



# BSP52

NPN Darlington transistor

23 February 2018

Product data sheet

## 1. General description

NPN Darlington transistor in an SOT223 plastic package.

PNP complement: BSP62

## 2. Features and benefits

- High current of 1 A
- Low voltage of 80 V
- Integrated diode and resistor
- AEC-Q101 qualified

## 3. Applications

- Industrial high gain amplification

## 4. Quick reference data

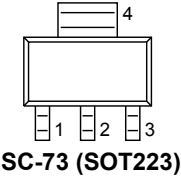
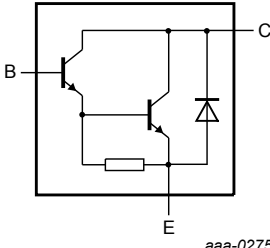
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter	-	-	90	V
$V_{CES}$	collector-emitter voltage	base short-circuited to emitter	-	-	80	V
$I_C$	collector current		-	-	1	A
$I_{CM}$	peak collector current		-	-	2	A
$h_{FE}$	DC current gain	$V_{CE} = 10 \text{ V}; I_C = 150 \text{ mA}$	[1]	1000	-	-

[1] Pulse test:  $t_p \leq 300 \mu\text{s}$ ;  $\delta \leq 0.02$ .

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 <p>SC-73 (SOT223)</p>	 <p>aaa-027580</p>
2	C	collector		
3	E	emitter		
4	C	collector		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BSP52	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads; 4.6 mm pitch; 6.5 mm x 3.5 mm x 1.65 mm body	SOT223

## 7. Marking

Table 4. Marking codes

Type number	Marking code
BSP52	BSP52

## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions		Min	Max	Unit
$V_{CB0}$	collector-base voltage	open emitter		-	90	V
$V_{CES}$	collector-emitter voltage	base short-circuited to emitter		-	80	V
$V_{EBO}$	emitter-base voltage	open collector		-	5	V
$I_C$	collector current			-	1	A
$I_{CM}$	peak collector current			-	2	A
$I_{Blim}$	limiting base current			-	100	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	-	1.25	W
$T_j$	junction temperature			-	150	°C
$T_{amb}$	ambient temperature			-65	150	°C
$T_{stg}$	storage temperature			-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1]	-	-	96	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	17	K/W

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

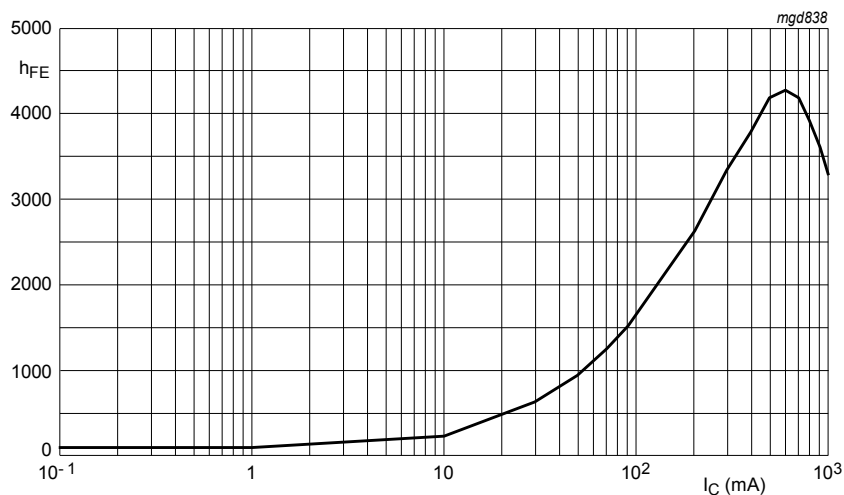
## 10. Characteristics

**Table 7. Characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\text{ }\mu\text{A}; I_E = 0\text{ A}$	90	-	-	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 2\text{ mA}; V_{BE} = 0\text{ V}$	80	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_C = 0\text{ A}; I_E = 100\text{ }\mu\text{A}$	5	-	-	V
$I_{CES}$	collector-emitter cut-off current	$V_{BE} = 0\text{ V}; V_{CE} = 80\text{ V}$	-	-	50	nA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 4\text{ V}; I_C = 0\text{ A}$	-	-	50	nA
$h_{FE}$	DC current gain	$V_{CE} = 10\text{ V}; I_C = 150\text{ mA}$	[1]	1000	-	-
		$V_{CE} = 10\text{ V}; I_C = 500\text{ mA}$	[1]	2000	-	-
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 500\text{ mA}; I_B = 0.5\text{ mA}; T_j = 150\text{ °C}$	-	-	1.3	V
			-	-	1.3	V
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 500\text{ mA}; I_B = 0.5\text{ mA}$	-	-	1.9	V
$t_{on}$	turn-on time	$I_C = 500\text{ mA}; I_{B(on)} = 0.5\text{ mA}; I_{B(off)} = -0.5\text{ mA}$	-	500	-	ns
$t_{off}$	turn-off time		-	1300	-	ns
$f_T$	transition frequency	$V_{CE} = 5\text{ V}; I_C = 500\text{ mA}; f = 100\text{ MHz}$	-	200	-	MHz

