



# THE DATASHEET OF BCV61,235





# BCV61

## NPN general-purpose double transistors

Rev. 04 — 18 December 2009

Product data sheet

## 1. Product profile

### 1.1 General description

NPN general-purpose double transistors in a small SOT143B Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		PNP complement
	Nexperia	JEITA	
BCV61	SOT143B	-	BCV62
BCV61A			BCV62A
BCV61B			BCV62B
BCV61C			BCV62C

### 1.2 Features

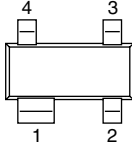
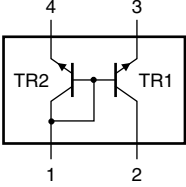
- Low current (max. 100 mA)
- Low voltage (max. 30 V)
- Matched pairs

### 1.3 Applications

- Applications with working point independent of temperature
- Current mirrors

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic 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
BCV61	-	plastic surface-mounted package; 4 leads	SOT143B
BCV61A			
BCV61B			
BCV61C			

### 4. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
BCV61	1M*
BCV61A	1J*
BCV61B	1K*
BCV61C	1L*

- [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</b>					
$V_{CBO}$	collector-base voltage	open emitter	-	30	V
$V_{CEO}$	collector-emitter voltage	open base	-	30	V
$V_{EBS}$	emitter-base voltage	$V_{CE} = 0\text{ V}$	-	6	V
$I_C$	collector current		-	100	mA
$I_{CM}$	peak collector current		-	200	mA
$I_{BM}$	peak base current		-	200	mA
<b>Per device</b>					
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	250	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 Printed-Circuit Board (PCB).

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W

[1] Device mounted on an FR4 PCB.

## 7. Characteristics

**Table 7. Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b>Transistor TR1</b>							
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 30\text{ V};$ $I_E = 0\text{ A}$	-	-	15	nA	
		$V_{CB} = 30\text{ V};$ $I_E = 0\text{ A};$ $T_j = 150\text{ °C}$	-	-	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	$V_{CE} = 5\text{ V};$ $I_C = 100\text{ }\mu\text{A}$	100	-	-		
		$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	110	-	800		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10\text{ mA};$ $I_B = 0.5\text{ mA}$	-	90	250	mV	
		$I_C = 100\text{ mA};$ $I_B = 5\text{ mA}$	-	200	600	mV	
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 10\text{ mA};$ $I_B = 0.5\text{ mA}$	[1]	700	-	mV	
		$I_C = 100\text{ mA};$ $I_B = 5\text{ mA}$	[1]	900	-	mV	
$V_{BE}$	base-emitter voltage	$I_C = 2\text{ mA};$ $V_{CE} = 5\text{ V}$	[2]	580	660	700	mV
		$I_C = 10\text{ mA};$ $V_{CE} = 5\text{ V}$	[2]	-	-	770	mV
$f_T$	transition frequency	$V_{CE} = 5\text{ V};$ $I_C = 10\text{ mA};$ $f = 100\text{ MHz}$	100	-	-	MHz	
$C_c$	collector capacitance	$V_{CB} = 10\text{ V};$ $I_E = I_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	2.5	-	pF	
NF	noise figure	$V_{CE} = 5\text{ V};$ $I_C = 200\text{ }\mu\text{A};$ $R_S = 2\text{ k}\Omega;$ $f = 1\text{ kHz};$ $B = 200\text{ Hz}$	-	-	10	dB	

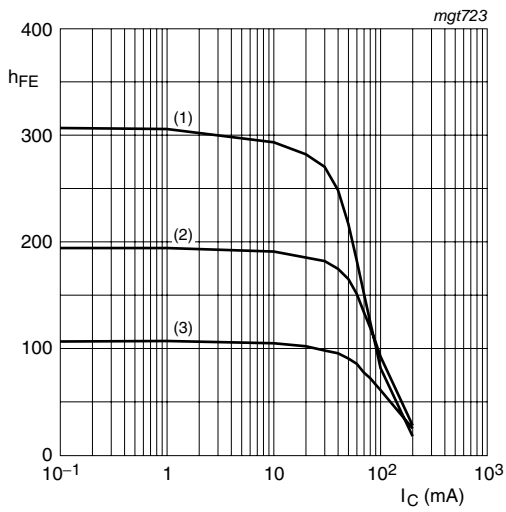
**Table 7. Characteristics ...continued**  
 $T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>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
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$				
		BCV61	110	-	800	
		BCV61A	110	-	220	
		BCV61B	200	-	450	
		BCV61C	420	-	800	
<b>Transistors TR1 and TR2</b>						
$I_{C1}/I_{E2}$	current matching	$I_{E2} = -0.5\text{ mA};$ $V_{CE1} = 5\text{ V}$				
		$T_{amb} \leq 25\text{ °C}$	0.7	-	1.3	
		$T_{amb} \leq 150\text{ °C}$	0.7	-	1.3	
$I_{E2}$	emitter current 2	$V_{CE1} = 5\text{ V}$	[3]	-	-5	mA

