



# BCM857BV

PNP/PNP matched double transistor

4 July 2023

Product data sheet

## 1. General description

PNP/PNP matched double transistor in an ultra small and flat lead SOT666 Surface-Mounted Device (SMD) plastic package. The transistors are fully isolated internally.

## 2. Features and benefits

- Current gain matching
- Base-emitter voltage matching
- Drop-in replacement for standard double transistors

## 3. Applications

- Current mirror
- Differential amplifier

## 4. Quick reference data

Table 1. Quick reference data

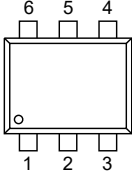
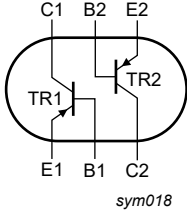
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per transistor</b>							
$V_{CE0}$	collector-emitter voltage	open base		-	-	-45	V
$I_C$	collector current			-	-	-100	mA
$h_{FE}$	DC current gain	$V_{CE} = -5\text{ V}$ ; $I_C = -2\text{ mA}$ ; $T_{amb} = 25\text{ °C}$		200	290	450	
<b>Per device</b>							
$h_{FE1}/h_{FE2}$	DC current gain matching	$V_{CE} = -5\text{ V}$ ; $I_C = -2\text{ mA}$ ; $T_{amb} = 25\text{ °C}$	[1]	0.9	1	-	
$V_{BE1}-V_{BE2}$	base-emitter voltage matching		[2]	-	-	2	mV

[1] The smaller of the two values is taken as the numerator.

[2] The smaller of the two values is subtracted from the larger value.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E1	emitter TR1	 SOT666	 sym018
2	B1	base TR1		
3	C2	collector TR2		
4	E2	emitter TR2		
5	B2	base TR2		
6	C1	collector TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">BCM857BV</a>	SOT666	plastic, surface-mounted package; 6 leads; 0.5 mm pitch; 1.6 mm x 1.2 mm x 0.55 mm body	<a href="#">SOT666</a>

7. Marking

Table 4. Marking codes

Type number	Marking code
BCM857BV	3B

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
$V_{CBO}$	collector-base voltage	open emitter		-	-50	V
$V_{CEO}$	collector-emitter voltage	open base		-	-45	V
$V_{EBO}$	emitter-base voltage	open collector		-	-5	V
$I_C$	collector current			-	-100	mA
$I_{CM}$	peak collector current	$t_p \leq 1$ ms; single pulse		-	-200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	<a href="#">[1]</a> <a href="#">[2]</a>	-	200	mW
Per device						
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	<a href="#">[1]</a> <a href="#">[2]</a>	-	300	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), single-sided copper, tin-plated and standard footprint.

[2] Reflow soldering is the only recommended soldering method.

## 9. 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] [2]	-	-	625	K/W
<b>Per device</b>							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	416	K/W

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

[2] Reflow soldering is the only recommended soldering method.

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C		-	-	-15	nA
		V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A; T <sub>j</sub> = 150 °C		-	-	-5	µA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = -5 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C		-	-	-100	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -10 µA; T <sub>amb</sub> = 25 °C		-	250	-	
		V <sub>CE</sub> = -5 V; I <sub>C</sub> = -2 mA; T <sub>amb</sub> = 25 °C		200	290	450	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -10 mA; I <sub>B</sub> = -0.5 mA; T <sub>amb</sub> = 25 °C		-	-50	-200	mV
		I <sub>C</sub> = -100 mA; I <sub>B</sub> = -5 mA; T <sub>amb</sub> = 25 °C		-	-200	-400	mV
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = -10 mA; I <sub>B</sub> = -0.5 mA; T <sub>amb</sub> = 25 °C	[1]	-	-760	-	mV
		I <sub>C</sub> = -100 mA; I <sub>B</sub> = -5 mA; T <sub>amb</sub> = 25 °C	[1]	-	-920	-	mV
V <sub>BE</sub>	base-emitter voltage	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -2 mA; T <sub>amb</sub> = 25 °C	[2]	-600	-650	-700	mV
		V <sub>CE</sub> = -5 V; I <sub>C</sub> = -10 mA; T <sub>amb</sub> = 25 °C	[2]	-	-	-760	mV
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = -10 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C		-	-	2.2	pF
C <sub>e</sub>	emitter capacitance	V <sub>EB</sub> = -0.5 V; I <sub>C</sub> = 0 A; i <sub>c</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C		-	10	-	pF
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -10 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C		100	175	-	MHz
NF	noise figure	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -0.2 mA; R <sub>S</sub> = 2 kΩ; f = 10 kHz to 15.7 kHz		-	1.6	-	dB
		V <sub>CE</sub> = -5 V; I <sub>C</sub> = -0.2 mA; f = 1 kHz; B = 200 Hz		-	3.1	-	dB
Per device							
h <sub>FE1</sub> /h <sub>FE2</sub>	DC current gain matching	V <sub>CE</sub> = -5 V; I <sub>C</sub> = -2 mA; T <sub>amb</sub> = 25 °C	[3]	0.9	1	-	
V <sub>BE1</sub> -V <sub>BE2</sub>	base-emitter voltage matching		[4]	-	-	2	mV

