



BCM846BS

NPN/NPN matched double transistor

26 June 2015

Product data sheet

1. General description

NPN/NPN matched double transistor in a very small SOT363 (TSSOP6) 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
- AEC-Q101 qualified

3. Applications

- Current mirror
- Differential amplifier

4. Quick reference data

Table 1. Quick reference data

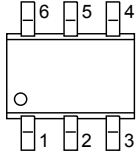
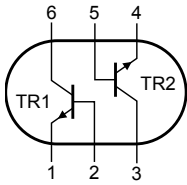
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
V_{CE0}	collector-emitter voltage	open base	-	-	65	V
I_C	collector current		-	-	100	mA
Per transistor						
h_{FE}	DC current gain	$V_{CE} = 5 \text{ V}; I_C = 2 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	200	290	450	
Per device						
h_{FE1}/h_{FE2}	h_{FE} matching	$V_{CE} = 5 \text{ V}; I_C = 2 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	[1]	0.9	1	-
$V_{BE1}-V_{BE2}$	V_{BE} matching		[2]	-	-	2 mV

[1] The smaller of the two values is taken as 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	E	emitter TR1	 <p>TSSOP6 (SOT363)</p>	 <p>sym020</p>
2	B	base TR1		
3	C	collector TR2		
4	E	emitter TR2		
5	B	base TR2		
6	C	collector TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BCM846BS	TSSOP6	plastic surface-mounted package; 6 leads	SOT363

7. Marking

Table 4. Marking codes

Type number	Marking code
BCM846BS	F2% [1]

[1] % = placeholder for manufacturing site code

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 _{CB0}	collector-base voltage	open emitter		-	80	V
V _{CEO}	collector-emitter voltage	open base		-	65	V
V _{EBO}	emitter-base voltage	open collector		-	6	V
I _C	collector current			-	100	mA
I _{CM}	peak collector current	single pulse; t _p ≤ 1 ms		-	200	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	200	mW
Per device						
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	300	mW
T _j	junction temperature			-	150	°C
T _{amb}	ambient temperature			-55	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.

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W
Per device							
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	-	416	K/W

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

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
Per transistor							
I _{CBO}	collector-base cut-off current	V _{CB} = 30 V; I _E = 0 A; T _{amb} = 25 °C	-	-	15	nA	
		V _{CB} = 30 V; I _E = 0 A; T _j = 150 °C	-	-	5	μA	
I _{EBO}	emitter-base cut-off current	V _{EB} = 5 V; I _C = 0 A; T _{amb} = 25 °C	-	-	100	nA	
h _{FE}	DC current gain	V _{CE} = 5 V; I _C = 2 mA; T _{amb} = 25 °C	200	290	450		
		V _{CE} = 5 V; I _C = 10 μA; T _{amb} = 25 °C	-	250	-		
V _{CEsat}	collector-emitter saturation voltage	I _C = 10 mA; I _B = 0.5 mA; T _{amb} = 25 °C	-	50	200	mV	
		I _C = 100 mA; I _B = 5 mA; pulsed; t _p ≤ 300 μs; δ ≤ 0.02; T _{amb} = 25 °C	-	200	400	mV	
V _{BEsat}	base-emitter saturation voltage	I _C = 10 mA; I _B = 0.5 mA; T _{amb} = 25 °C	[1]	910	-	mV	
		I _C = 10 mA; I _B = 0.5 mA; T _{amb} = 25 °C	[1]	760	-	mV	
V _{BE}	base-emitter voltage	V _{CE} = 5 V; I _C = 10 mA; T _{amb} = 25 °C	[2]	-	770	mV	
V _{BE}	base-emitter voltage	V _{CE} = 5 V; I _C = 2 mA; T _{amb} = 25 °C	[2]	610	660	710	mV
C _C	collector capacitance	V _{CB} = 10 V; I _E = 0 A; i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C	-	-	1.5	pF	
C _E	emitter capacitance	V _{EB} = 0.5 V; I _C = 0 A; i _c = 0 A; f = 1 MHz; T _{amb} = 25 °C	-	11	-	pF	
f _T	transition frequency	V _{CE} = 5 V; I _C = 10 mA; f = 100 MHz; T _{amb} = 25 °C	100	250	-	MHz	
NF	noise figure	V _{CE} = 5 V; I _C = 0.2 mA; R _S = 2 kΩ; f = 1 kHz; B = 200 Hz; T _{amb} = 25 °C	-	3.3	-	dB	
		V _{CE} = 5 V; I _C = 0.2 mA; R _S = 2 kΩ; T _{amb} = 25 °C; f = 10 Hz to 15.7 kHz	-	2.8	-	dB	
Per device							
h _{FE1} /h _{FE2}	h _{FE} matching	V _{CE} = 5 V; I _C = 2 mA; T _{amb} = 25 °C	[3]	0.9	1	-	
V _{BE1} -V _{BE2}	V _{BE} 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 numerator.

