

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

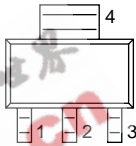
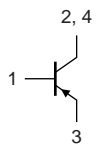
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-20	V
I_C	collector current		-	-	-1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	-2	A

Table 2. Quick reference data ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
h_{FE}	DC current gain	$V_{CE} = -1\text{ V};$ $I_C = -500\text{ mA}$				
	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		

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

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

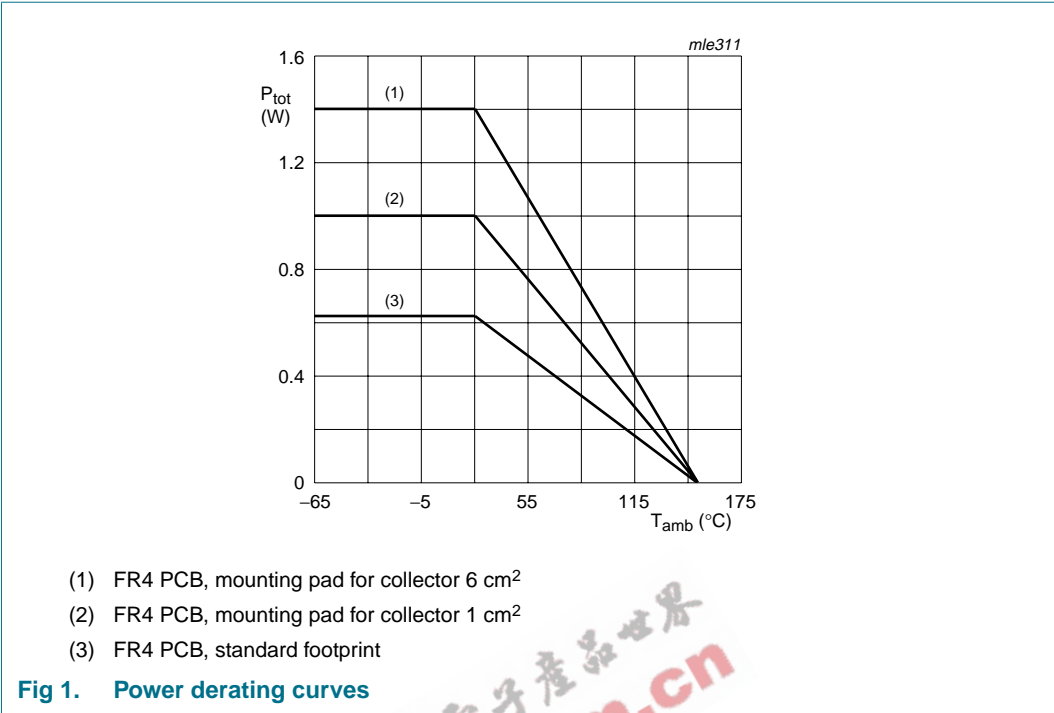
In accordance with the Absolute Maximum Rating System (IEC 60134).

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 cm².

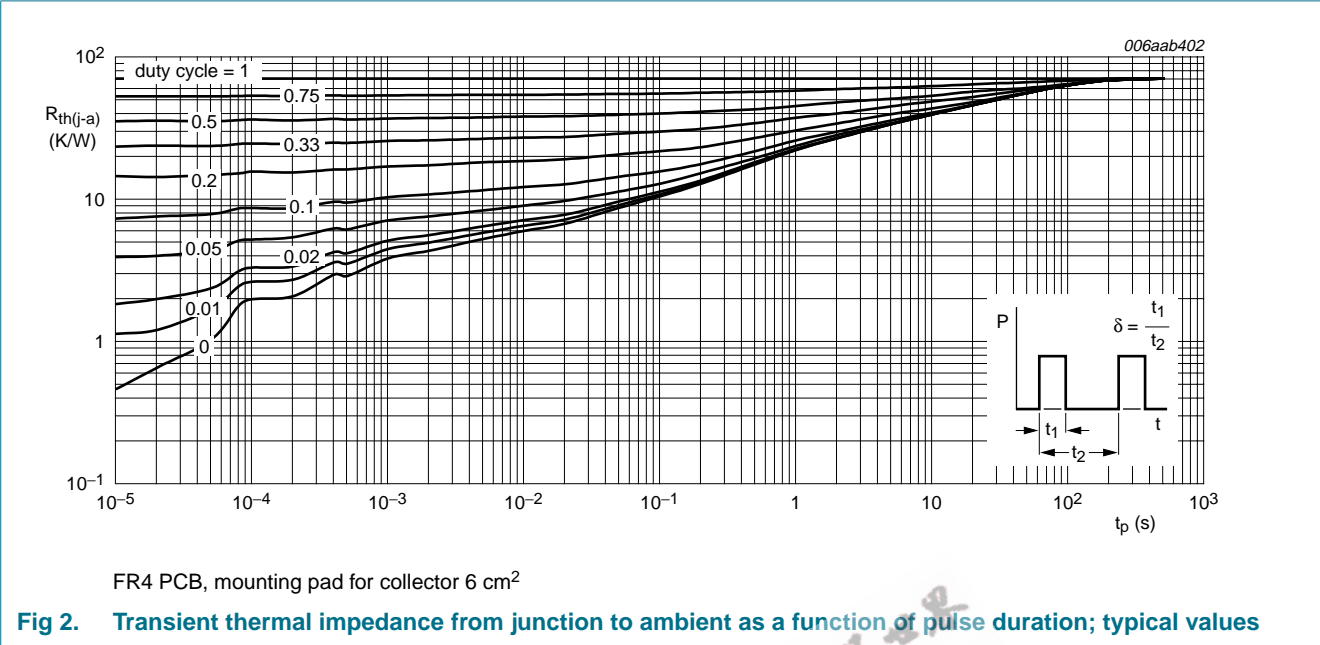
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².