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

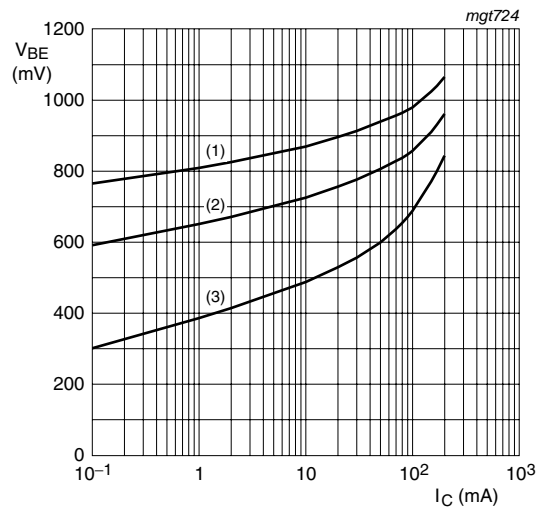
[2]  $V_{BE}$  decreases by about 2 mV/K with increasing temperature.

[3] Device, without emitter resistors, mounted on an FR4 PCB.



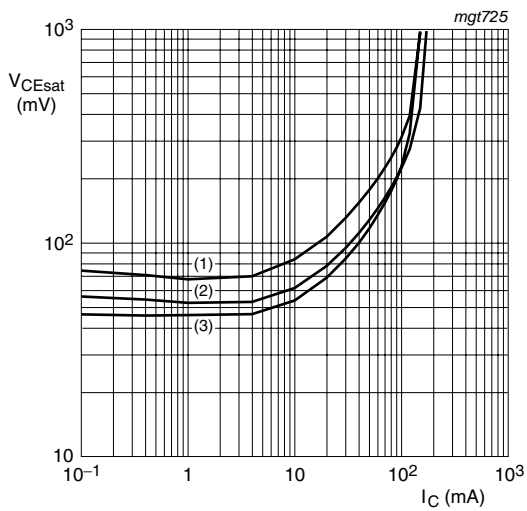
$V_{CE} = 5\text{ V}$   
 (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

**Fig 1. BCV61A: DC current gain as a function of collector current; typical values**



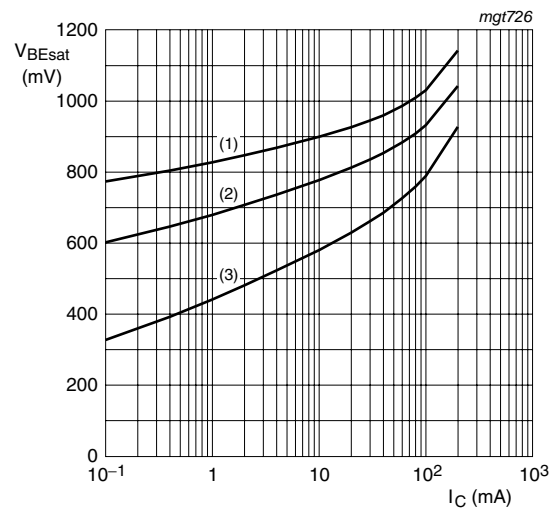
$V_{CE} = 5\text{ V}$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**Fig 2. BCV61A: Base-emitter voltage as a function of collector current; typical values**