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

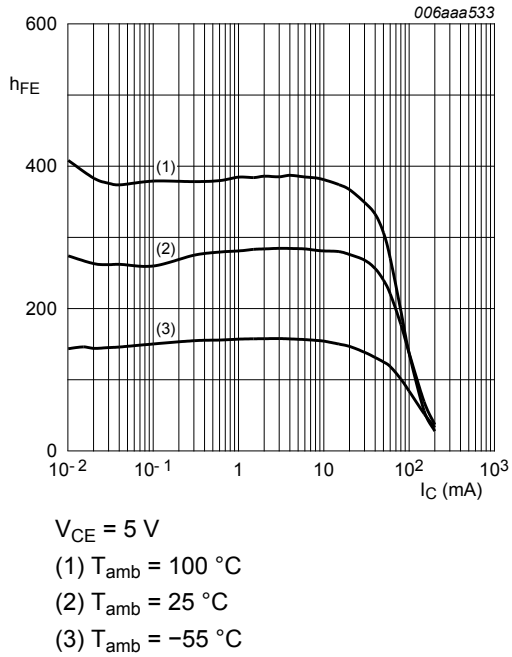


Fig. 1. DC current gain as a function of collector current; typical values

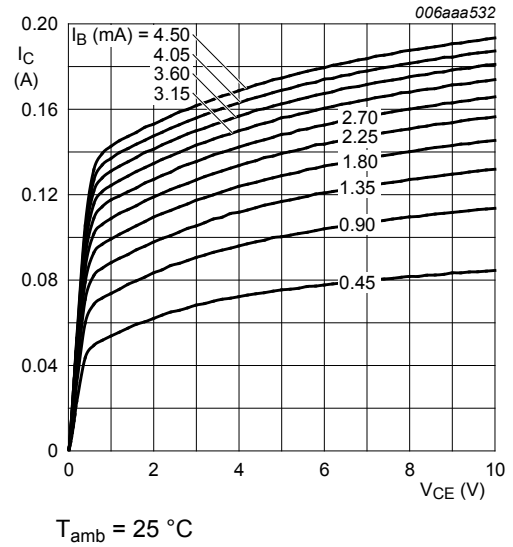


Fig. 2. Collector current as a function of collector-emitter voltage; typical values

