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_{CEO}	collector-emitter voltage	open base		-	-	65	V
I_C	collector current			-	-	100	mA
Per transistor							
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 2 mA; T_{amb} = 25 °C		200	290	450	
Per device							
h_{FE1}/h_{FE2}	h_{FE} matching	V_{CE} = 5 V; I_C = 2 mA; T_{amb} = 25 °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.

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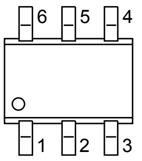
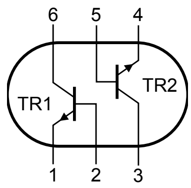
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter TR1	 TSSOP6 (SOT363)	 sym020
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 [1]
BCM846BS	F2%

[1] % = placeholder for manufacturing site code

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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		-	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; $t_p \leq 1$ ms		-	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	200	mW
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °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.

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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		[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.

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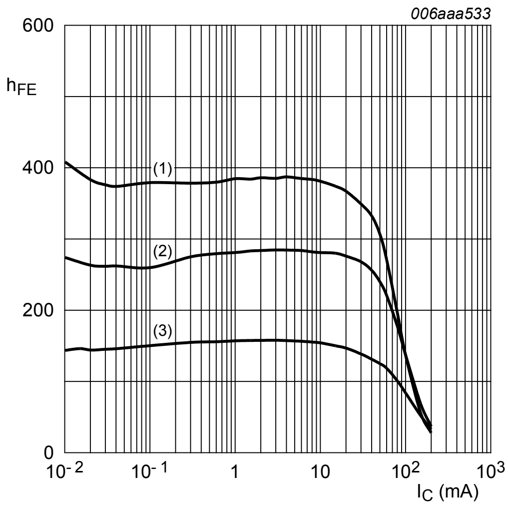


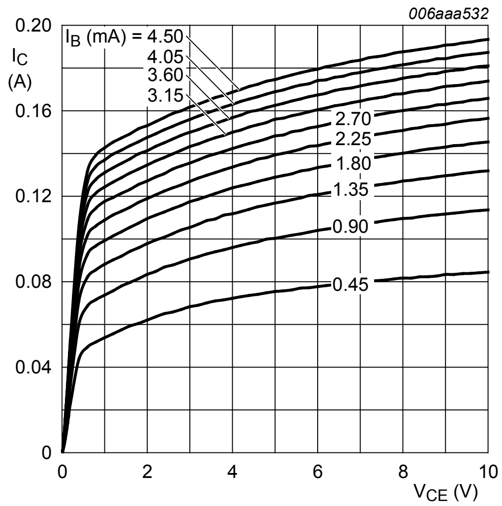
V_{CE} = 5 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