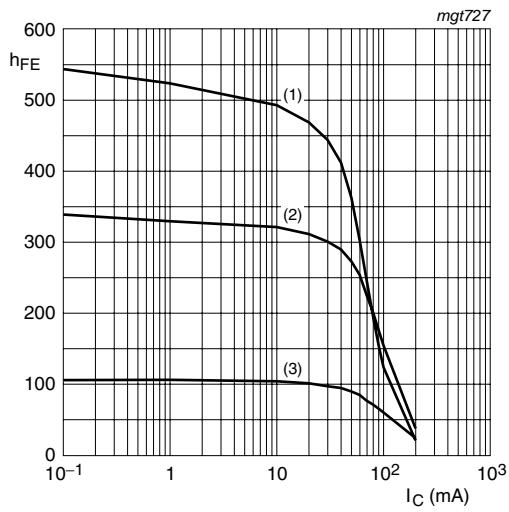
$I_C/I_B = 20$   
 (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

**Fig 3. BCV61A: Collector-emitter saturation voltage as a function of collector current; typical values**



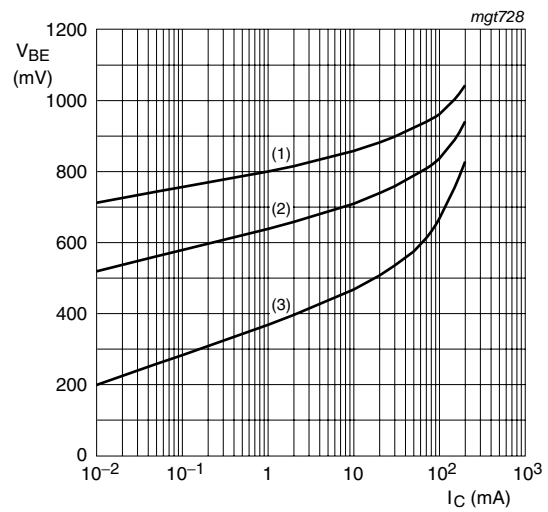
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**Fig 4. BCV61A: Base-emitter saturation voltage as a function of collector current; typical values**



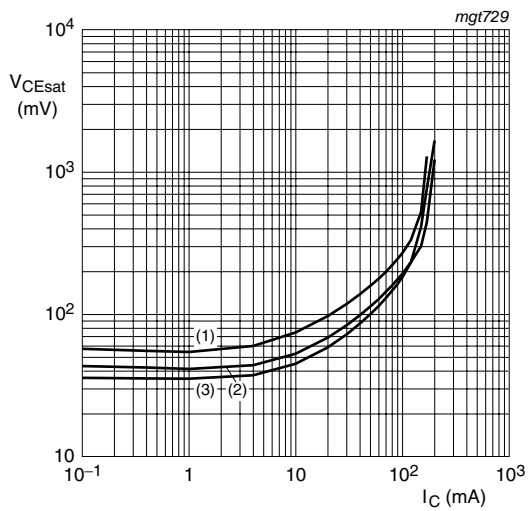
$V_{CE} = 5\text{ V}$   
 (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

**Fig 5. BCV61B: DC current gain as a function of collector current; typical values**



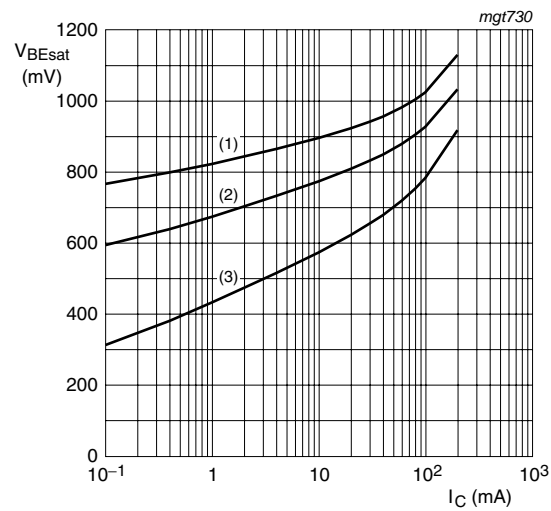
$V_{CE} = 5\text{ V}$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**Fig 6. BCV61B: Base-emitter voltage as a function of collector current; typical values**