[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] The smaller of the two values is taken as the numerator.

[4] The smaller of the two values is subtracted from the larger value.

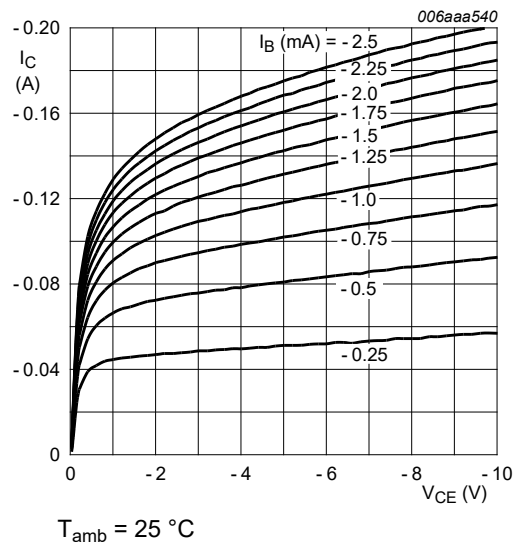


Fig. 1. Collector current as a function of collector-emitter voltage; typical values

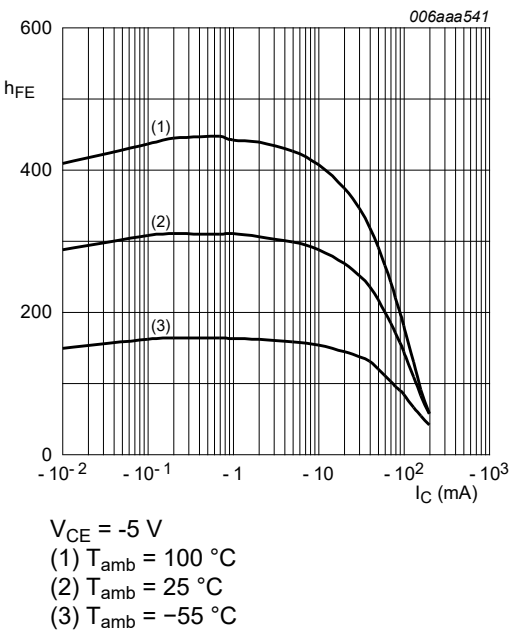


Fig. 2. DC current gain as a function of collector current; typical values

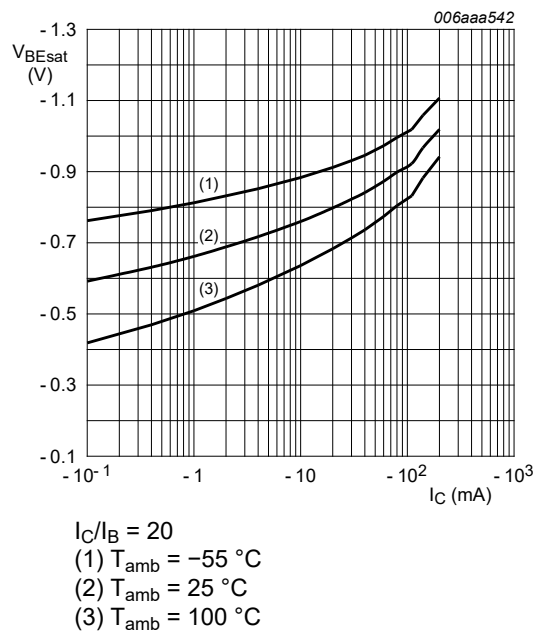


Fig. 3. Base-emitter saturation voltage as a function of collector current; typical values