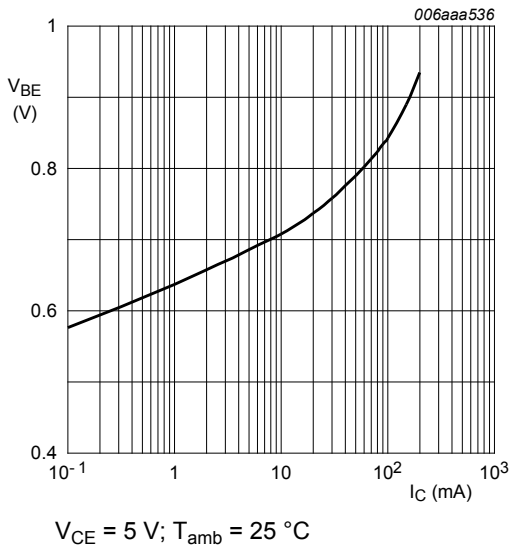


Fig. 3. Base-emitter voltage as a function of collector current; typical values

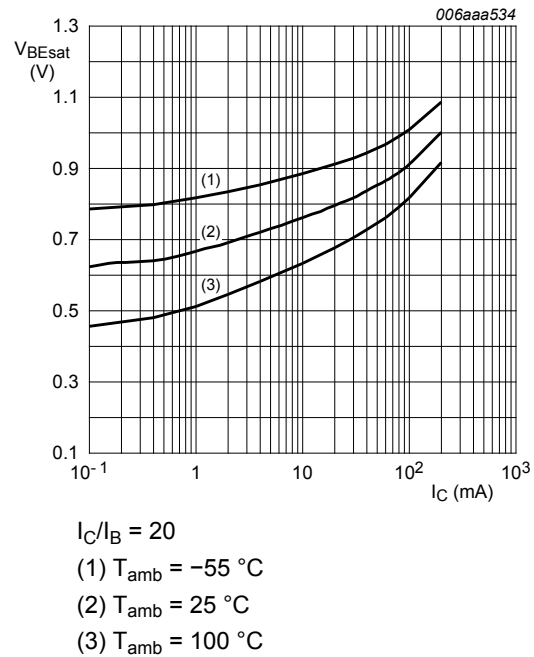
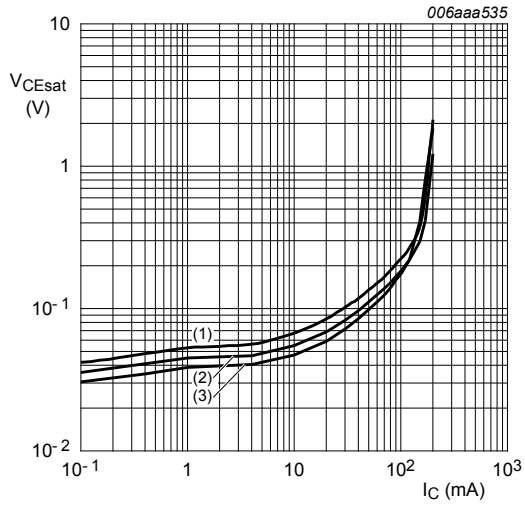
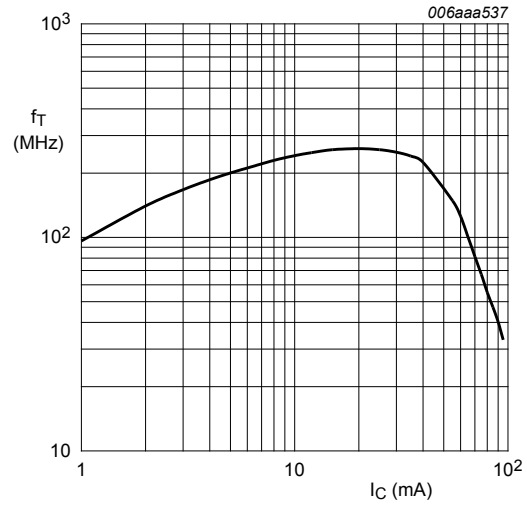


Fig. 4. Base-emitter saturation voltage as a function of collector current; typical values



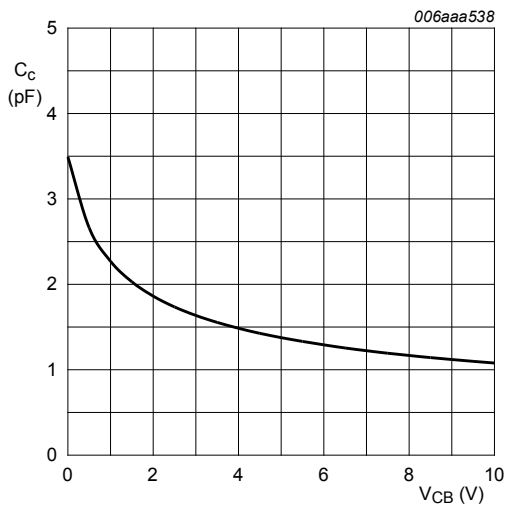
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^\circ\text{C}$
 (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 (3) $T_{amb} = -55\text{ }^\circ\text{C}$

