



# BCP69

20 V, 1 A PNP medium power transistor

Rev. 06 — 2 December 2008

Product data sheet

## 1. Product profile

### 1.1 General description

PNP medium power transistor in a Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number <sup>[1]</sup>	Package		Package configuration
	NXP	JEITA	
BCP69	SOT223	SC-73	medium power
BCP69-16			
BCP69-16/DG			
BCP69-16/IN			
BCP69-25			

[1] /DG: halogen-free

### 1.2 Features

- High current
- Three current gain selections
- 1.4 W total power dissipation
- Medium power SMD plastic package

### 1.3 Applications

- Linear voltage regulators
- High-side switches
- Supply line switches
- MOSFET drivers
- Audio preamplifier

### 1.4 Quick reference data

Table 2. Quick reference data

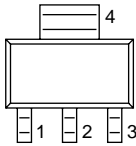
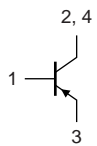
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CE0}$	collector-emitter voltage	open base	-	-	-20	V
$I_C$	collector current		-	-	-1	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	-2	A

**Table 2. Quick reference data ...continued**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$h_{FE}$	DC current gain	$V_{CE} = -1 \text{ V};$ $I_C = -500 \text{ mA}$				
			BCP69	85	-	375
			BCP69-16 BCP69-16/DG	100	-	250
			BCP69-16/IN	140	-	230
			BCP69-25	160	-	375

## 2. Pinning information

**Table 3. Pinning**

Pin	Description	Simplified outline	Graphic symbol
1	base		
2	collector		
3	emitter		
4	collector		

*sym028*

## 3. Ordering information

**Table 4. Ordering information**

Type number <sup>[1]</sup>	Package		
	Name	Description	Version
BCP69	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223
BCP69-16			
BCP69-16/DG			
BCP69-16/IN			
BCP69-25			

[1] /DG: halogen-free

## 4. Marking

**Table 5. Marking codes**

Type number <sup>[1]</sup>	Marking code
BCP69	BCP69
BCP69-16	BCP69/16
BCP69-16/DG	BCP69-16D
BCP69-16/IN	69-16N
BCP69-25	BCP69/25

[1] /DG: halogen-free

## 5. Limiting values

**Table 6. Limiting values**

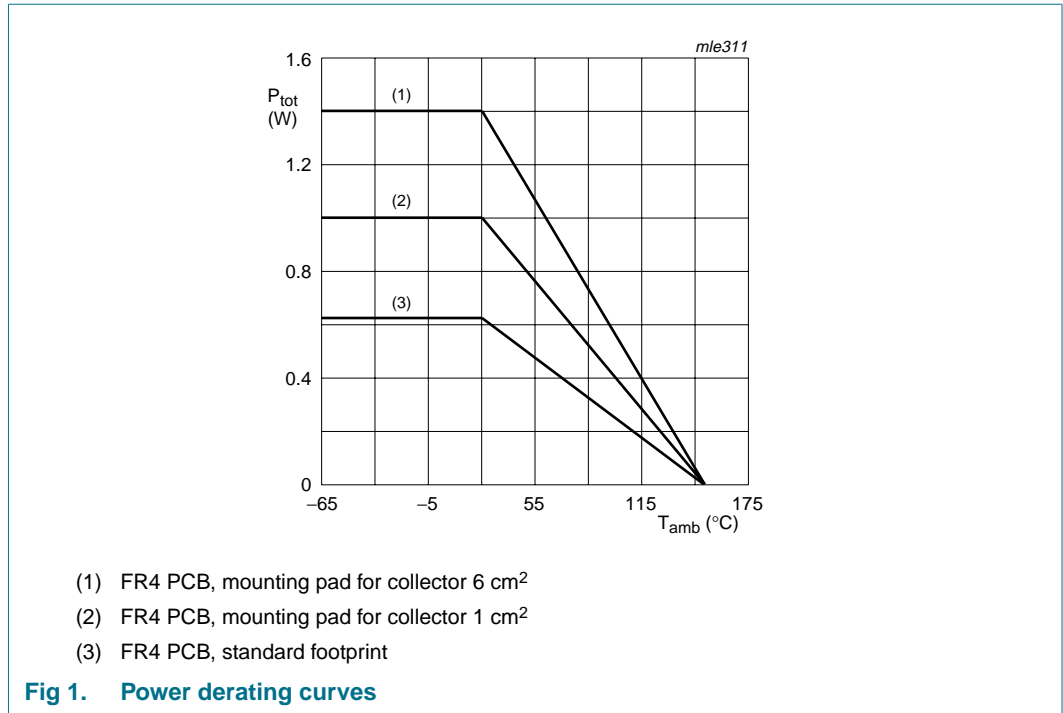
*In accordance with the Absolute Maximum Rating System (IEC 60134).*

