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[1]	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_{CEO}	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 V; I_C = –500 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		

3. Ordering information

Table 4. Ordering information

Type number[1]	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

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4. Marking

Table 5. Marking codes

Type number[1]	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^2.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

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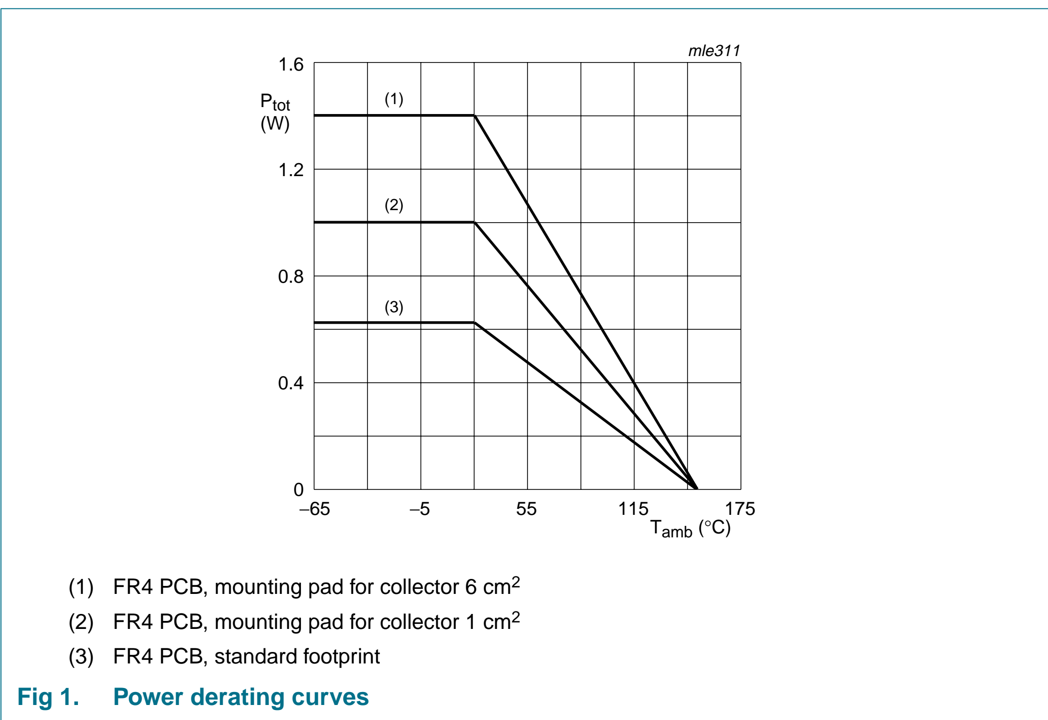

(1) FR4 PCB, mounting pad for collector 6 cm^2

(2) FR4 PCB, mounting pad for collector 1 cm^2

(3) FR4 PCB, standard footprint

Fig 1. Power derating curves

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^2.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm^2.