[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .



$V_{CE} = 10\text{ V}$

**Fig. 1. DC current gain; typical values**

### 11. Test information

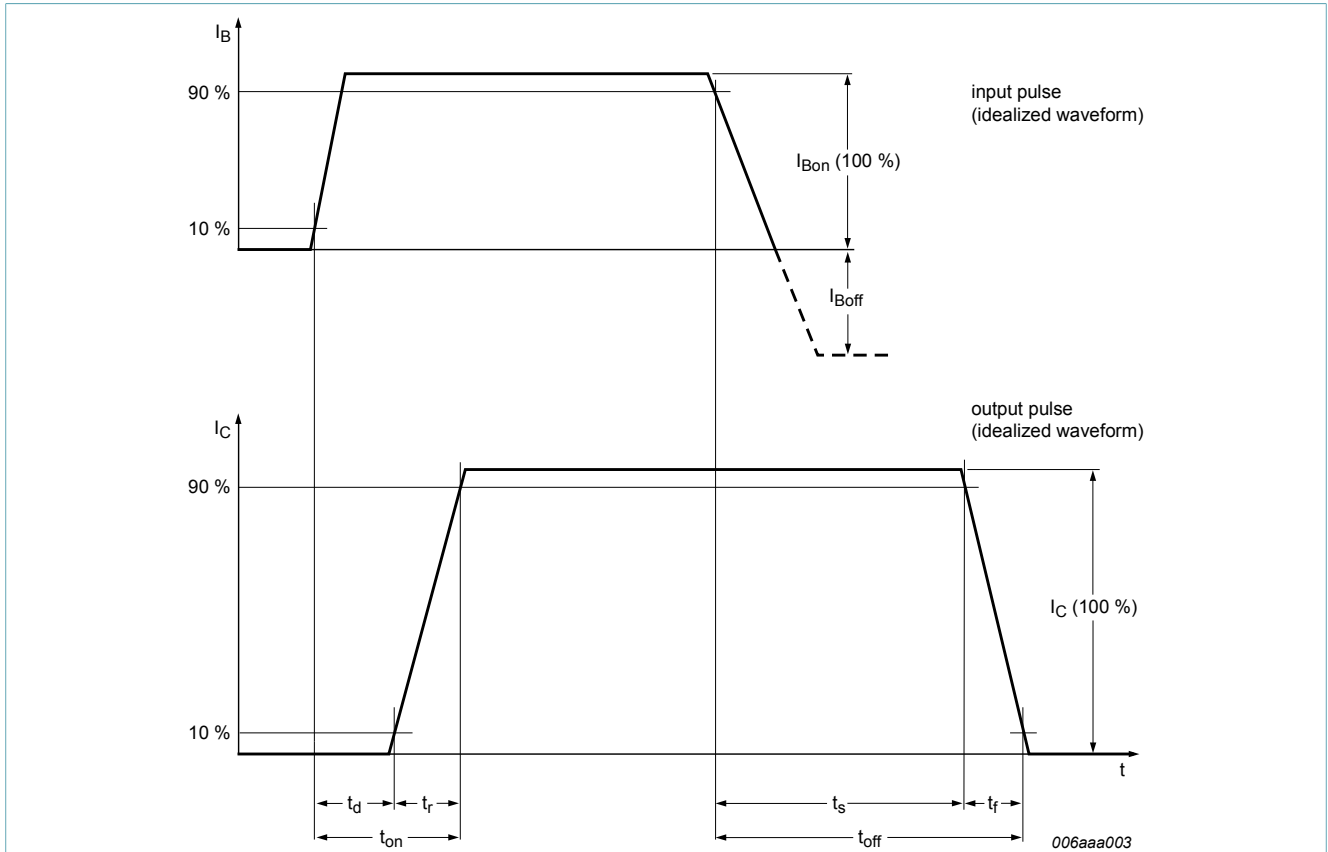


Fig. 2. Transistor switching time definition

