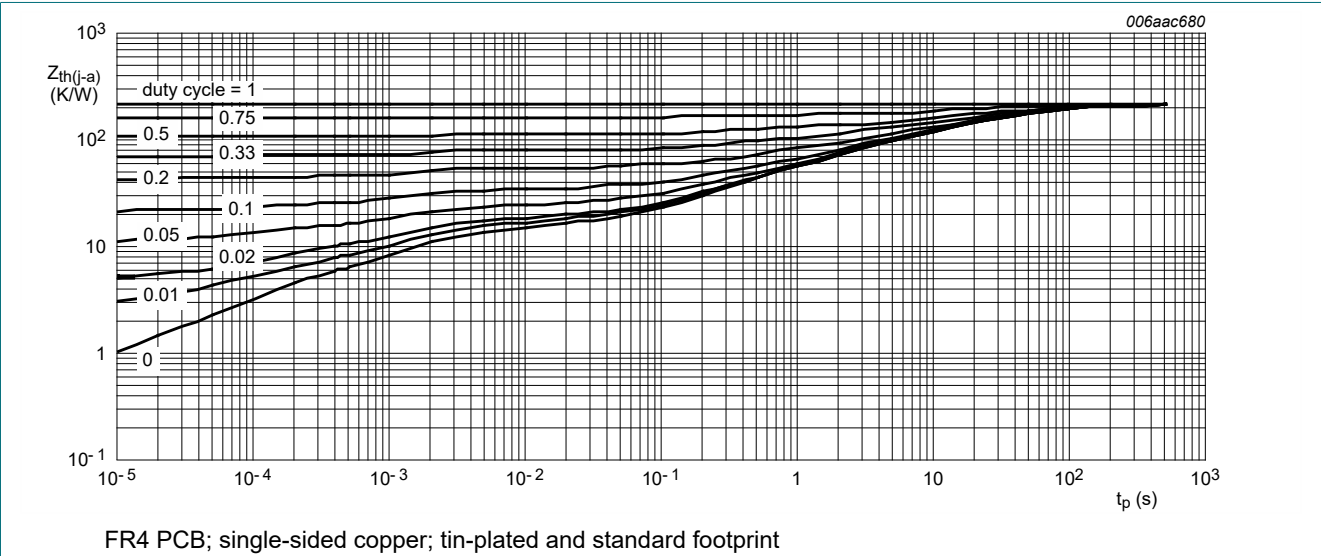


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

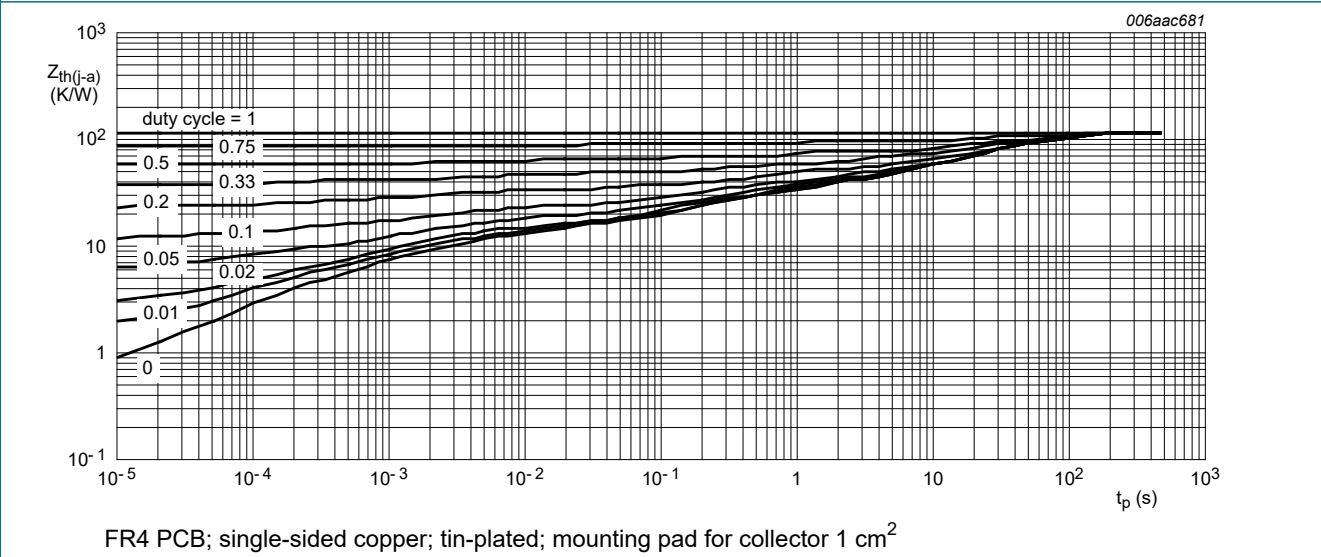


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics
Tamb = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _{(BR)CBO}	collector-base breakdown voltage	I _C = 100 µA; I _E = 0 A		45	-	-	V
V _{(BR)CEO}	collector-emitter breakdown voltage	I _C = 2 mA; I _B = 0 A		45	-	-	V
V _{(BR)EBO}	emitter-base breakdown voltage	I _E = 100 µA; I _C = 0 A		5	-	-	V
I _{CBO}	collector-base cut-off current	V _{CB} = 30 V; I _E = 0 A		-	-	100	nA
		V _{CB} = 30 V; I _E = 0 A; T _J = 150 °C		-	-	10	µA
I _{EBO}	emitter-base cut-off current	V _{EB} = 5 V; I _C = 0 A		-	-	100	nA
h _{FE}	DC current gain						
	BCX54	V _{CE} = 2 V; I _C = 5 mA	[1]	63	-	-	
		V _{CE} = 2 V; I _C = 150 mA		63	-	250	
		V _{CE} = 2 V; I _C = 500 mA		40	-	-	