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

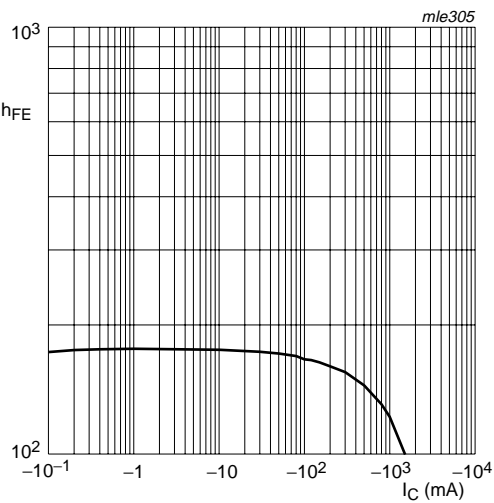


7. Characteristics

Table 8. Characteristics

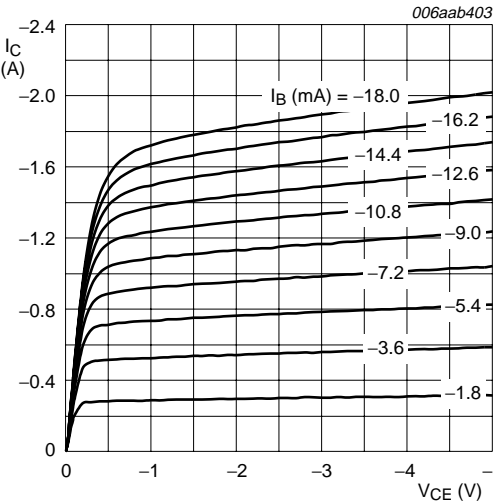
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

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	μA
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	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -1\text{ A}; I_B = -100\text{ mA}$	-	-	-500	mV
		$V_{CE} = -10\text{ V}; I_C = -5\text{ mA}$	-	-	-700	mV
V_{BE}	base-emitter voltage	$V_{CE} = -1\text{ V}; I_C = -1\text{ A}$	-	-	-1	V
		$V_{CB} = -10\text{ V}; I_E = I_B = 0\text{ A}; f = 1\text{ MHz}$	-	28	-	pF
C_c	collector capacitance					
f_T	transition frequency	$V_{CE} = -5\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}$	40	140	-	MHz