Symbol	Parameter	Conditions	Min	Max	Unit	
$V_{CBO}$	collector-base voltage	open emitter	-	-32	V	
$V_{CEO}$	collector-emitter voltage	open base	-	-20	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	
$I_{BM}$	peak base current	single pulse; $t_p \leq 1$ ms	-	-200	mA	
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	0.625	W
			[2]	-	1	W
			[3]	-	1.4	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 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>.



## 6. Thermal characteristics

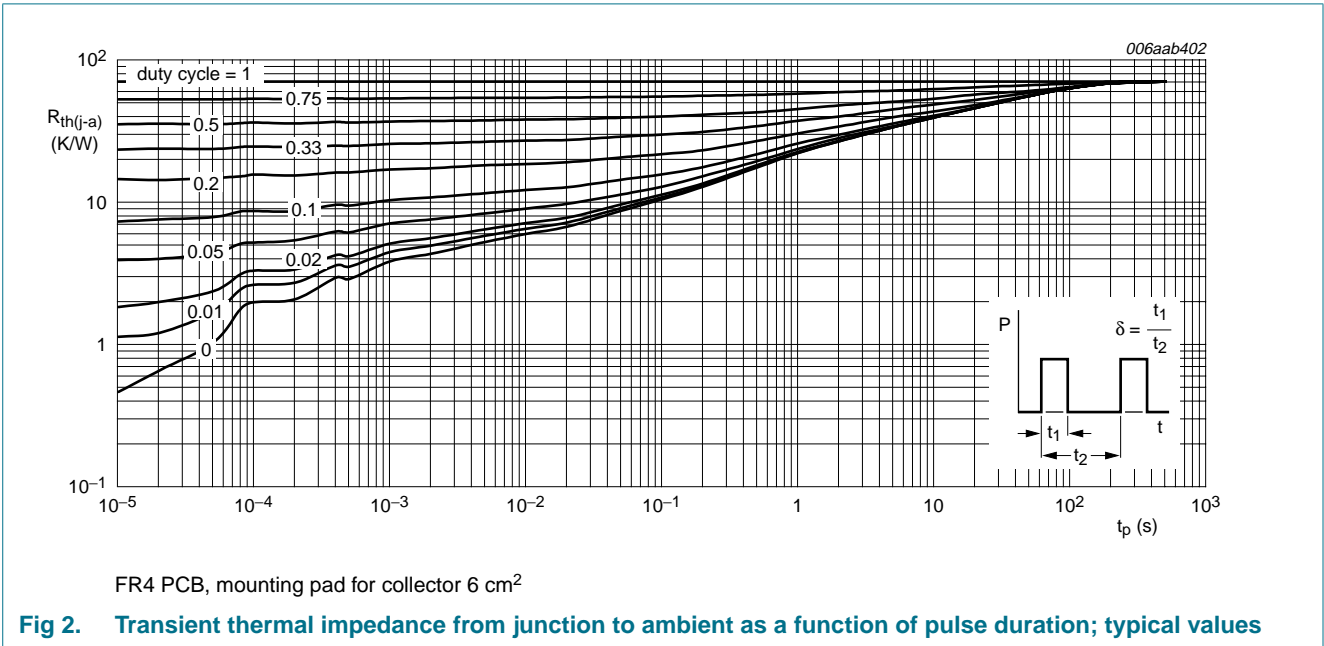
**Table 7. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	200	K/W
			[2]	-	-	125	K/W
			[3]	-	-	89	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	15	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>.