	BCX54-10	V _{CE} = 2 V; I _C = 5 mA	[1]	63	-	-	
		V _{CE} = 2 V; I _C = 150 mA		63	-	160	
		V _{CE} = 2 V; I _C = 500 mA		40	-	-	
	BCX54-16	V _{CE} = 2 V; I _C = 5 mA	[1]	63	-	-	
		V _{CE} = 2 V; I _C = 150 mA		100	-	250	
		V _{CE} = 2 V; I _C = 500 mA		40	-	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = 500 mA; I _B = 50 mA	[1]	-	-	0.5	V
V _{BE}	base-emitter voltage	V _{CE} = 2 V; I _C = 500 mA	[1]	-	-	1	V
C _c	collector capacitance	V _{CB} = 10 V; I _E = i _e = 0 A; f = 1 MHz		-	6	-	pF
f _T	transition frequency	V _{CE} = 5 V; I _C = 50 mA; f = 100 MHz		100	180	-	MHz

[1] pulsed; t_p ≤ 300 µs; δ ≤ 0.02

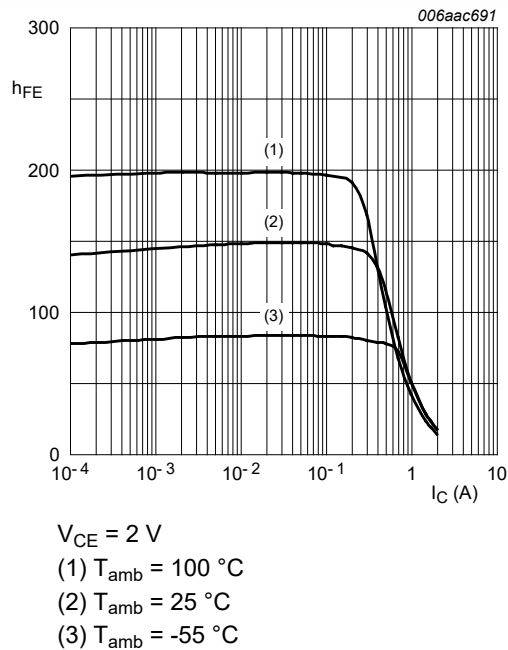


Fig. 5. DC current gain as a function of collector current; typical values

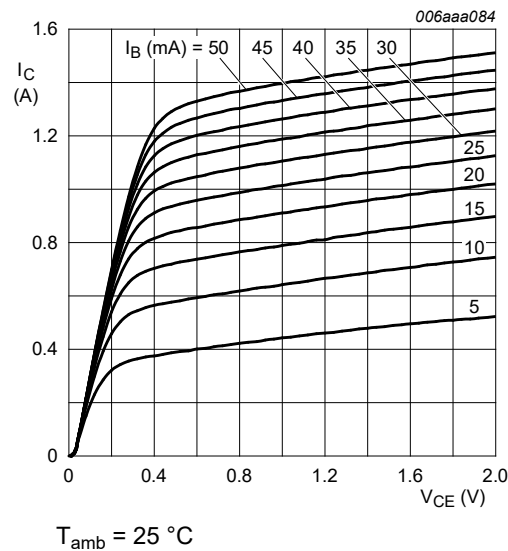


Fig. 6. Collector current as a function of collector-emitter voltage; typical values

