

# BCM61B

NPN/NPN matched double transistor

Rev. 02 — 28 August 2009

Product data sheet

## 1. Product profile

### 1.1 General description

NPN/NPN matched double transistor in a SOT143B small Surface-Mounted Device (SMD) plastic package. Matched version of BCV61.

PNP/PNP equivalent: BCM62B

### 1.2 Features

- Current gain matching

### 1.3 Applications

- Current mirror
- Differential amplifier

### 1.4 Quick reference data

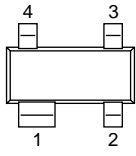
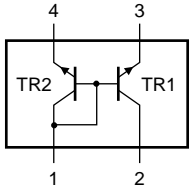
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor TR1</b>						
$V_{CEO}$	collector-emitter voltage	open base	-	-	45	V
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	200	290	450	
<b>Per transistor</b>						
$I_C$	collector current		-	-	100	mA
<b>Per device</b>						
$I_{C1}/I_{E2}$	current matching	$V_{CE1} = 5\text{ V};$ $I_{E2} = -0.5\text{ mA};$ $T_{amb} \leq 25\text{ °C}$	[1] 0.92	1.02	1.12	

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Symbol
1	collector TR2, base TR1 and TR2		
2	collector TR1		
3	emitter TR1		
4	emitter TR2		

*006aaa842*

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
BCM61B	-	plastic surface-mounted package; 4 leads	SOT143B

## 4. Marking

**Table 4. Marking codes**

Type number	Marking code <sup>[1]</sup>
BCM61B	*AC

- [1] \* = -: made in Hong Kong  
 \* = p: made in Hong Kong  
 \* = t: made in Malaysia  
 \* = W: made in China

## 5. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
<b>Per transistor TR1</b>					
$V_{CBO}$	collector-base voltage	open emitter	-	50	V
$V_{CEO}$	collector-emitter voltage	open base	-	45	V
<b>Per transistor</b>					
$V_{EBS}$	emitter-base voltage	$V_{CB} = 0\text{ V}$	-	6	V
$I_C$	collector current		-	100	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1] -	220	mW
<b>Per device</b>					
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1] -	390	mW
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-65	+150	°C
$T_{stg}$	storage temperature		-65	+150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] -	-	568	K/W
<b>Per device</b>						
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] -	-	321	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 7. Characteristics

**Table 7. Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b>Per transistor TR1</b>							
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 30\text{ V};$ $I_E = 0\text{ A}$	-	-	15	nA	
		$V_{CB} = 30\text{ V};$ $I_E = 0\text{ A};$ $T_j = 150\text{ }^{\circ}\text{C}$	-	-	5	$\mu\text{A}$	
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	-	-	100	nA	
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V};$ $I_C = 10\text{ }\mu\text{A}$	-	250	-		
		$V_{CE} = 5\text{ V};$ $I_C = 100\text{ }\mu\text{A}$	100	-	-		
		$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	200	290	450		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10\text{ mA};$ $I_B = 0.5\text{ mA}$	-	50	200	mV	
		$I_C = 100\text{ mA};$ $I_B = 5\text{ mA}$	-	200	400	mV	
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 10\text{ mA};$ $I_B = 0.5\text{ mA}$	[1]	-	760	-	mV
		$I_C = 100\text{ mA};$ $I_B = 5\text{ mA}$	[1]	-	910	-	mV
$V_{BE}$	base-emitter voltage	$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	[2]	610	660	710	mV
		$V_{CE} = 5\text{ V};$ $I_C = 10\text{ mA}$	[2]	-	-	770	mV
$C_c$	collector capacitance	$V_{CB} = 10\text{ V};$ $I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	-	1.5	pF	
$C_e$	emitter capacitance	$V_{EB} = 0.5\text{ V};$ $I_C = i_c = 0\text{ A};$ $f = 1\text{ MHz}$	-	11	-	pF	
$f_T$	transition frequency	$V_{CE} = 5\text{ V};$ $I_C = 10\text{ mA};$ $f = 100\text{ MHz}$	100	250	-	MHz	
NF	noise figure	$V_{CE} = 5\text{ V};$ $I_C = 0.2\text{ mA};$ $R_S = 2\text{ k}\Omega;$ $f = 10\text{ Hz to}$ $15.7\text{ kHz}$	-	2.8	-	dB	
		$V_{CE} = 5\text{ V};$ $I_C = 0.2\text{ mA};$ $R_S = 2\text{ k}\Omega;$ $f = 1\text{ kHz};$ $B = 200\text{ Hz}$	-	3.3	-	dB	