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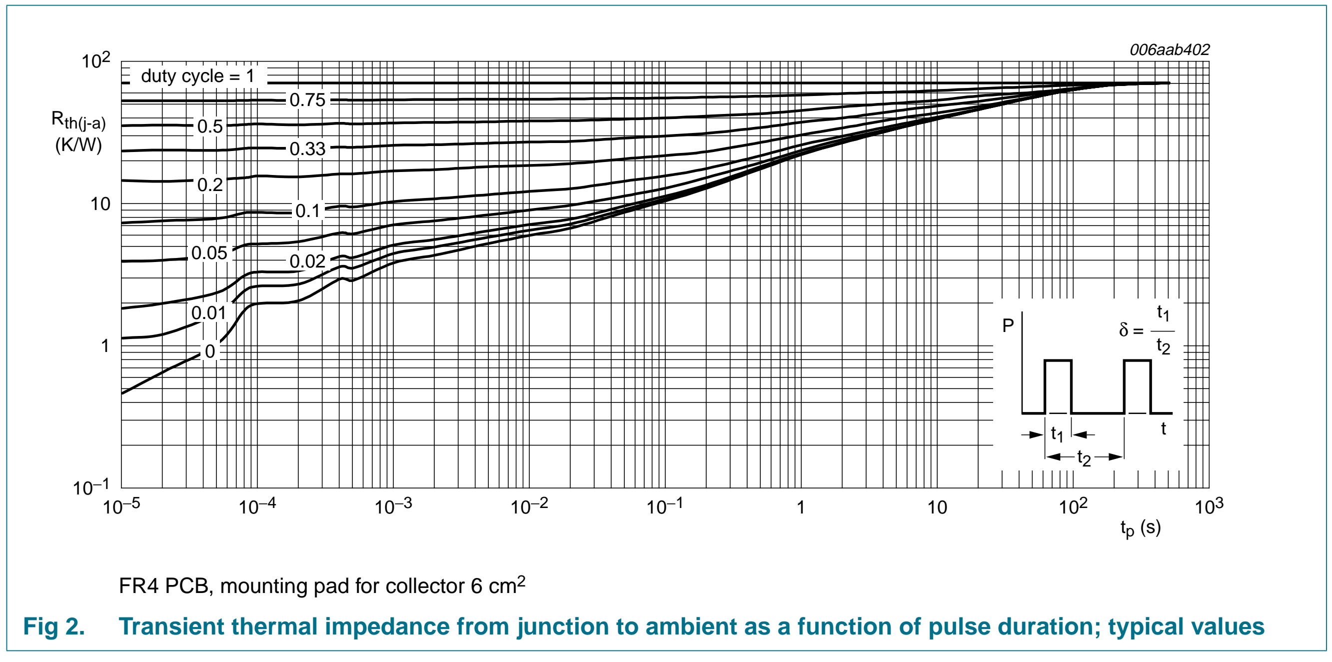

FR4 PCB, mounting pad for collector 6 cm^2

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

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7. Characteristics

Table 8. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = –25 V; I_E = 0 A	-	-	–100	nA
		V_{CB} = –25 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					
	BCP69	V_{CE} = –10 V; I_C = –5 mA	50	-	-	
		V_{CE} = –1 V; I_C = –500 mA	85	-	375	
		V_{CE} = –1 V; I_C = –1 A	60	-	-	
	BCP69-16 BCP69-16/DG	V_{CE} = –1 V; I_C = –500 mA	100	-	250	
	BCP69-16/IN	V_{CE} = –1 V; I_C = –500 mA	140	-	230	
	BCP69-25	V_{CE} = –1 V; I_C = –500 mA	160	-	375	
V_{CEsat}	collector-emitter saturation voltage	I_C = –1 A; I_B = –100 mA	-	-	–500	mV
V_{BE}	base-emitter voltage	V_{CE} = –10 V; I_C = –5 mA	-	-	–700	mV
		V_{CE} = –1 V; I_C = –1 A	-	-	–1	V
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0 A; f = 1 MHz	-	28	-	pF
f_T	transition frequency	V_{CE} = –5 V; I_C = –50 mA; f = 100 MHz	40	140	-	MHz

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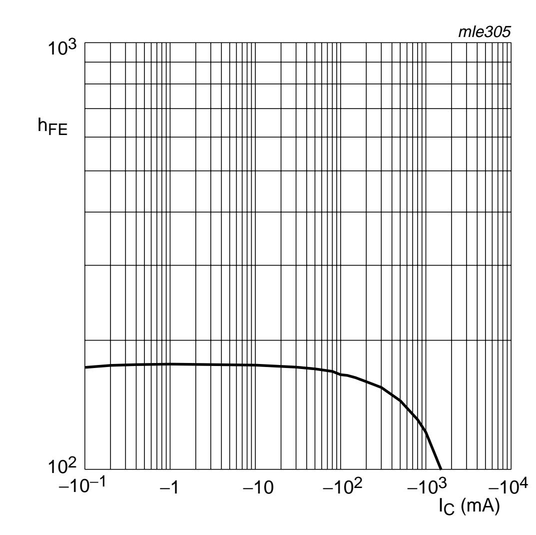
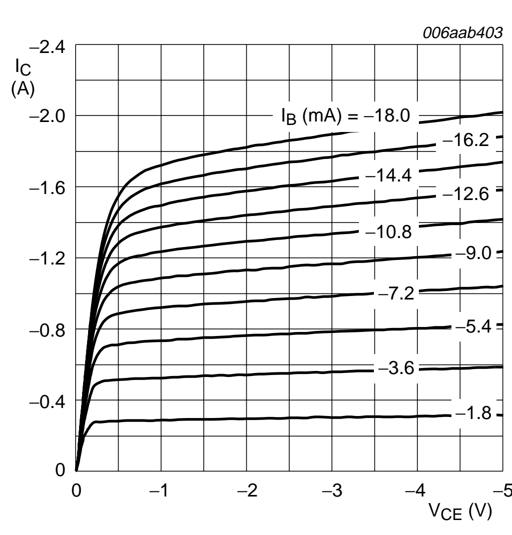