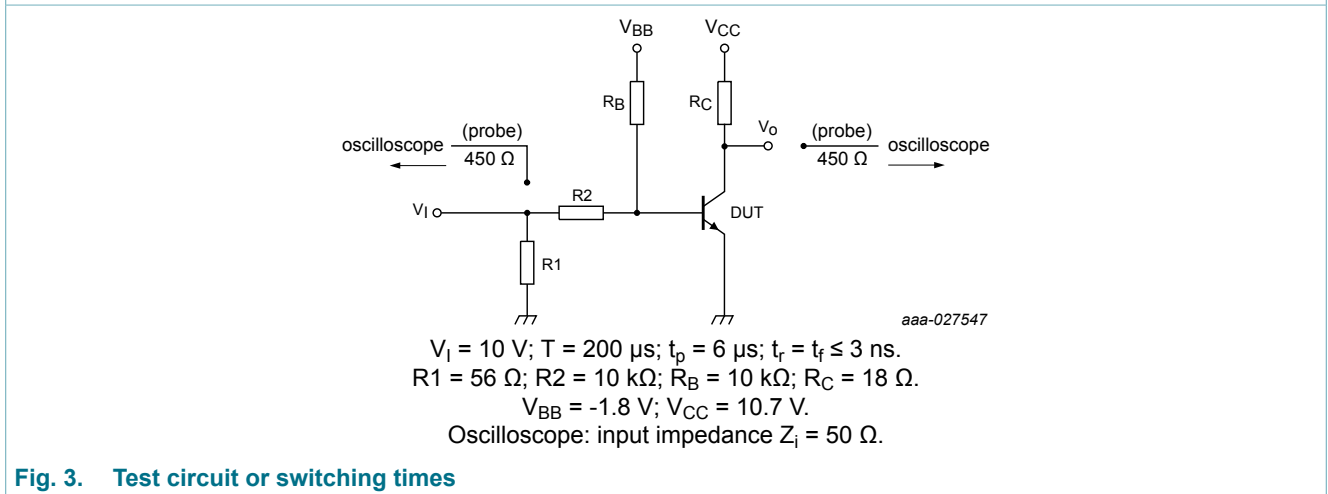


Fig. 3. Test circuit or switching times

### 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

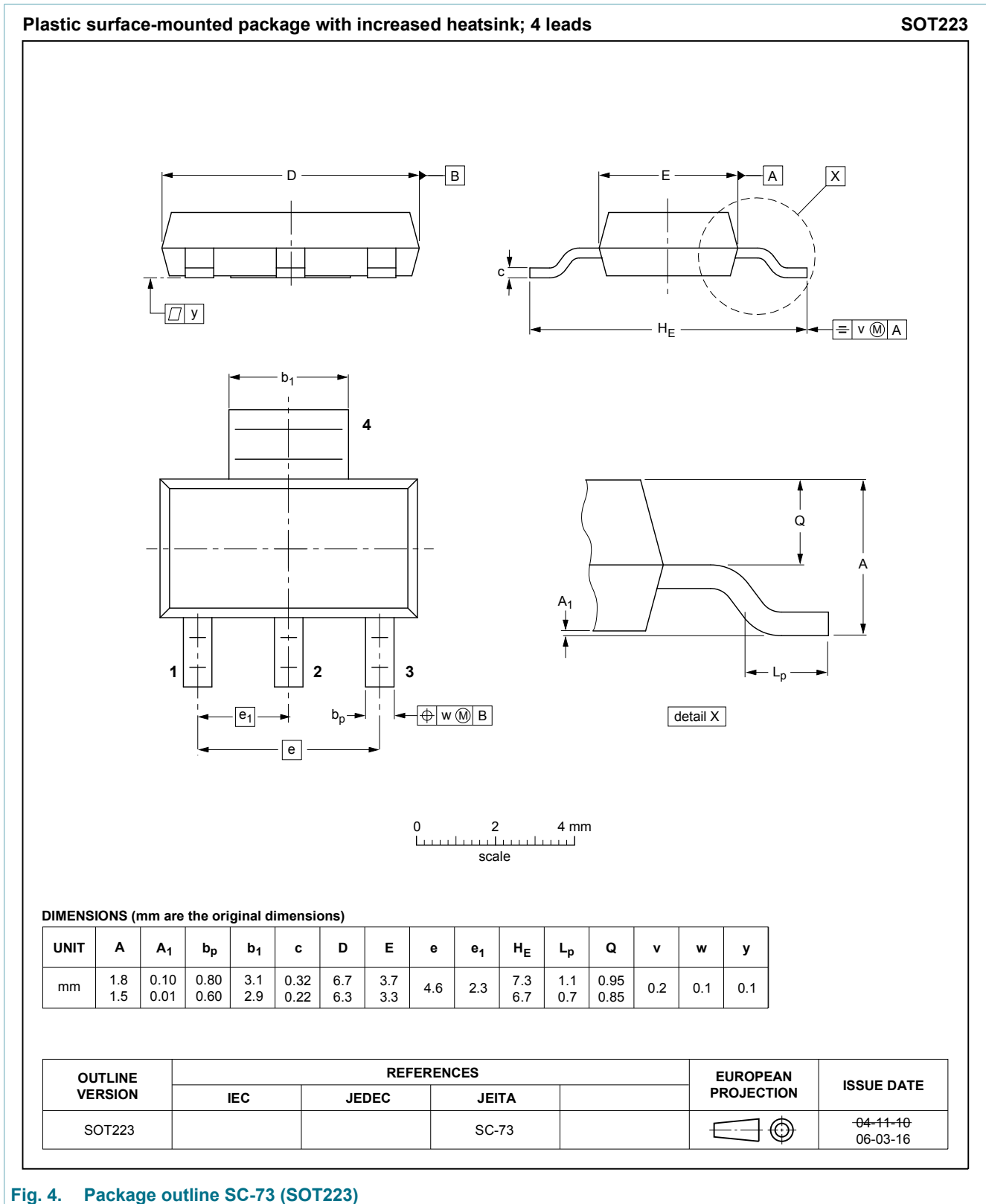


Fig. 4. Package outline SC-73 (SOT223)