**Table 7. Characteristics ...continued** $T_{amb} = 25\text{ °C}$  unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor TR2</b>						
$V_{EBS}$	emitter-base voltage	$V_{CB} = 0\text{ V};$ $I_E = -250\text{ mA}$	-	-	-1.8	V
		$V_{CB} = 0\text{ V};$ $I_E = -10\text{ }\mu\text{A}$	-400	-	-	mV
<b>Per device</b>						
$I_{C1}/I_{E2}$	current matching	$V_{CE1} = 5\text{ V};$ $I_{E2} = -0.5\text{ mA};$ $T_{amb} \leq 25\text{ °C}$	[3] 0.92	1.02	1.12	
		$V_{CE1} = 5\text{ V};$ $I_{E2} = -0.5\text{ mA};$ $T_{amb} \leq 150\text{ °C}$	[3] 0.93	-	1.13	
		$V_{CE1} = 3\text{ V};$ $I_{E2} = -0.5\text{ mA};$ $T_{amb} \leq 25\text{ °C}$	[3] 0.91	1.01	1.11	
		$V_{CE1} = 1\text{ V};$ $I_{E2} = -0.5\text{ mA};$ $T_{amb} \leq 25\text{ °C}$	[3] 0.9	1	1.1	

[1]  $V_{BEsat}$  decreases by about 1.7 mV/K with increasing temperature.

[2]  $V_{BE}$  decreases by about 2 mV/K with increasing temperature.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

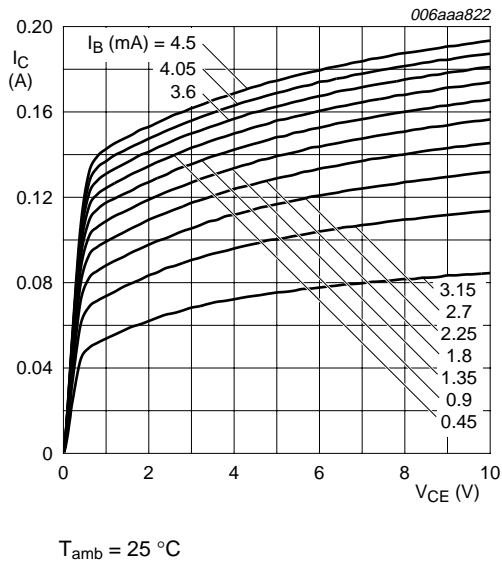


Fig 1. Collector current as a function of collector-emitter voltage; typical values