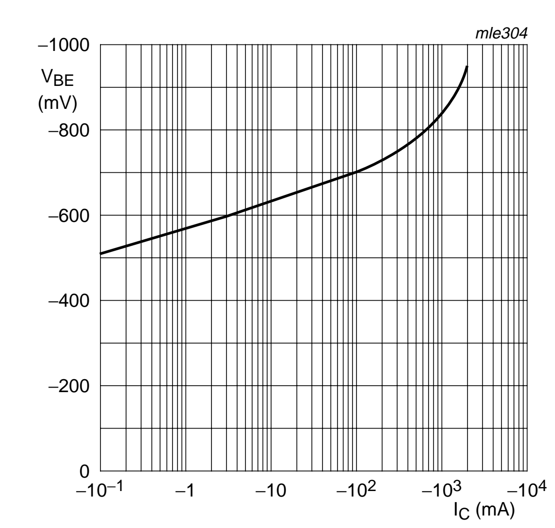
$V_{CE} = -1$ V

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



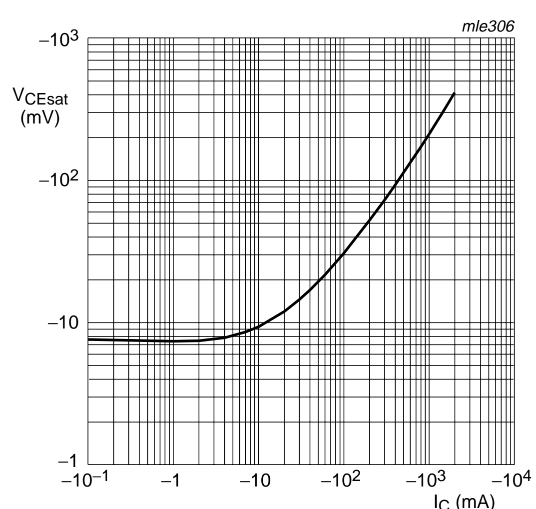
$T_{amb} = 25$ °C

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



$V_{CE} = -1$ 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

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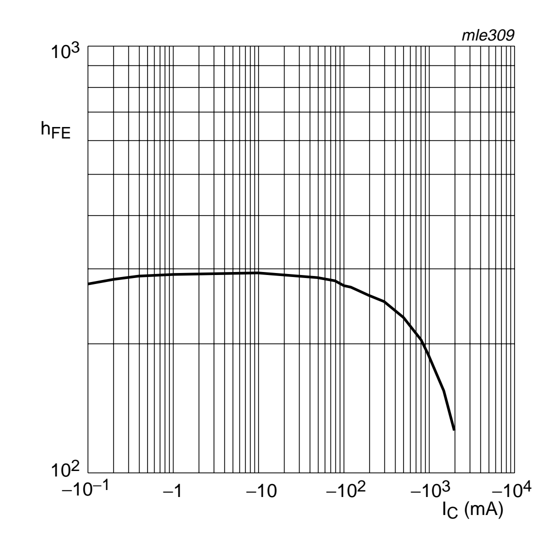
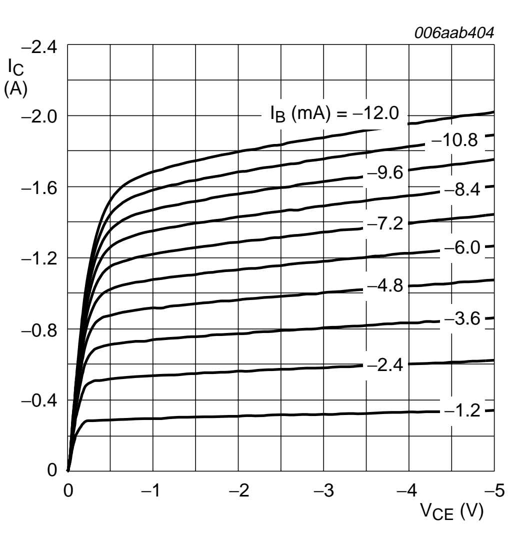