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



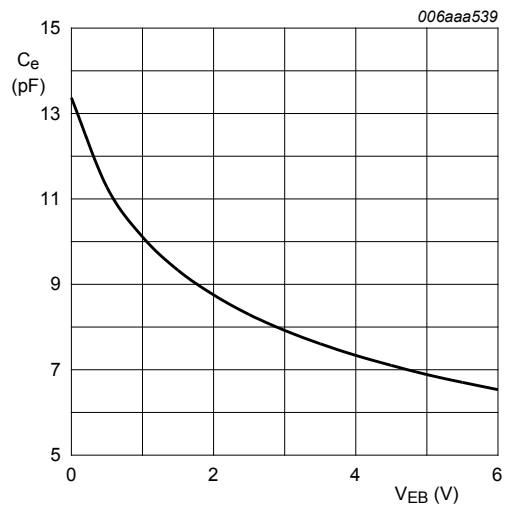
$V_{CE} = 5\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$

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



$f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$

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



$f = 1\text{ MHz}; T_{amb} = 25\text{ }^\circ\text{C}$

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

11. Package outline

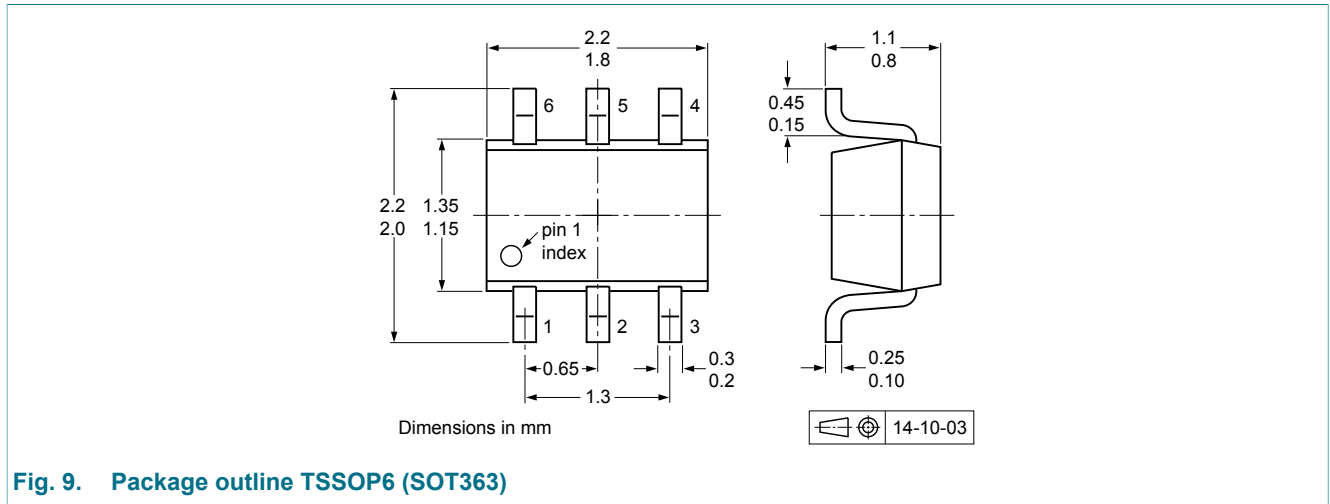


Fig. 9. Package outline TSSOP6 (SOT363)