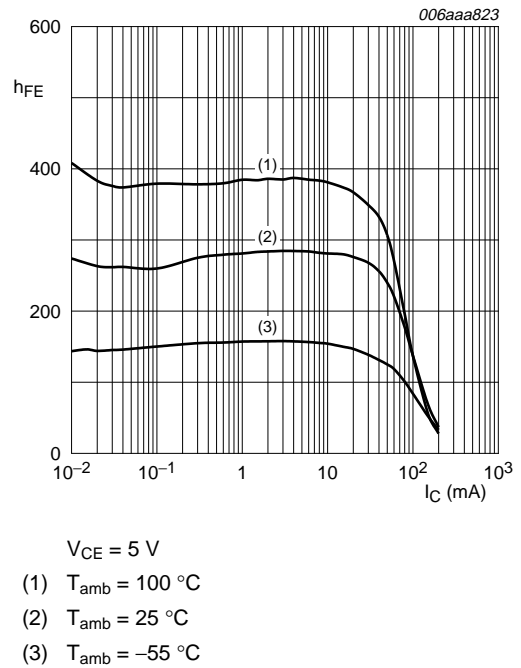


Fig 2. DC current gain as a function of collector current; typical values

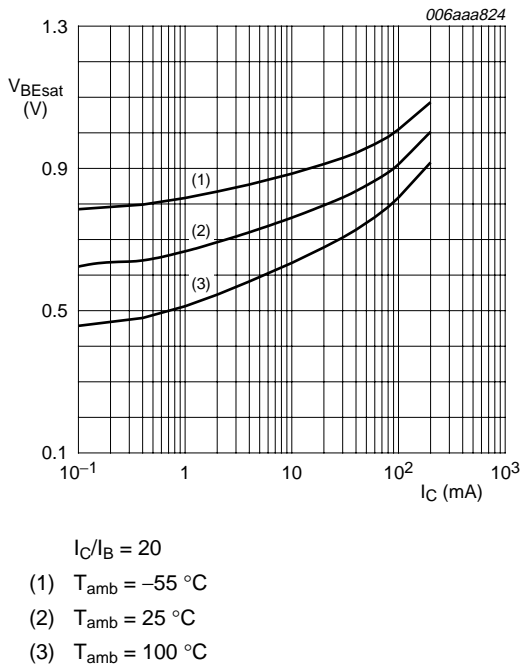


Fig 3. Base-emitter saturation voltage as a function of collector current; typical values

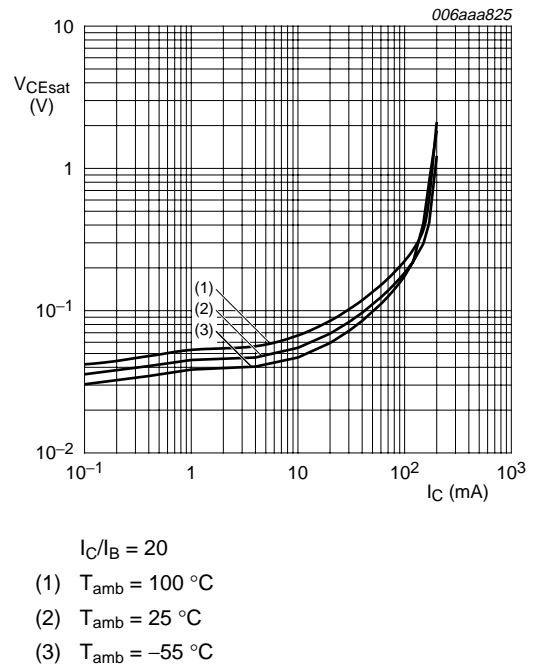
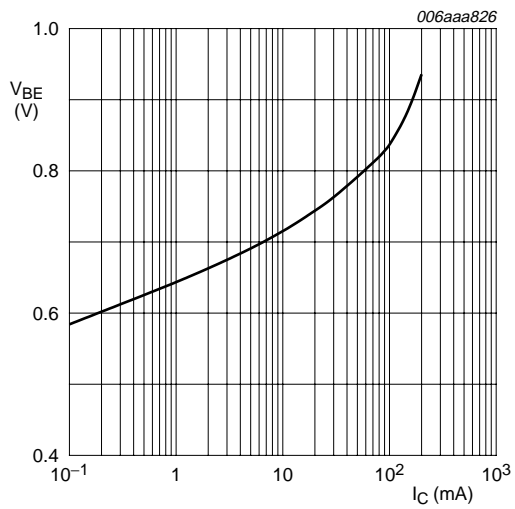
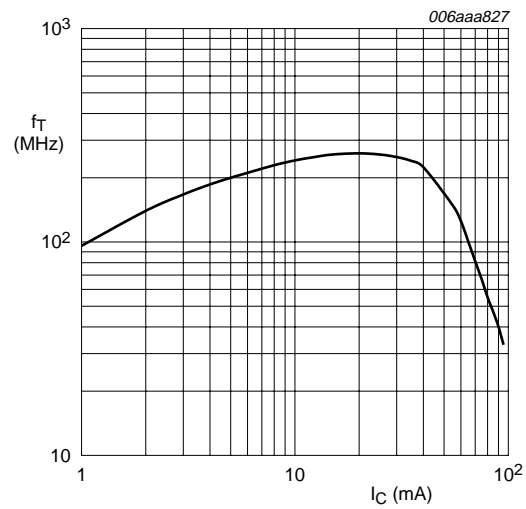


Fig 4. Collector-emitter saturation voltage as a function of collector current; typical values