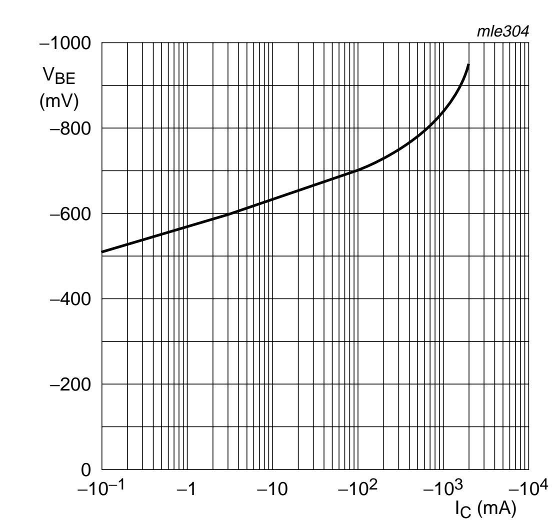
$V_{CE} = -1$ V

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



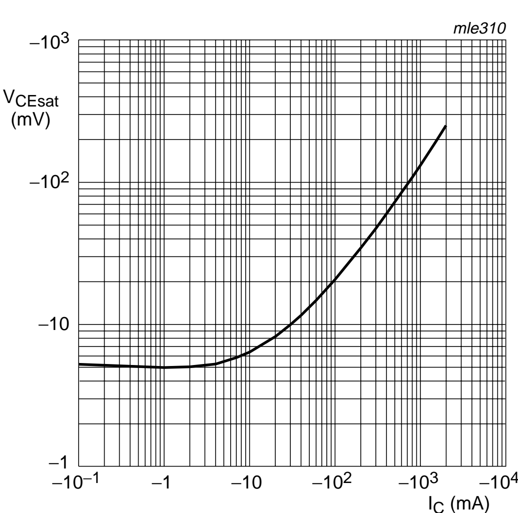
$T_{amb} = 25$ °C

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



$V_{CE} = -1$ 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

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8. Package outline

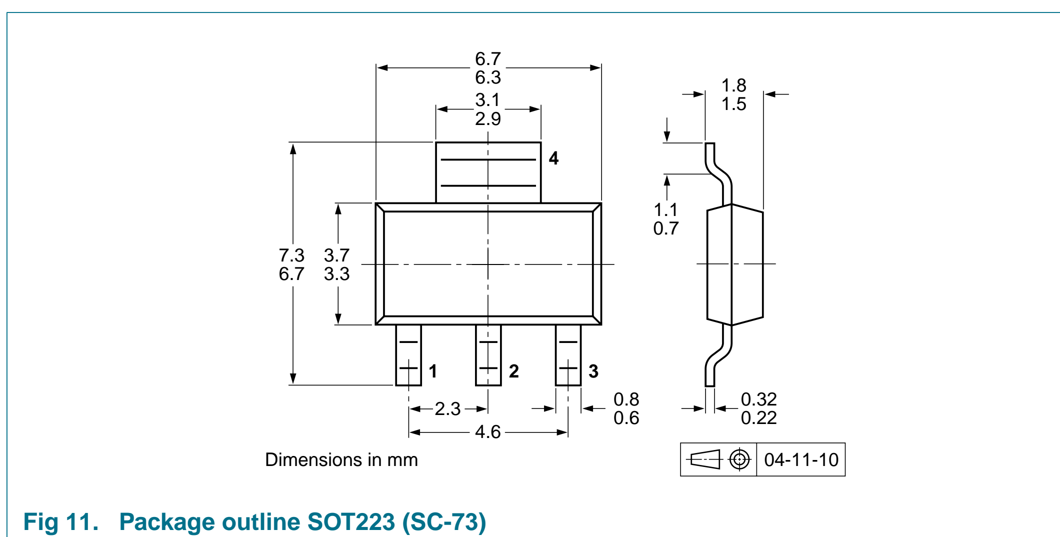

Fig 11. Package outline SOT223 (SC-73)