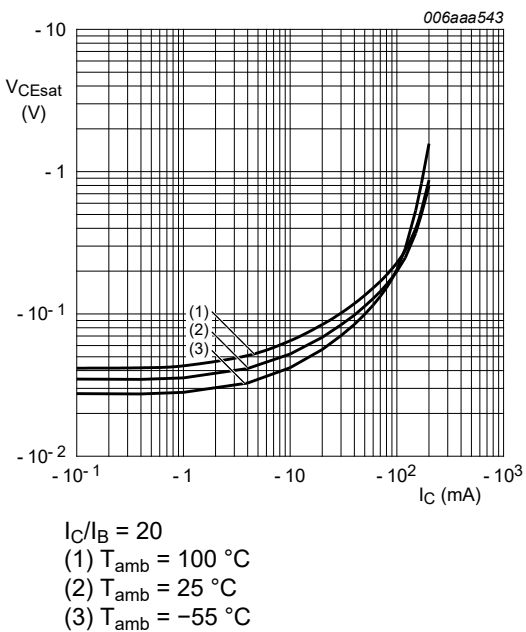


Fig. 4. Collector-emitter saturation voltage as a function of collector current; typical values

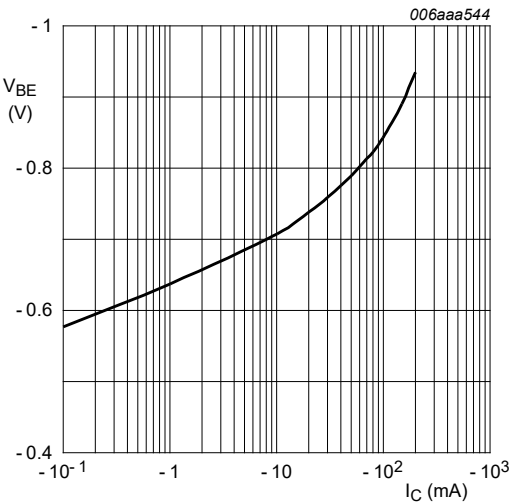


Fig. 5. Base-emitter voltage as a function of collector current; typical values

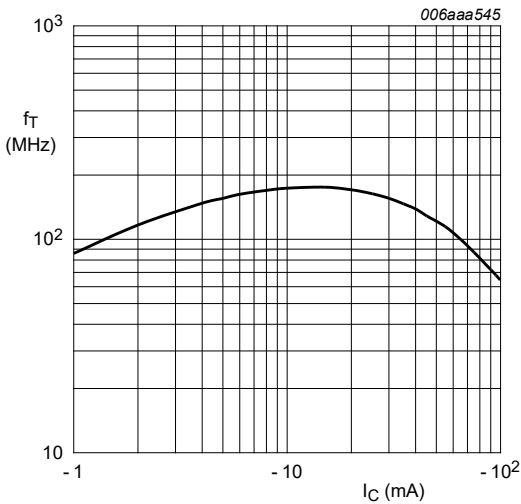


Fig. 6. Transition frequency as a function of collector current; typical values

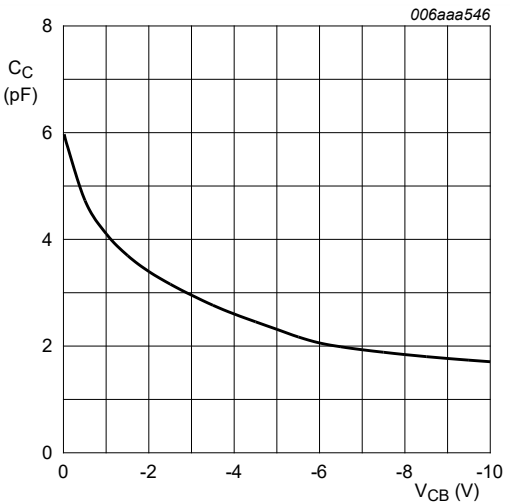


Fig. 7. Collector capacitance as a function of collector-base voltage; typical values