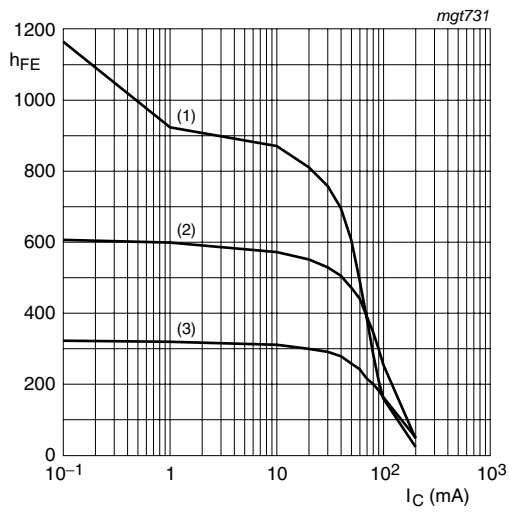
$I_C/I_B = 20$   
 (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

**Fig 7. BCV61B: Collector-emitter saturation voltage as a function of collector current; typical values**



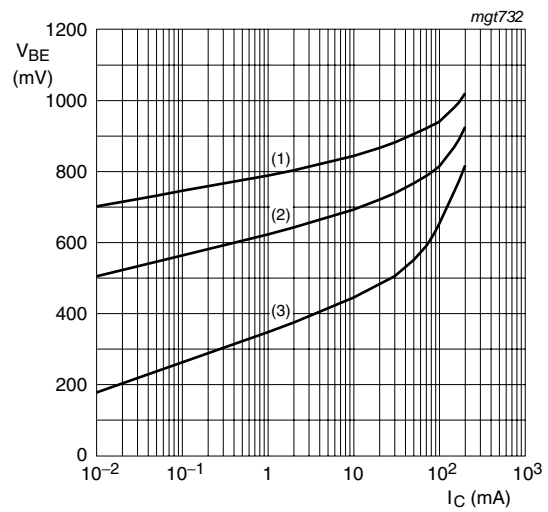
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**Fig 8. BCV61B: Base-emitter saturation voltage as a function of collector current; typical values**



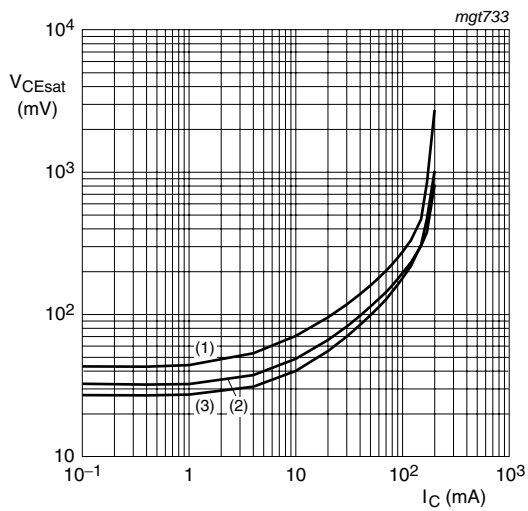
$V_{CE} = 5\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

**Fig 9. BCV61C: DC current gain as a function of collector current; typical values**



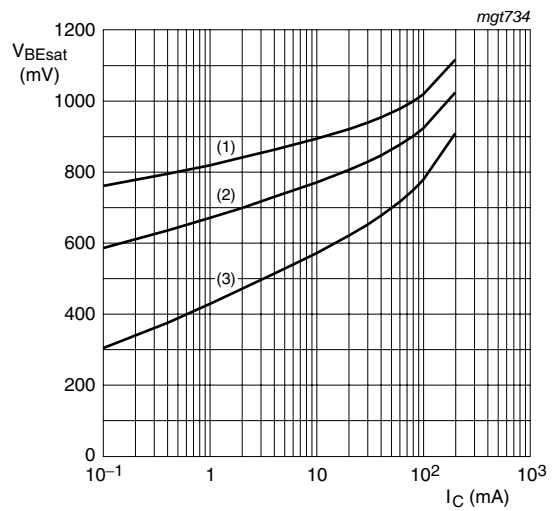
$V_{CE} = 5\text{ V}$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