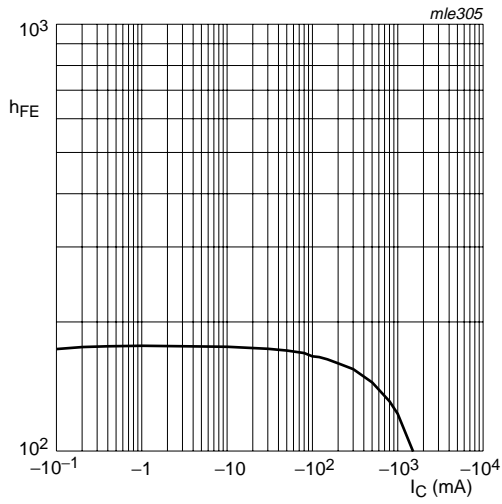


## 7. Characteristics

**Table 8. Characteristics**

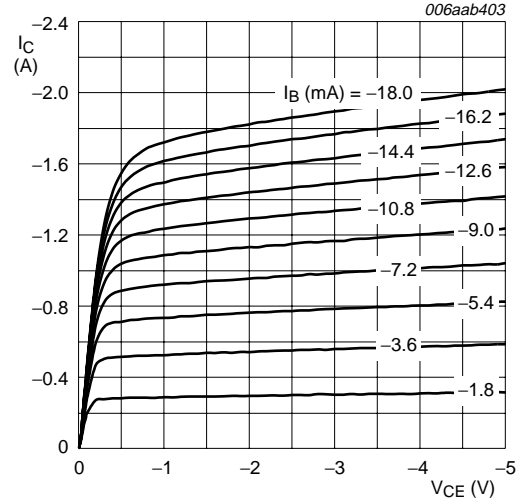
$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -25\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA
		$V_{CB} = -25\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	-10	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-100	nA
$h_{FE}$	DC current gain					
	BCP69	$V_{CE} = -10\text{ V}; I_C = -5\text{ mA}$	50	-	-	
		$V_{CE} = -1\text{ V}; I_C = -500\text{ mA}$	85	-	375	
		$V_{CE} = -1\text{ V}; I_C = -1\text{ A}$	60	-	-	
	BCP69-16 BCP69-16/DG	$V_{CE} = -1\text{ V}; I_C = -500\text{ mA}$	100	-	250	
	BCP69-16/IN	$V_{CE} = -1\text{ V}; I_C = -500\text{ mA}$	140	-	230	
BCP69-25	$V_{CE} = -1\text{ V}; I_C = -500\text{ mA}$	160	-	375		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -1\text{ A}; I_B = -100\text{ mA}$	-	-	-500	mV
$V_{BE}$	base-emitter voltage	$V_{CE} = -10\text{ V}; I_C = -5\text{ mA}$	-	-	-700	mV
		$V_{CE} = -1\text{ V}; I_C = -1\text{ A}$	-	-	-1	V
$C_C$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	-	28	-	pF
$f_T$	transition frequency	$V_{CE} = -5\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}$	40	140	-	MHz