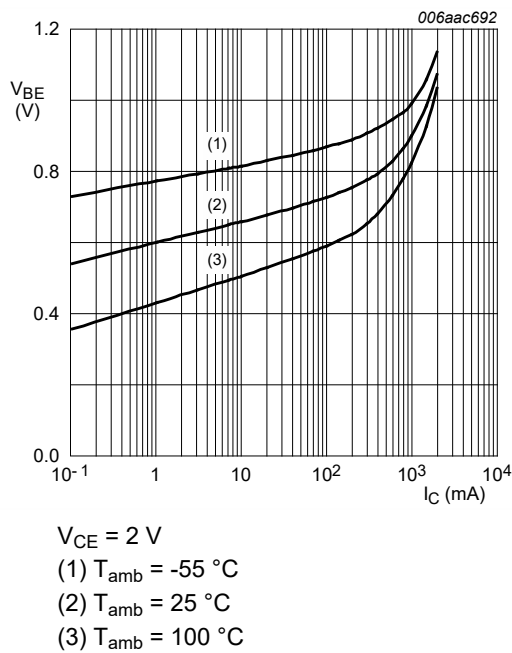


Fig. 7. Base-emitter voltage as a function of collector current; typical values

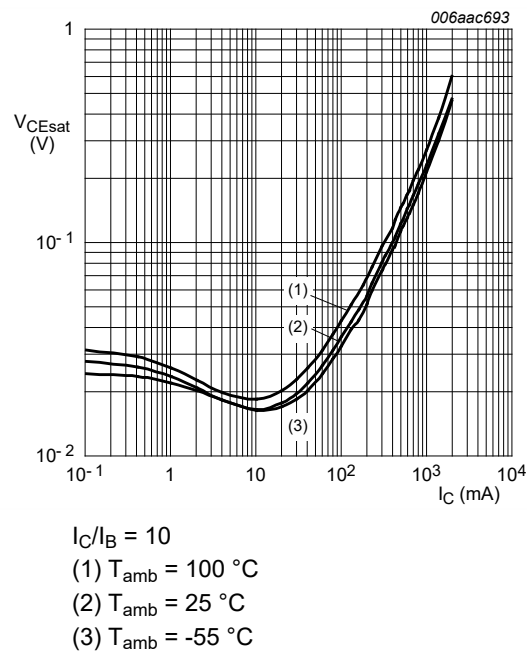


Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values