**Fig 10. BCV61C: Base-emitter voltage as a function of collector current; typical values**



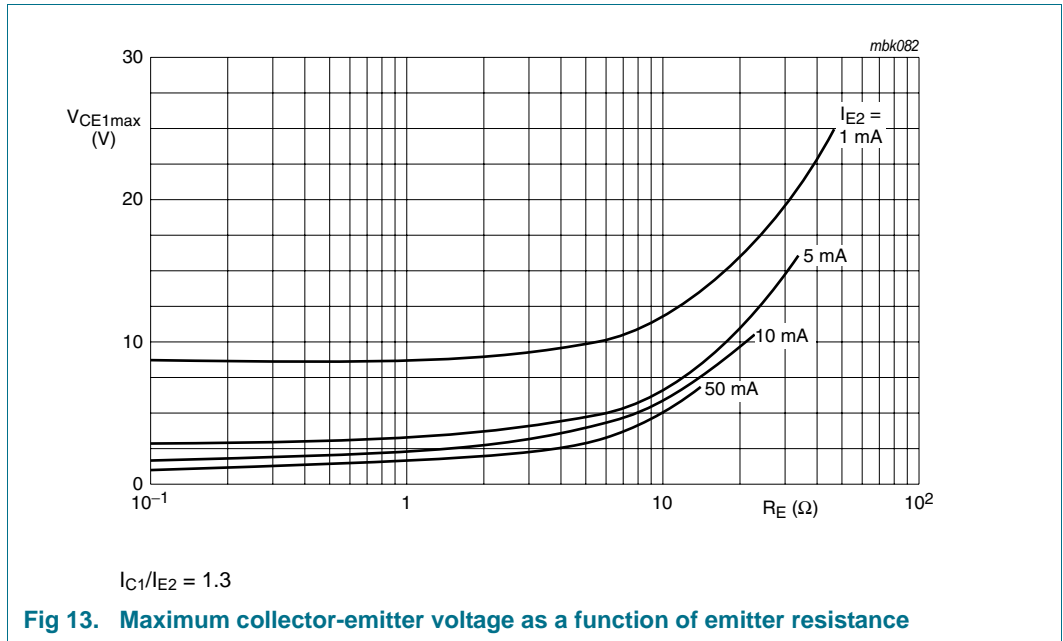
$I_C/I_B = 20$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

**Fig 11. BCV61C: Collector-emitter saturation voltage as a function of collector current; typical values**

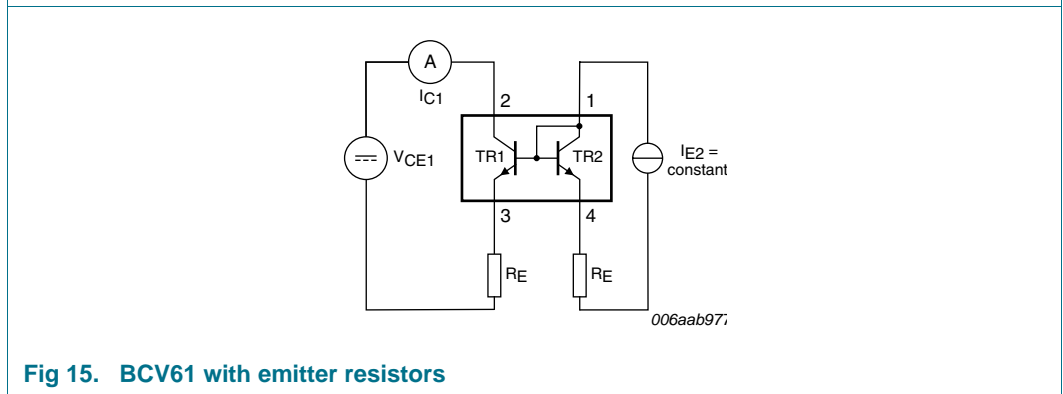
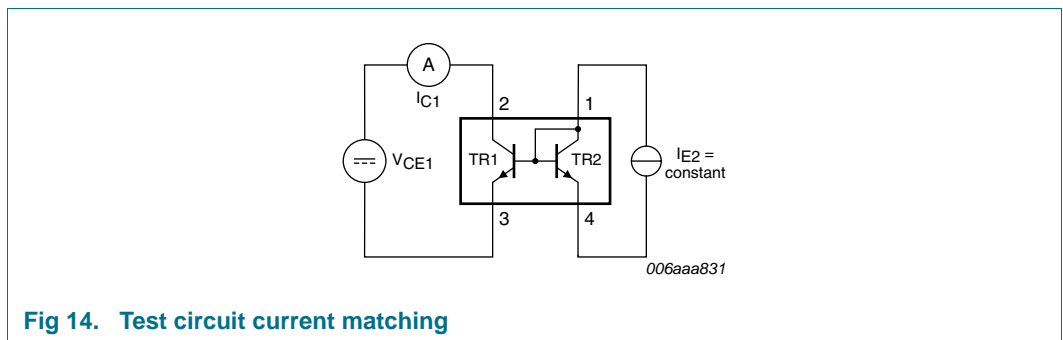