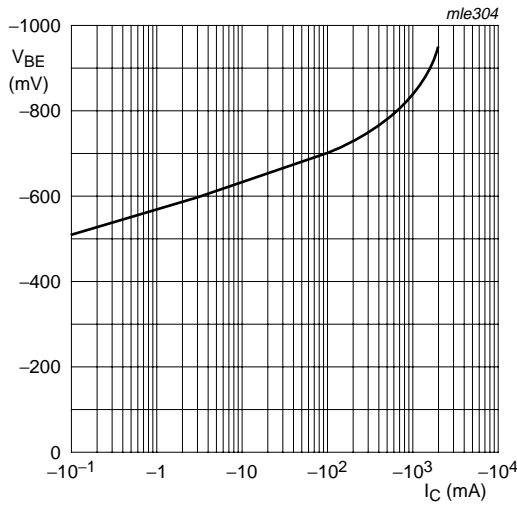
$V_{CE} = -1\text{ V}$

**Fig 3. BCP69-16: DC current gain as a function of collector current; typical values**



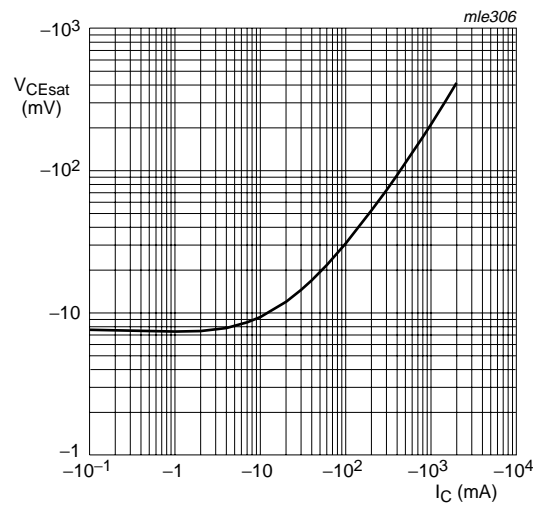
$T_{amb} = 25\text{ }^{\circ}\text{C}$

**Fig 4. BCP69-16: Collector current as a function of collector-emitter voltage; typical values**



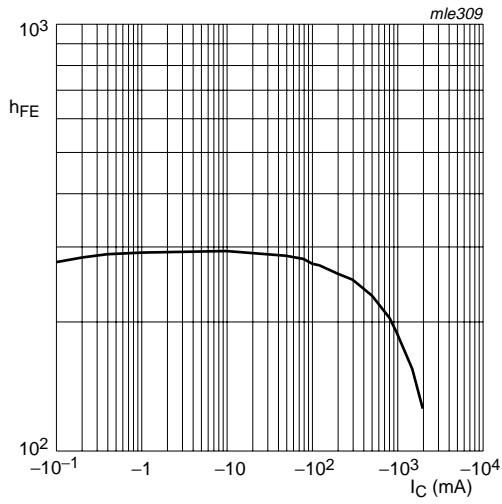
$V_{CE} = -1\text{ V}$

**Fig 5. BCP69-16: Base-emitter voltage as a function of collector current; typical values**



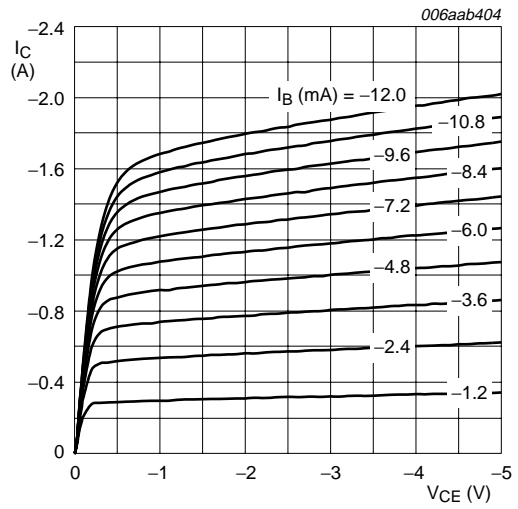
$I_C/I_B = 10$

**Fig 6. BCP69-16: Collector-emitter saturation voltage as a function of collector current; typical values**



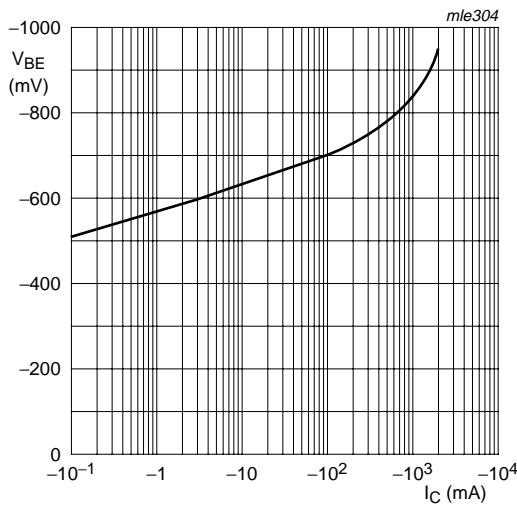
$V_{CE} = -1 \text{ V}$

**Fig 7. BCP69-25: DC current gain as a function of collector current; typical values**



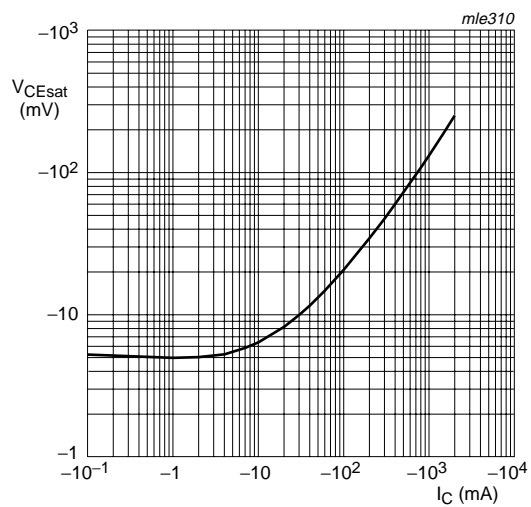