9. Packing information

Table 9. Packing methods

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

Type number[2]	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

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10. Soldering

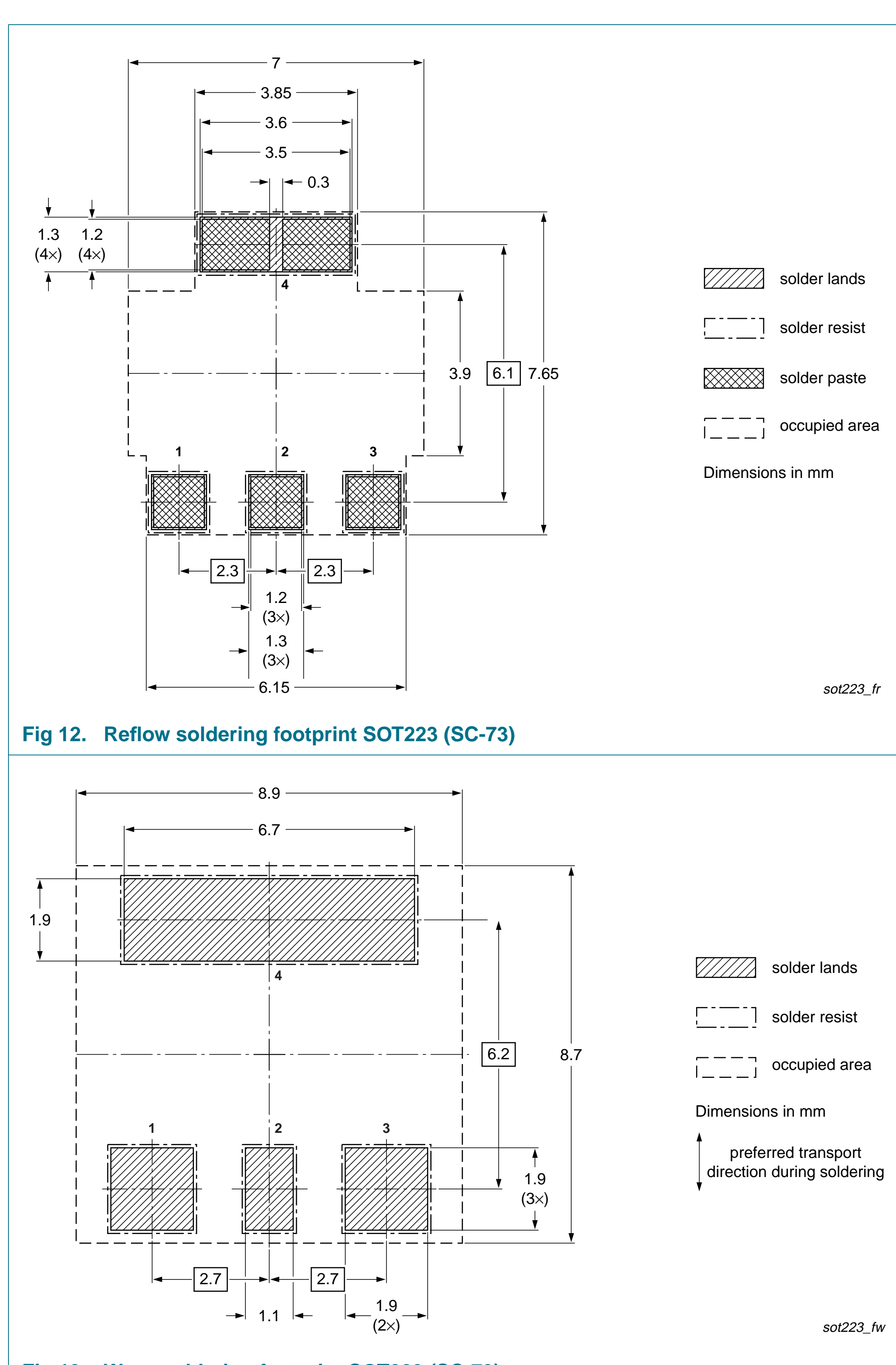

Fig 12. Reflow soldering footprint SOT223 (SC-73)

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

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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:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Table 1 “Product overview”: enhanced • Table 4 “Ordering information”: enhanced • Figure 2, 4 and 8: updated • Figure 11: superseded by minimized package outline drawing • Section 9 “Packing information”: added • Section 10 “Soldering”: enhanced • Section 12 “Legal information”: updated			
BCP69_5	20031125	Product specification	-	BCP69_4
BCP69_4	20021115	Product specification	-	BCP69_3
BCP69_3	19990408	Product specification	-	BCP69_CNV_2

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12. Legal information

12.1 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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