$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

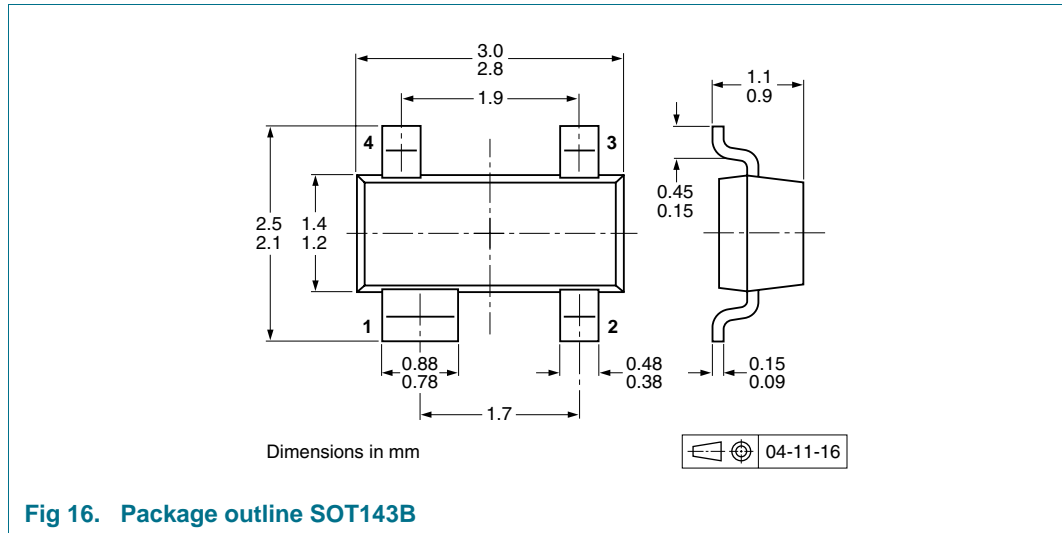
**Fig 12. BCV61C: Base-emitter saturation voltage as a function of collector current; typical values**



## 8. Test information



## 9. Package outline



## 10. Packing information

Please refer to packing information on [www.nexperia.com](http://www.nexperia.com).