$T_{amb} = 25 \text{ }^\circ\text{C}$

**Fig 8. BCP69-25: Collector current as a function of collector-emitter voltage; typical values**



$V_{CE} = -1 \text{ V}$

**Fig 9. BCP69-25: Base-emitter voltage as a function of collector current; typical values**

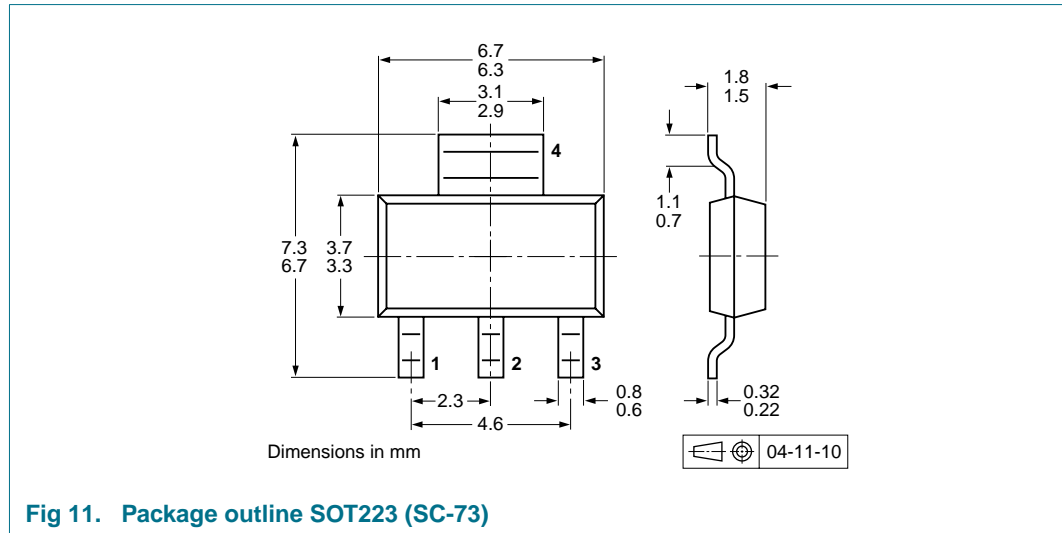


$I_C/I_B = 10$

**Fig 10. BCP69-25: Collector-emitter saturation voltage as a function of collector current; typical values**



## 8. Package outline



## 9. Packing information

**Table 9. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

Type number <sup>[2]</sup>	Package	Description	Packing quantity	
			1000	4000
BCP69	SOT223	8 mm pitch, 12 mm tape and reel	-115	-135
BCP69-16				
BCP69-16/DG				
BCP69-16/IN				
BCP69-25				

[1] For further information and the availability of packing methods, see [Section 13](#).