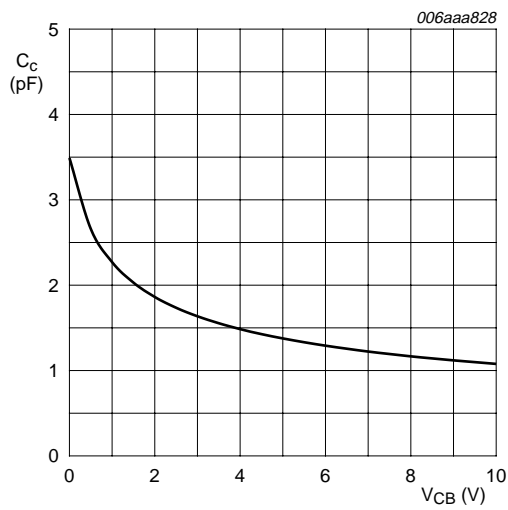
$V_{CE} = 5$  V;  $T_{amb} = 25$  °C

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



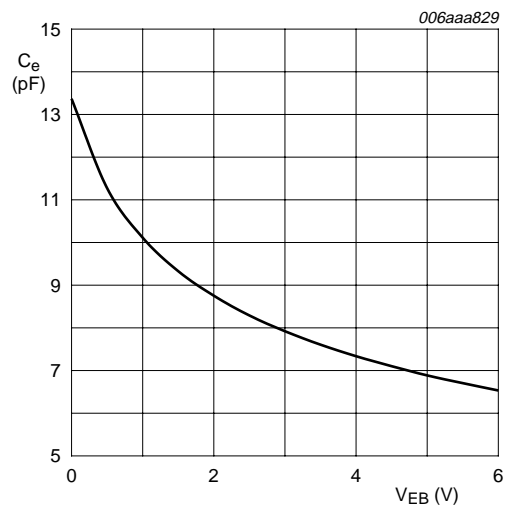
$V_{CE} = 5$  V;  $T_{amb} = 25$  °C

**Fig 6. Transition frequency as a function of collector current; typical values**



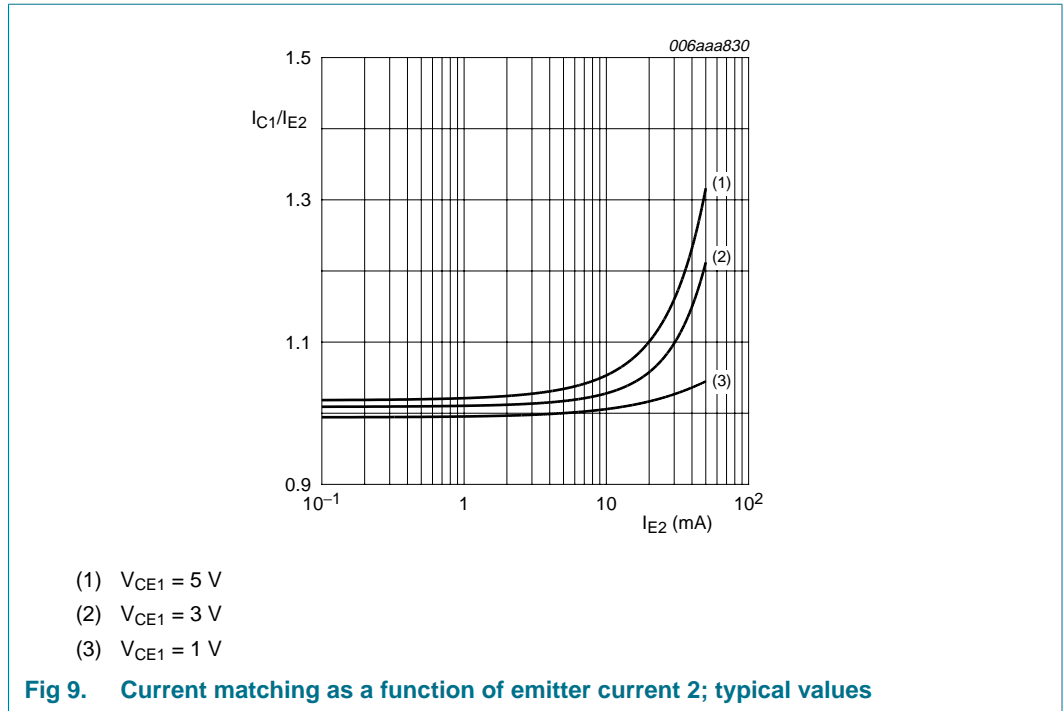
$f = 1$  MHz;  $T_{amb} = 25$  °C

**Fig 7. Collector capacitance as a function of collector-base voltage; typical values**

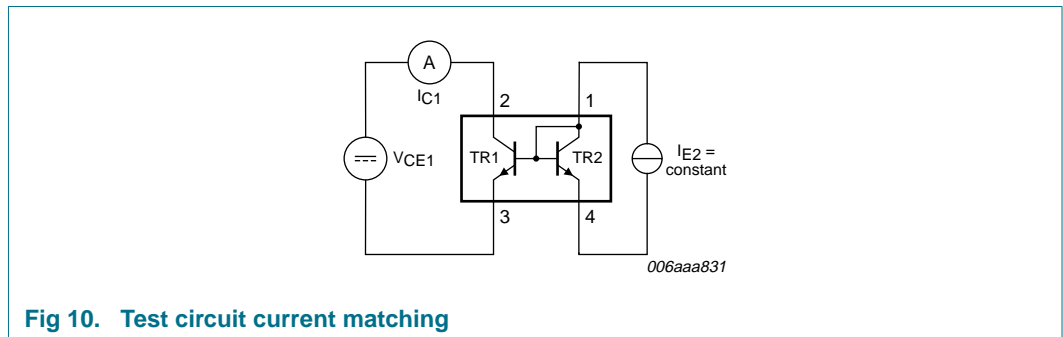