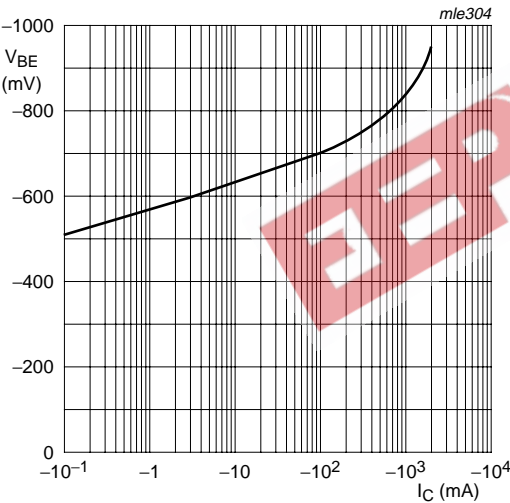
$V_{CE} = -1\text{ V}$

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



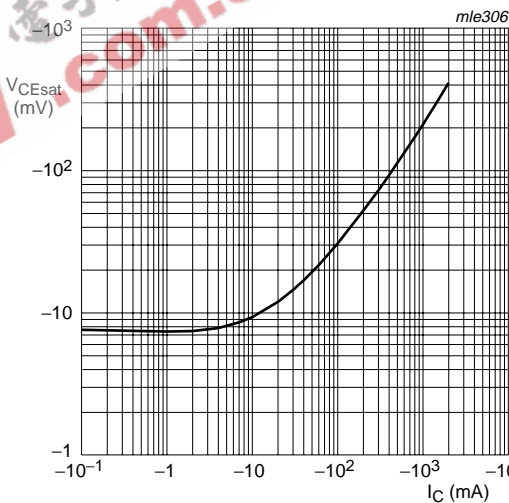
$T_{amb} = 25\text{ }^{\circ}\text{C}$

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



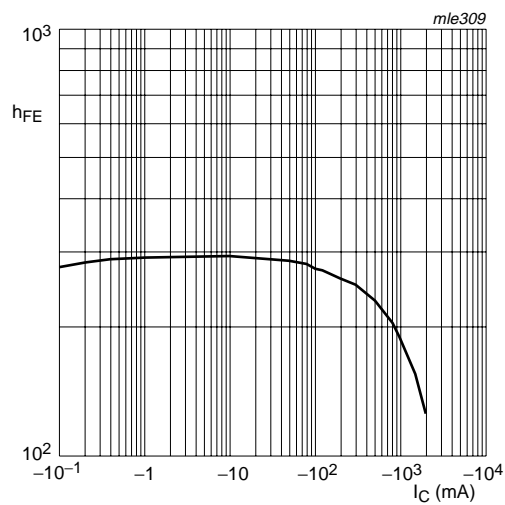
$V_{CE} = -1\text{ V}$

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



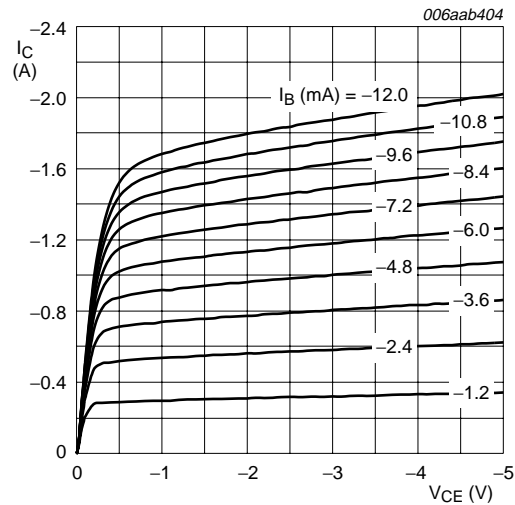
$I_C/I_B = 10$

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



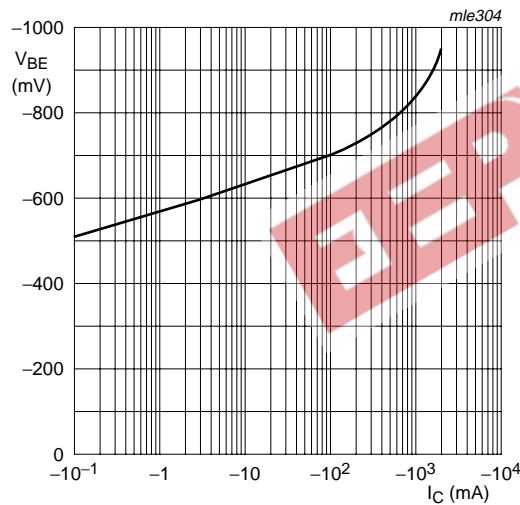