[2] /DG: halogen-free

10. Soldering

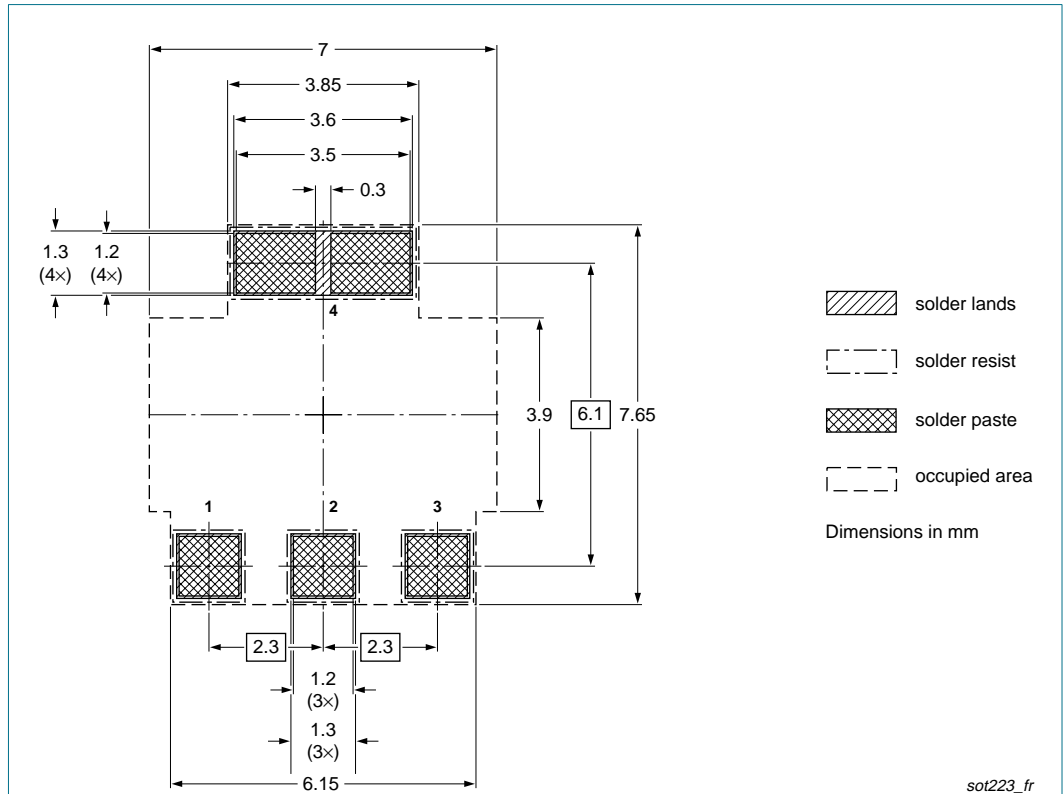


Fig 12. Reflow soldering footprint SOT223 (SC-73)

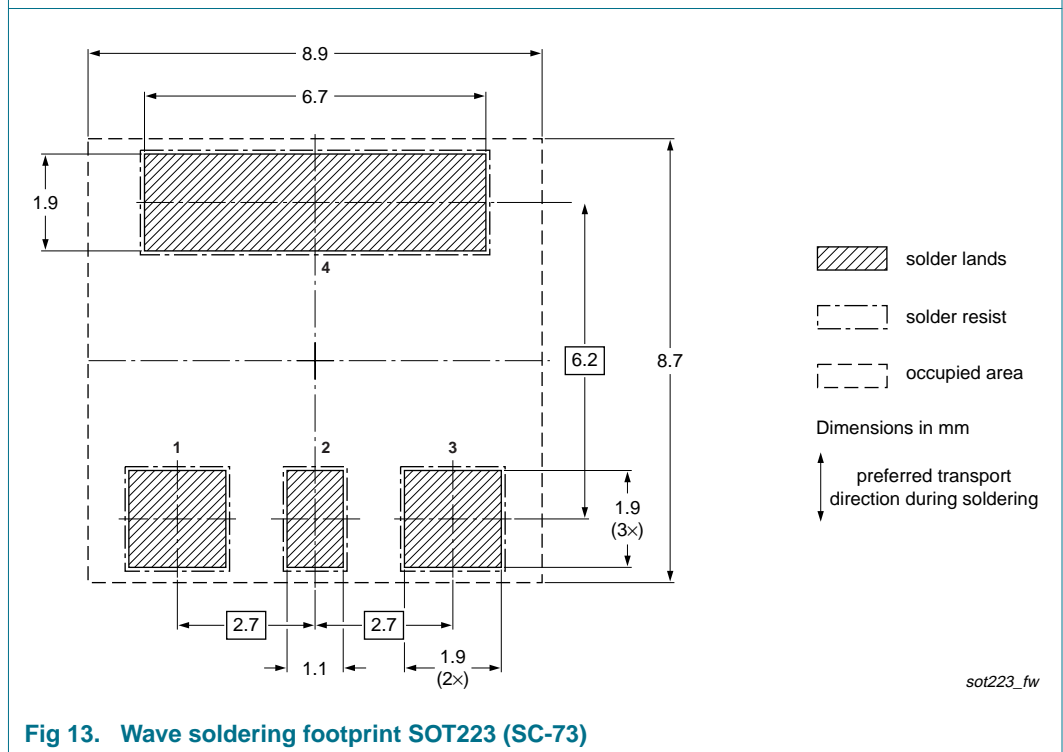


Fig 13. Wave soldering footprint SOT223 (SC-73)

## 11. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP69_6	20081202	Product data sheet	-	BCP69_5
Modifications:	<ul style="list-style-type: none"> <li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• <a href="#">Table 1 “Product overview”</a>: enhanced</li> <li>• <a href="#">Table 4 “Ordering information”</a>: enhanced</li> <li>• <a href="#">Figure 2, 4 and 8</a>: updated</li> <li>• <a href="#">Figure 11</a>: superseded by minimized package outline drawing</li> <li>• <a href="#">Section 9 “Packing information”</a>: added</li> <li>• <a href="#">Section 10 “Soldering”</a>: enhanced</li> <li>• <a href="#">Section 12 “Legal information”</a>: updated</li> </ul>			
BCP69_5	20031125	Product specification	-	BCP69_4
BCP69_4	20021115	Product specification	-	BCP69_3
BCP69_3	19990408	Product specification	-	BCP69_CNV_2

## 12. Legal information

### 12.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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 URL <http://www.nxp.com>.

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