11. Package outline

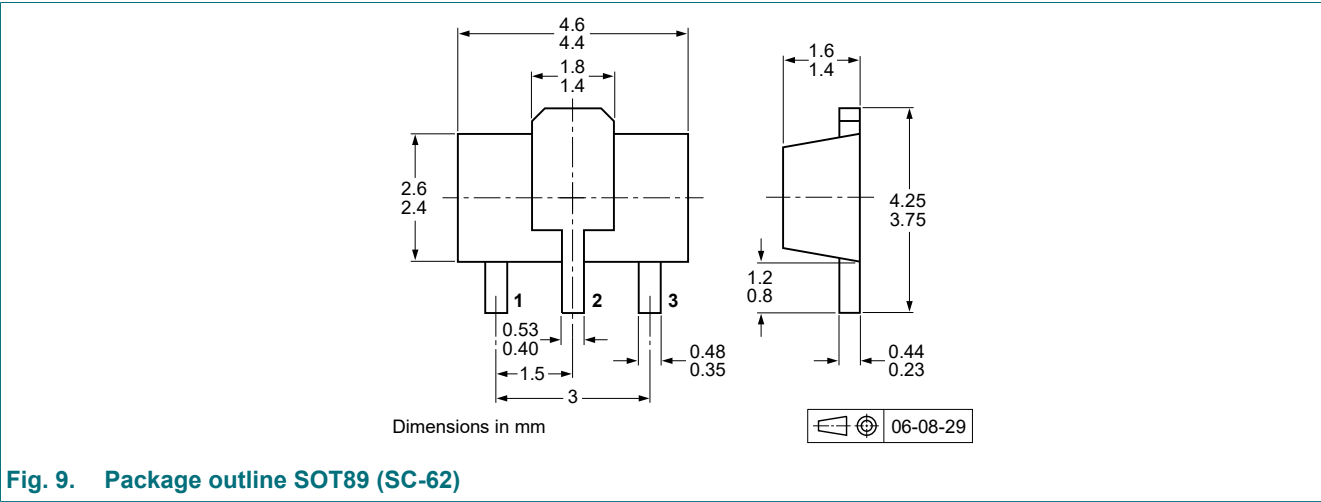


Fig. 9. Package outline SOT89 (SC-62)

12. Soldering

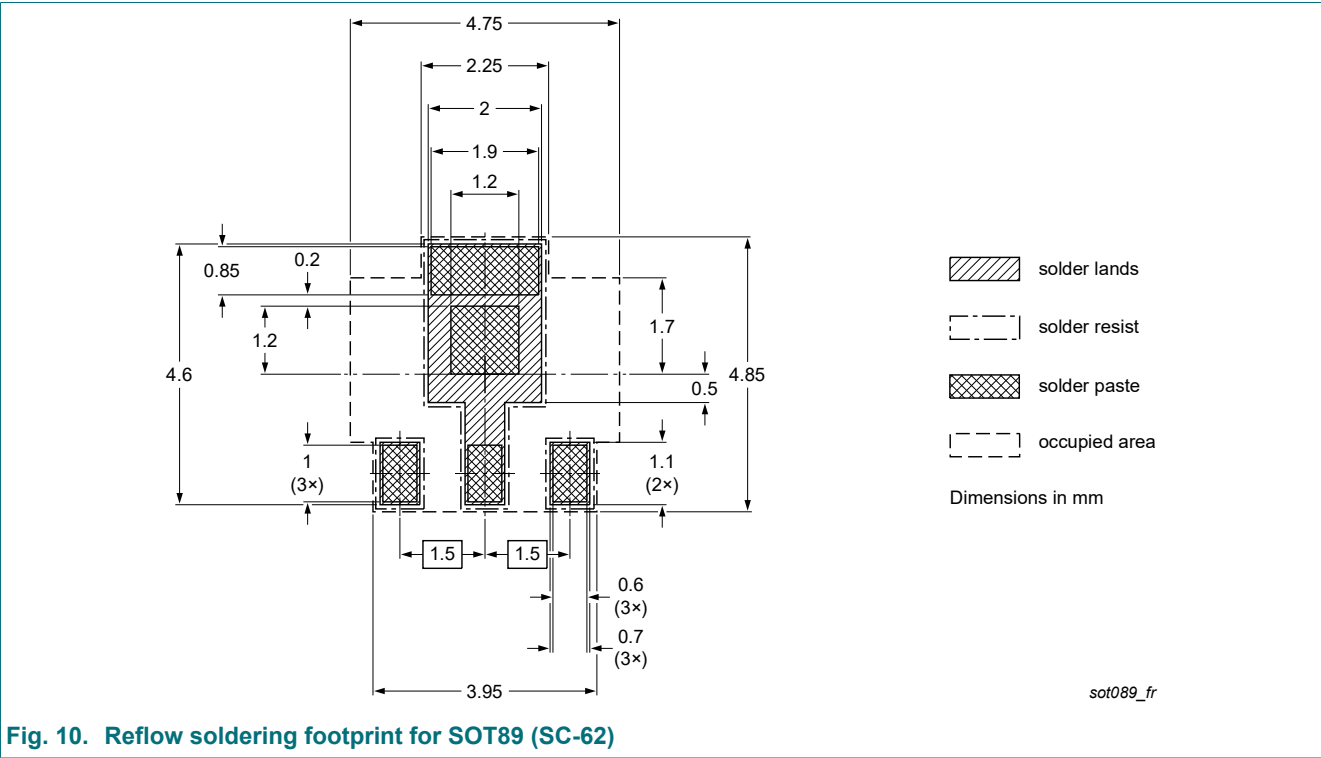


Fig. 10. Reflow soldering footprint for SOT89 (SC-62)