$V_{CE} = -1\text{ V}$

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



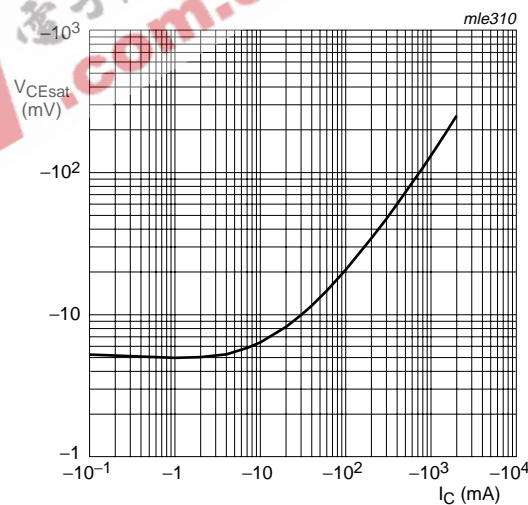
$T_{amb} = 25\text{ }^{\circ}\text{C}$

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



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

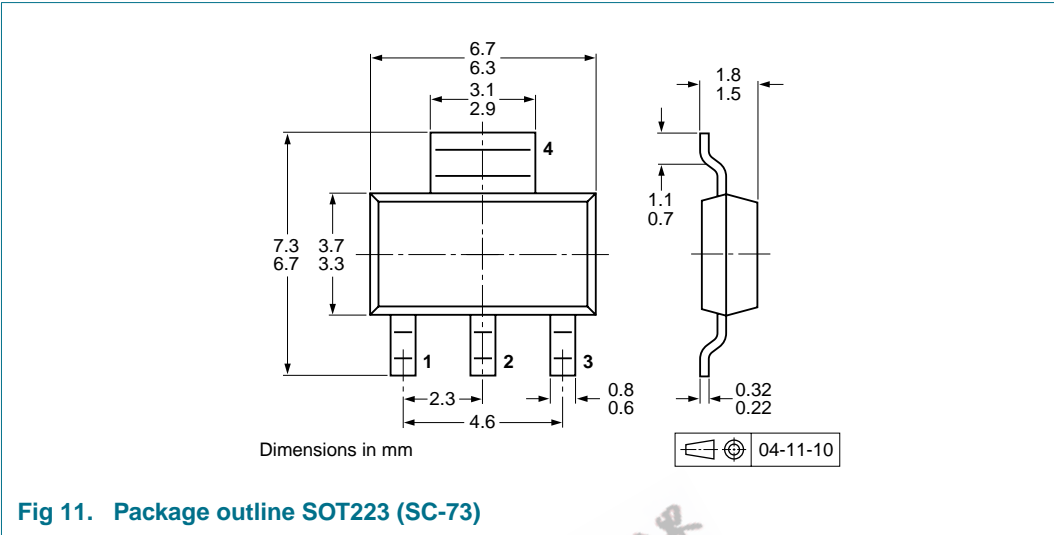
Fig 9. BCP69-25: Base-emitter voltage as a function of collector current; typical values



$I_C/I_B = 10$

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.^[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