11. Soldering

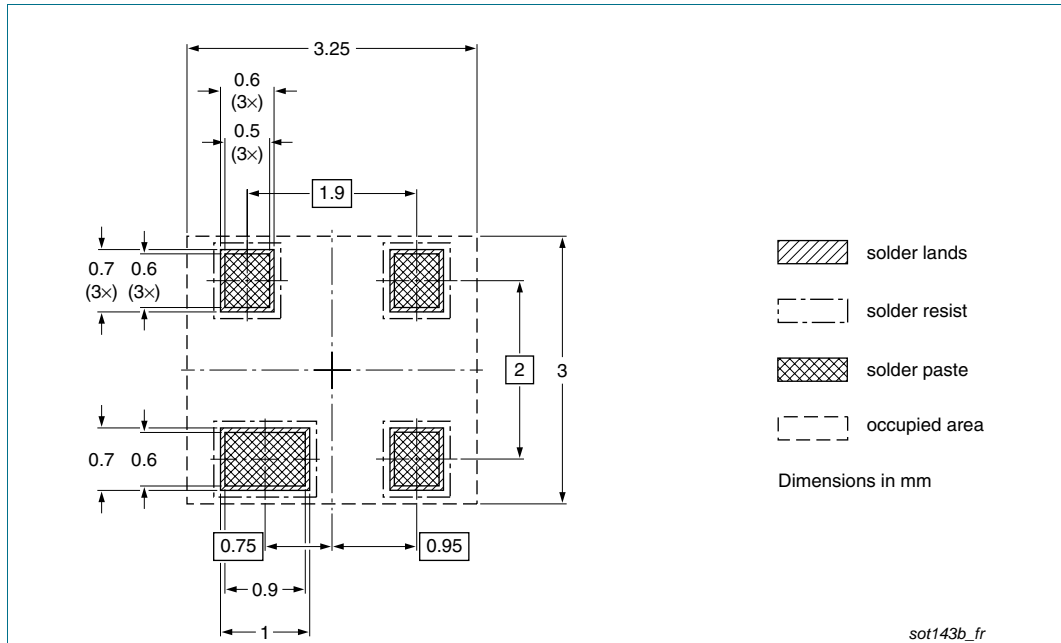


Fig 17. Reflow soldering footprint SOT143B

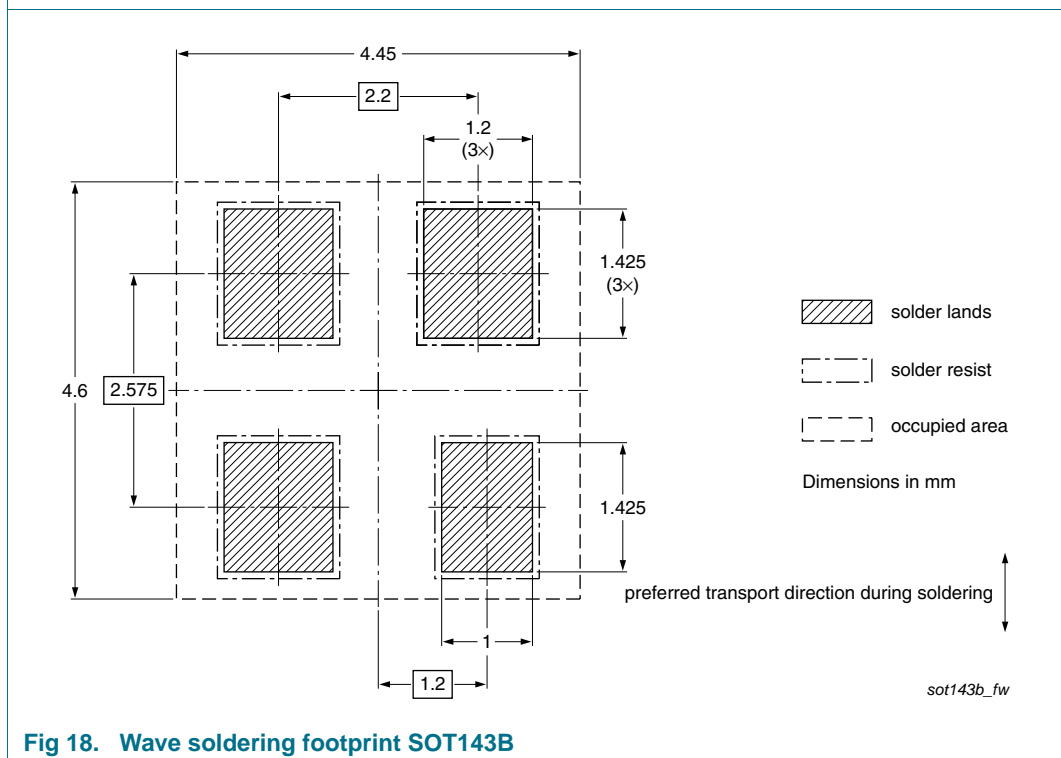


Fig 18. Wave soldering footprint SOT143B

## 12. Revision history

**Table 9.** Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCV61_4	20091218	Product data sheet	-	BCV61_3
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="#">Section 3 "Ordering information"</a>: added</li> <li>• <a href="#">Section 4 "Marking"</a>: updated</li> <li>• <a href="#">Figure 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11</a> and <a href="#">12</a>: added</li> <li>• <a href="#">Section 8 "Test information"</a>: added</li> <li>• <a href="#">Figure 16</a>: superseded by minimized package outline drawing</li> <li>• <a href="#">Section 10 "Packing information"</a>: added</li> <li>• <a href="#">Section 11 "Soldering"</a>: added</li> <li>• <a href="#">Section 13 "Legal information"</a>: updated</li> </ul>			
BCV61_3	19990408	Product specification	-	BCV61_CNV_2
BCV61_CNV_2	19970616	Product specification	-	-

## 13. Legal information

### 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".

[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.nexperia.com>.

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

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Date of release: 18 December 2009

Document identifier: BCV61

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