$f = 1$  MHz;  $T_{amb} = 25$  °C

**Fig 8. Emitter capacitance as a function of emitter-base voltage; typical values**

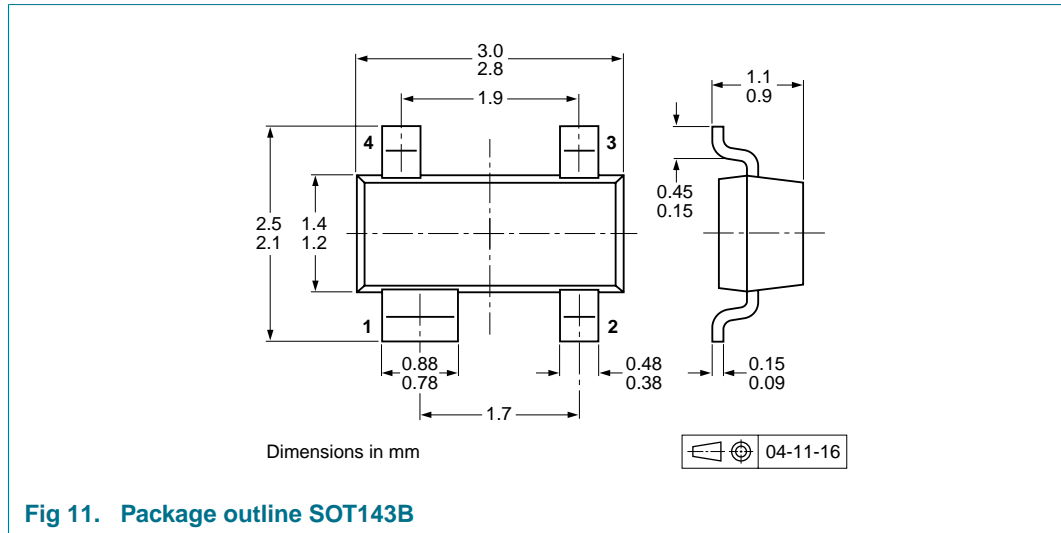


## 8. Test information





## 9. Package outline



## 10. Packing information

**Table 8. Packing methods**

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

Type number	Package	Description	Packing quantity	
			3000	10000
BCM61B	SOT143B	4 mm pitch, 8 mm tape and reel	-215	-235