12. Soldering

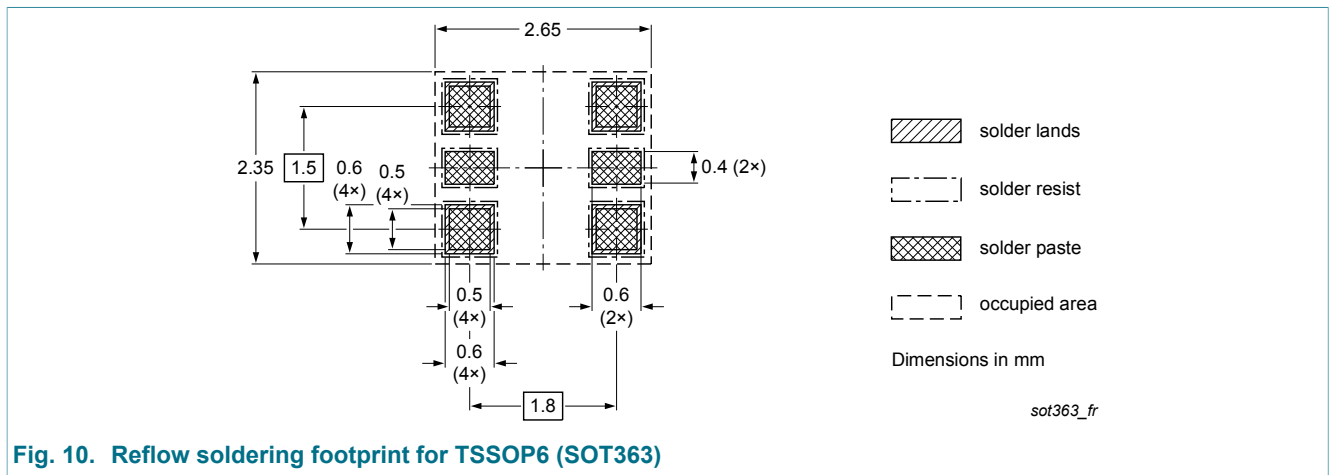


Fig. 10. Reflow soldering footprint for TSSOP6 (SOT363)

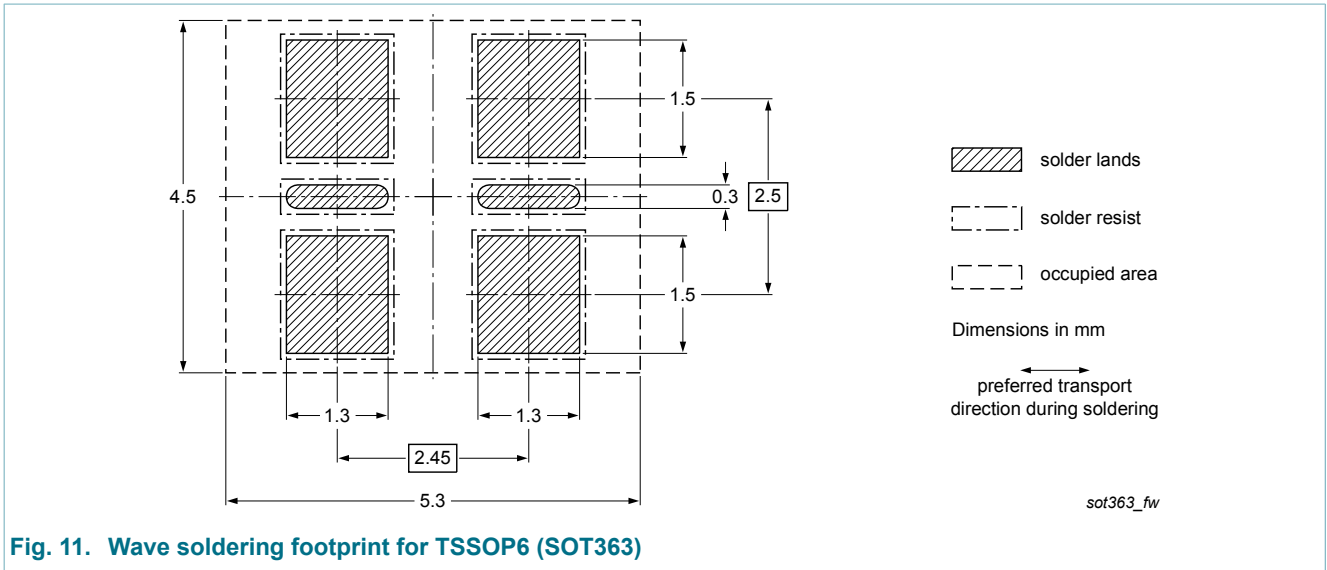


Fig. 11. Wave soldering footprint for TSSOP6 (SOT363)

13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BCM846BS v.2	20150626	Product data sheet	-	BCM846BS v.1
Modification:	<ul style="list-style-type: none">Product status changed			
BCM846BS v.1	20150424	Objective data sheet	-	-

14. Legal information

14.1 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.

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