10. Soldering

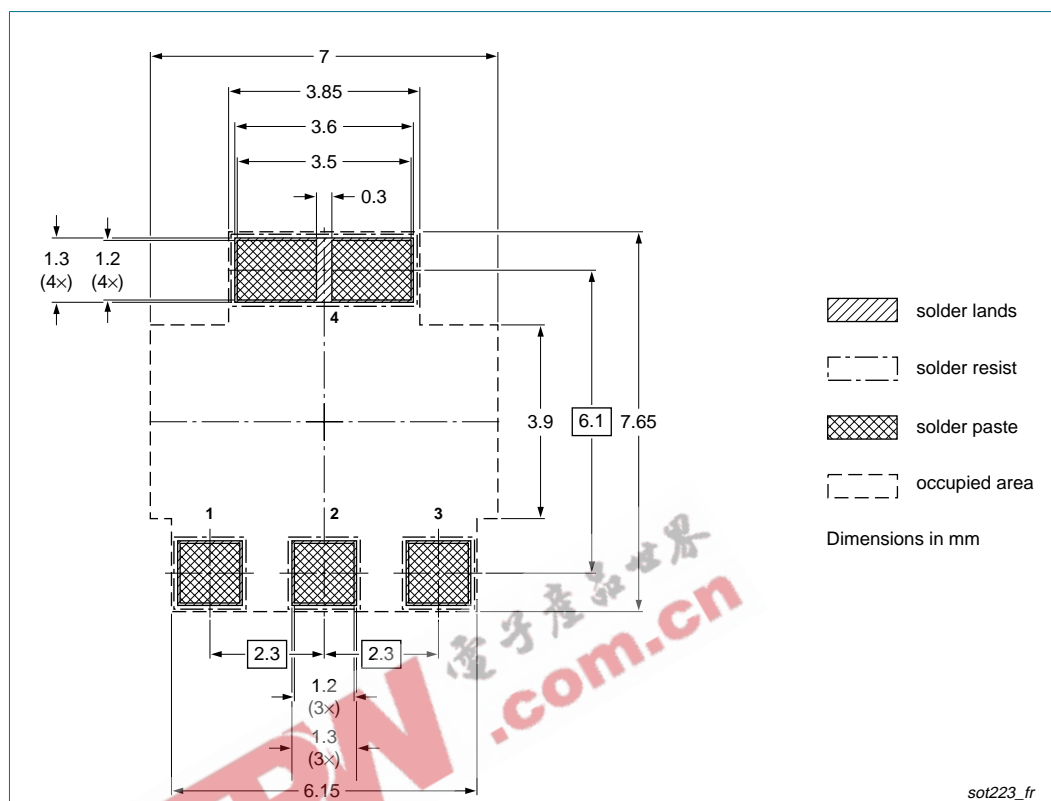


Fig 12. Reflow soldering footprint SOT223 (SC-73)

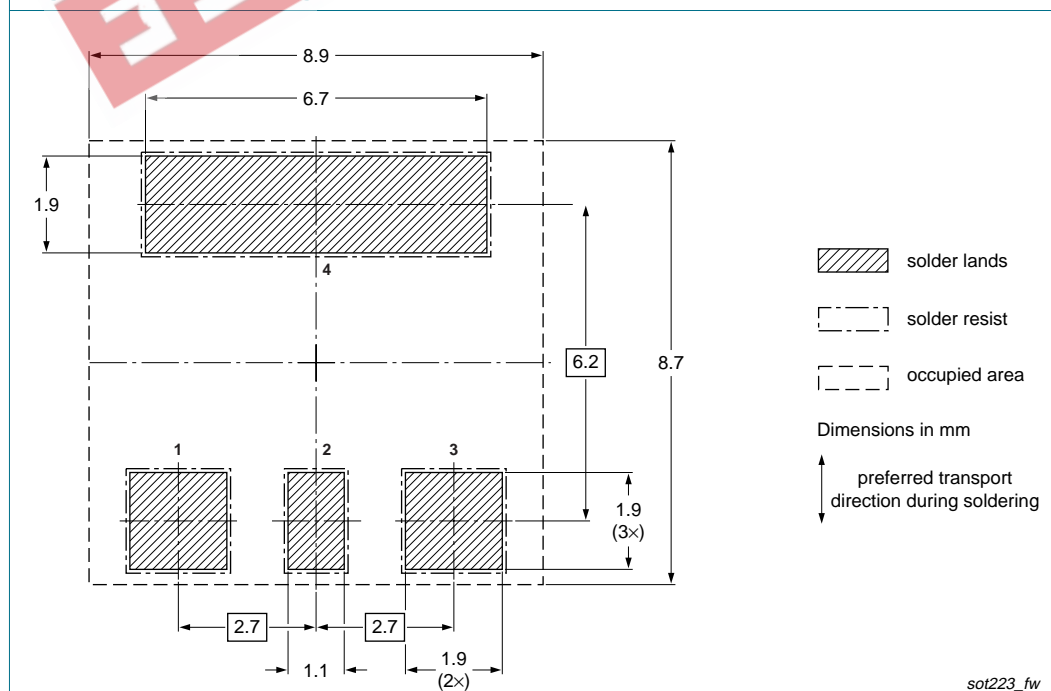


Fig 13. Wave soldering footprint SOT223 (SC-73)

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">• 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

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".

[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>.

12.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

12.3 Disclaimers

General — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental

damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

Terms and conditions of sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

12.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

13. Contact information

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: salesaddresses@nxp.com

14. Contents

1	Product profile	1
1.1	General description	1
1.2	Features	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
3	Ordering information	2
4	Marking	3
5	Limiting values	3
6	Thermal characteristics	4
7	Characteristics	6
8	Package outline	9
9	Packing information	9
10	Soldering	10
11	Revision history	11
12	Legal information	12
12.1	Data sheet status	12
12.2	Definitions	12
12.3	Disclaimers	12
12.4	Trademarks	12
13	Contact information	12
14	Contents	13

EEPW.com.cn 电子產品世界

founded by

PHILIPS

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© NXP B.V. 2008.

All rights reserved.

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 2 December 2008

Document identifier: BCP69_6