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering

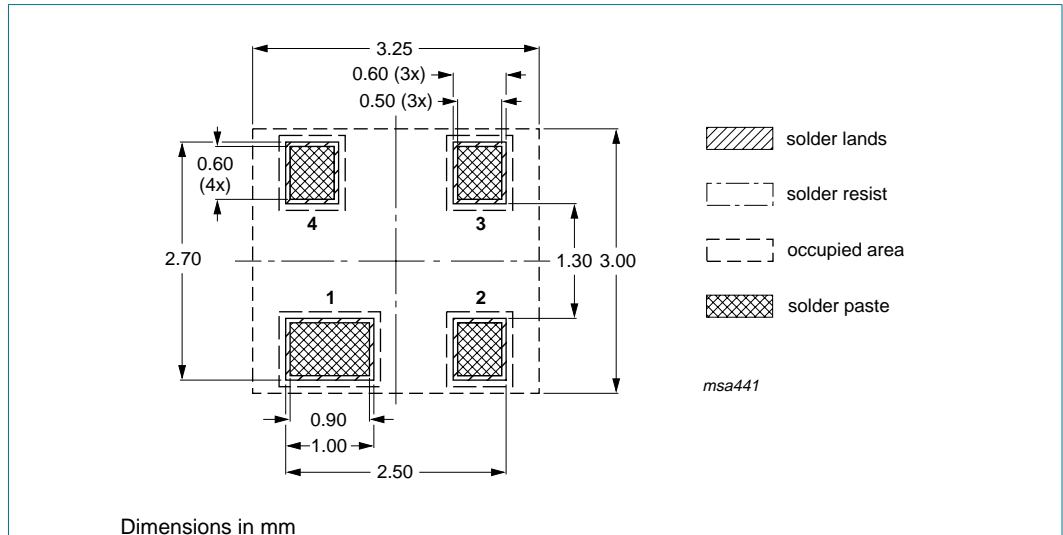


Fig 12. Reflow soldering footprint SOT143B

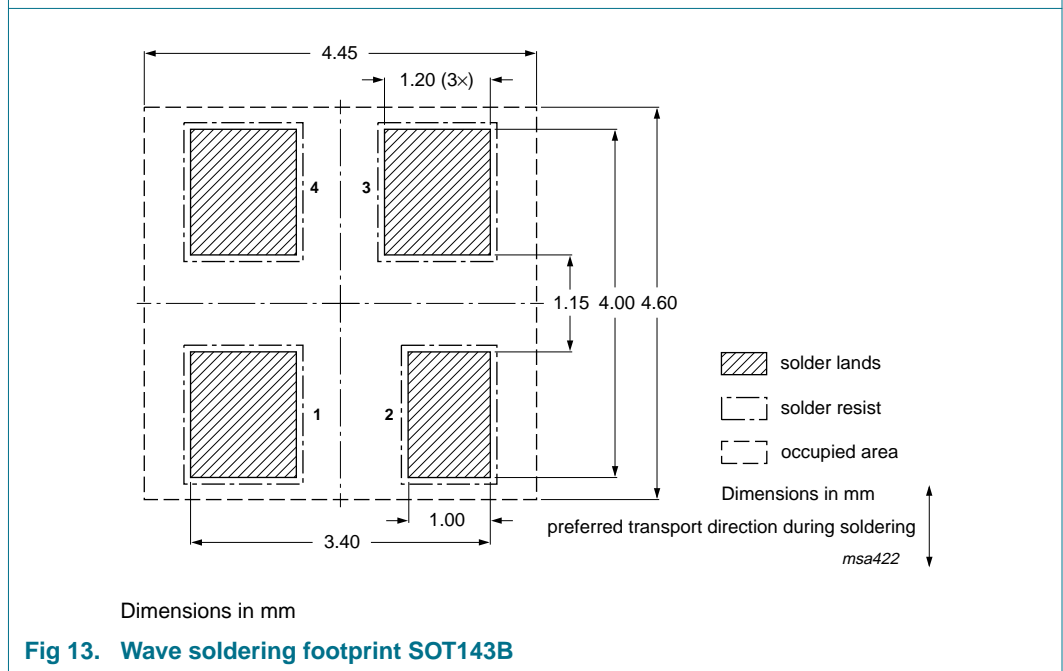


Fig 13. Wave soldering footprint SOT143B

## 12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCM61B_2	20090828	Product data sheet	-	BCM61B_1
Modifications:		<ul style="list-style-type: none"><li>This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content.</li><li><a href="#">Figure 13 "Wave soldering footprint SOT143B"</a>: updated</li></ul>		
BCM61B_1	20060919	Product data sheet	-	-

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### 13.1 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".

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Date of release: 28 August 2009

Document identifier: BCM61B\_2