### 13. Soldering

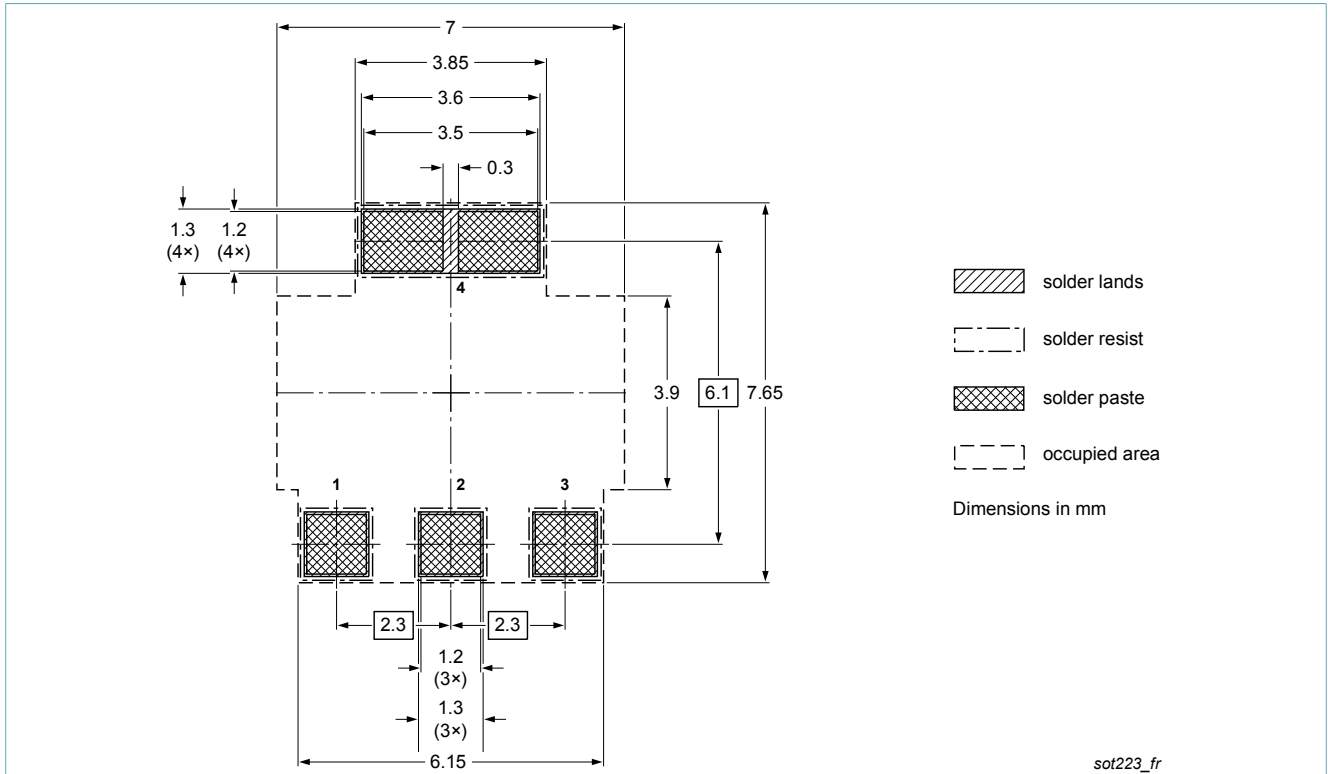


Fig. 5. Reflow soldering footprint for SC-73 (SOT223)

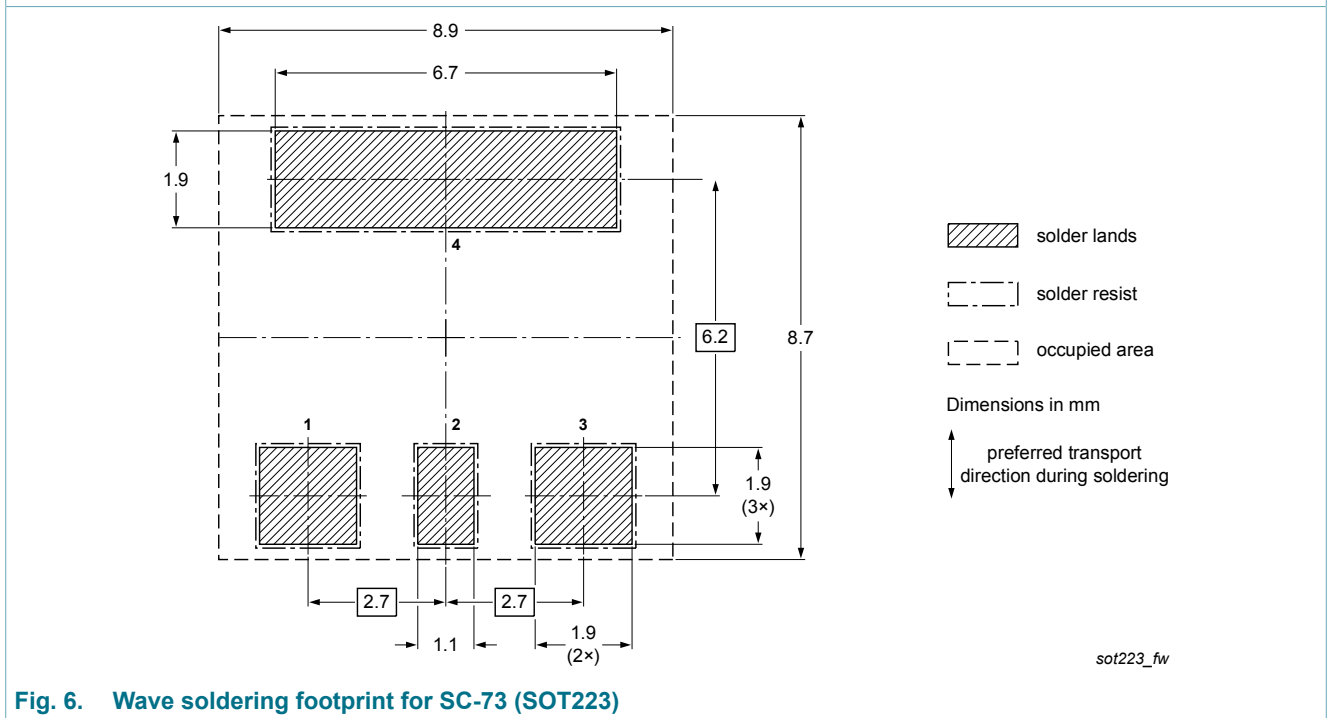


Fig. 6. Wave soldering footprint for SC-73 (SOT223)

## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BSP52 v.3	20180223	Product data sheet	-	19990423
Modifications:	<ul style="list-style-type: none"> <li>• The products is AEC-Q101 qualified.</li> <li>• Family data sheet is transformed to single data sheet.</li> <li>• Quick reference data added.</li> <li>• Limiting values and characteristics: new parameters added.</li> <li>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
BSP50_51_52 v.2	19990423	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.
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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