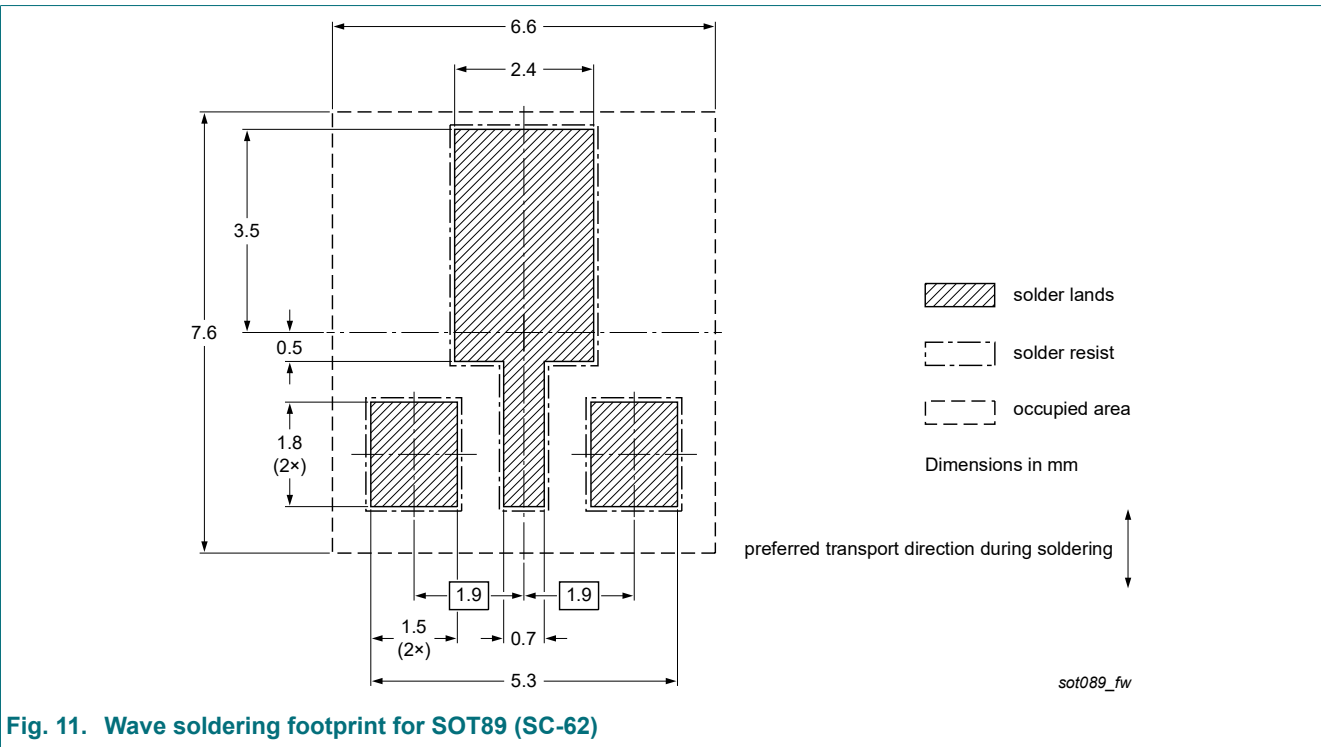


Fig. 11. Wave soldering footprint for SOT89 (SC-62)

13. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCX54_SER v.10	20230401	Product data sheet	-	BCX54_SER v.9
Modifications:	Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
BCX54_SER v.9	20220106	Product data sheet	-	BCP54_BCX54_BC54PA v.8
BCP54_BCX54_BC54PA v.8	20111021	Product data sheet	-	BC635_BCP54_BCX54 v.7
BC635_BCP54_BCX54 v.7	20070604	Product data sheet	-	BC635_BCP54_BCX54 v.6
BC635_BCP54_BCX54 v.6	20050225	Product data sheet	CPCN200405029	BC635_637_639 v.4 BCP54_55_56 v.5 BCP54_55_56 v.4
BC635_637_639 v.4	20011010	Product specification	-	BC635_637_639 v.3
BCX54_55_56 v.5	20030206	Product specification	-	BCX54_55_56 v.4
BCX54_55_56 v.4	20011010	Product specification	-	BCX54_55_56 v.3

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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