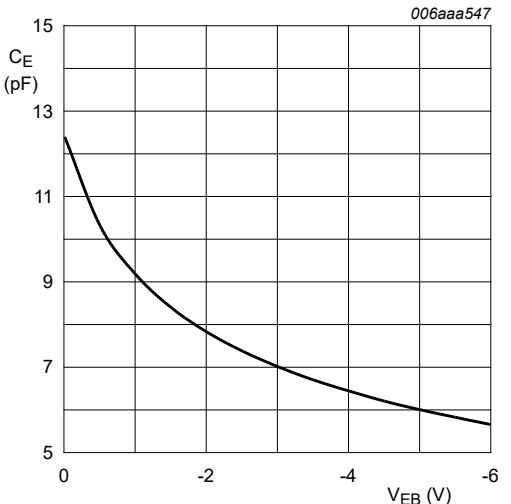


Fig. 8. Emitter capacitance as a function of emitter-base voltage; typical values

11. Application information

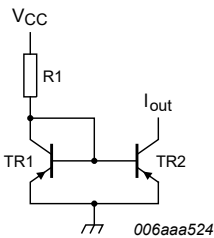


Fig. 9. Current mirror

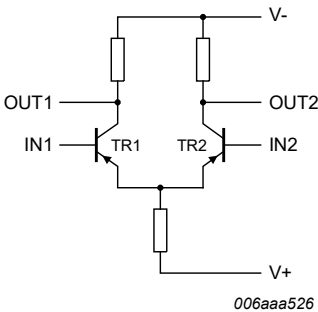
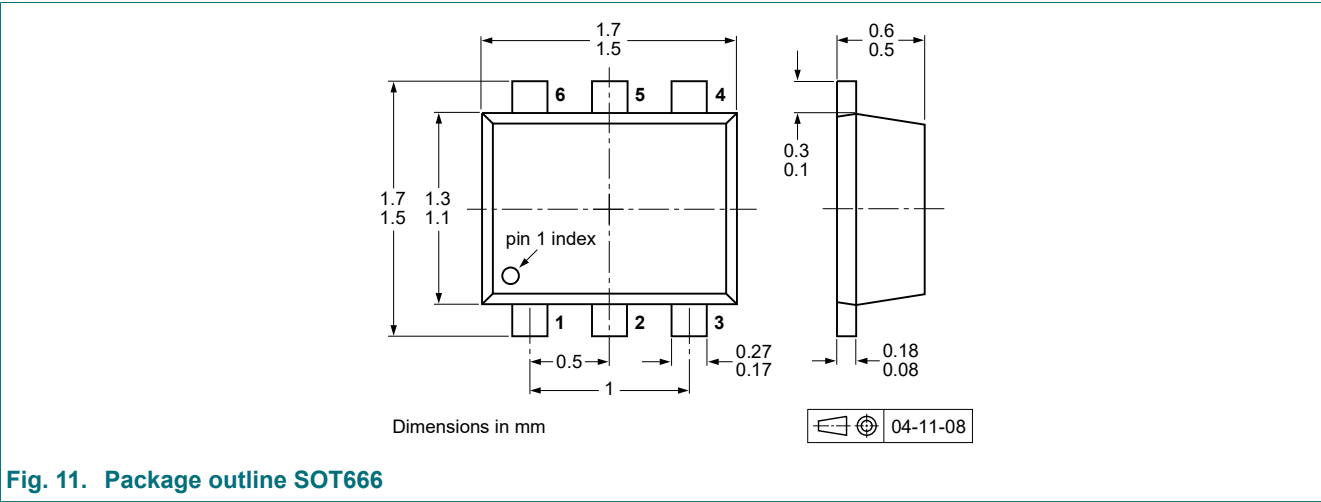
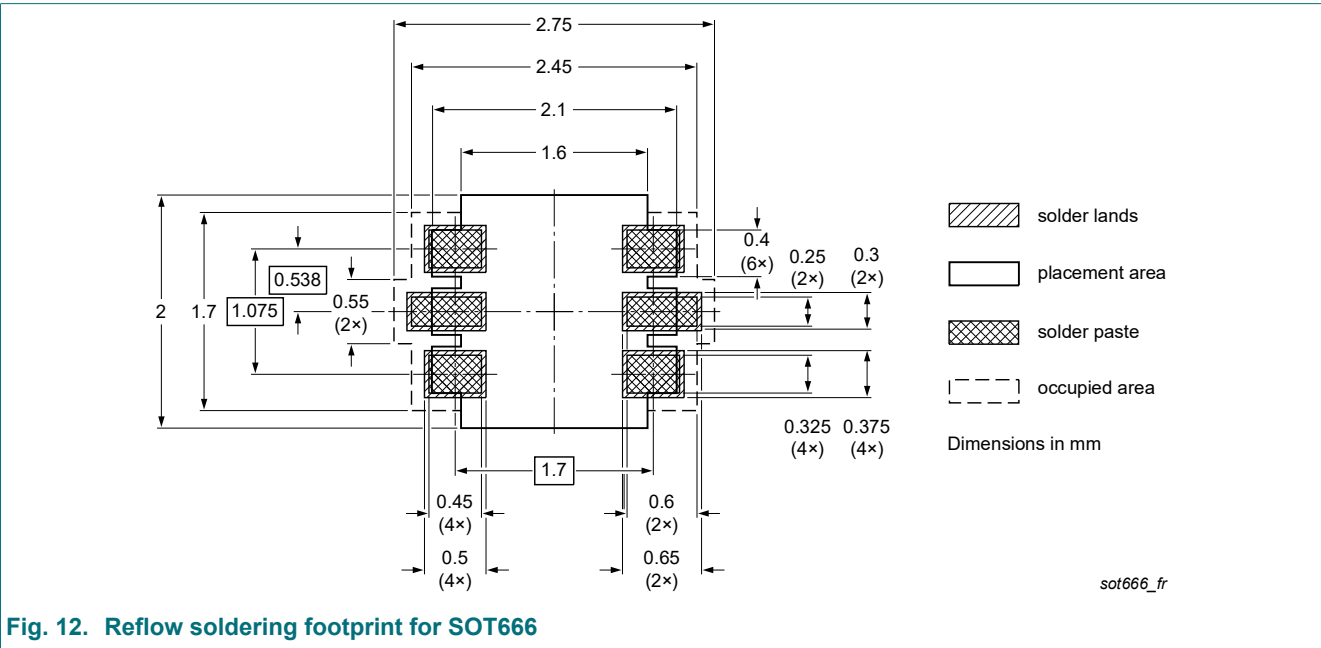


Fig. 10. Differential amplifier

12. Package outline



13. Soldering



14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BCM857BV v.7	20230704	Product data sheet	-	BCM857BV_BS_DS_6
Modifications:	<ul style="list-style-type: none"><li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>Legal texts have been adapted to the new company name where appropriate.</li><li>Family data sheet splitted to single type data sheets.</li><li>Section "Packing information" removed.</li></ul>			
BCM857BV_BS_DS_6	20090828			BCM857BV_BS_DS_5
BCM857BV_BS_DS_5	20060627	Product data sheet	-	BCM857BS_DS_4
BCM857BS_DS_4	20060216	Product data sheet	-	BCM857BS_DS_3
BCM857BS_DS_3	20060130	Product data sheet	-	BCM857BS_2
BCM857BS_2	20050411	Product data sheet	-	BCM857BS_1
BCM857BS_1	20040914	Product data sheet	-	-

## 15. Legal information

### 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.

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- [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 <https://www.nexperia.com>.

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Contents

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information.....2

6. Ordering information.....2

7. Marking.....2

8. Limiting values..... 2

9. Thermal characteristics..... 3

10. Characteristics..... 3

11. Application information.....5

12. Package outline..... 6

13. Soldering..... 6

14. Revision history.....7

15. Legal information.....8

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