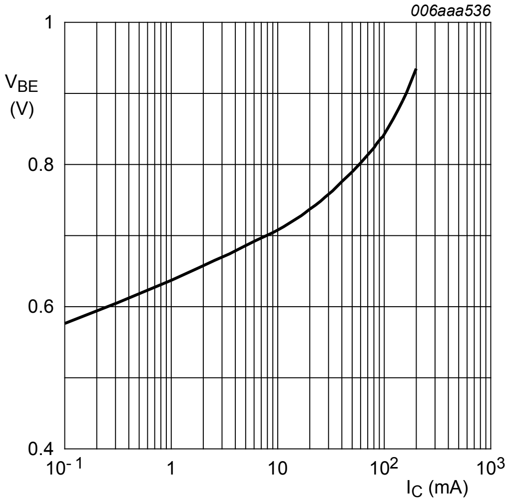
(3) T_{amb} = −55 °C

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



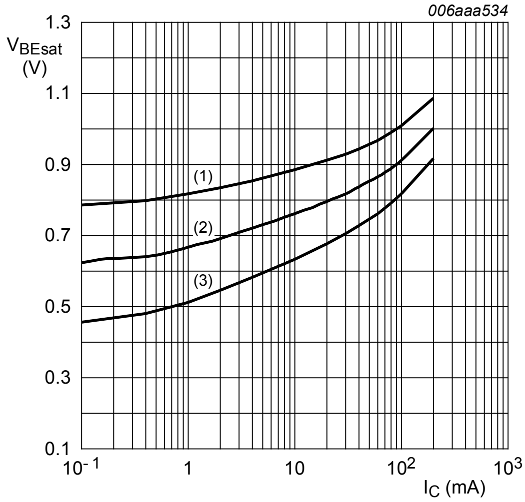
T_{amb} = 25 °C

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



V_{CE} = 5 V; T_{amb} = 25 °C

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



I_C/I_B = 20

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

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

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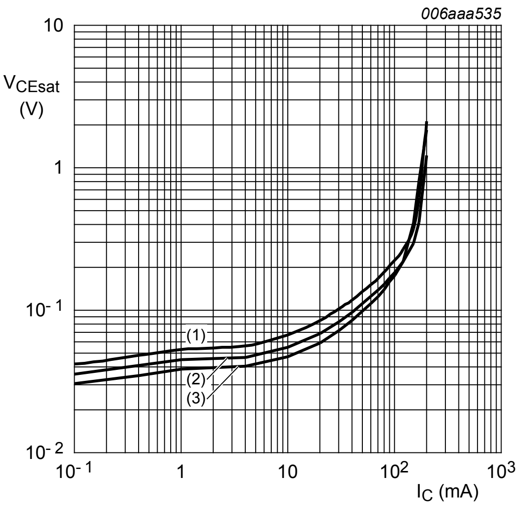


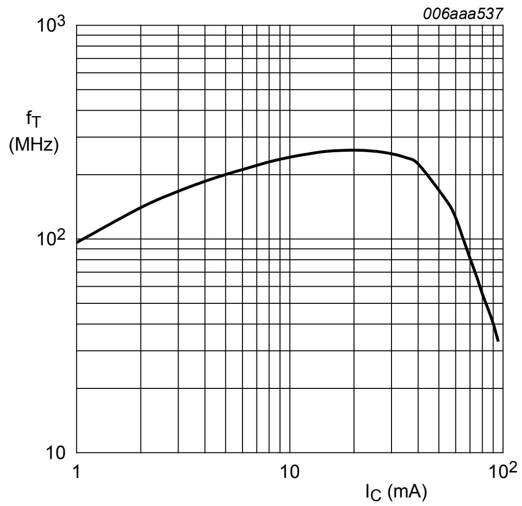
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

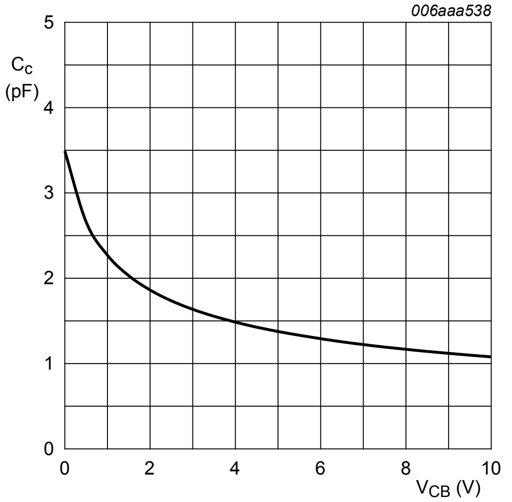
(3) T_{amb} = −55 °C

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



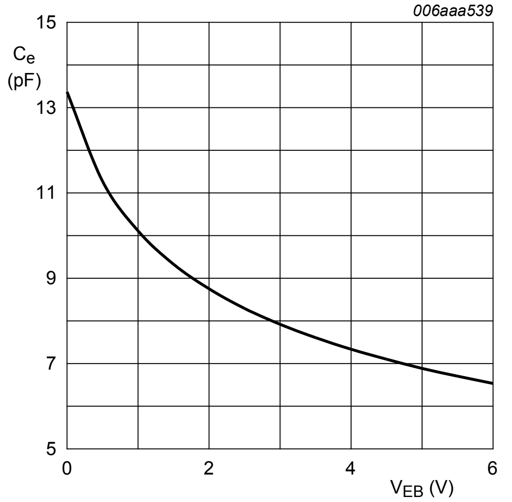
V_{CE} = 5 V; T_{amb} = 25 °C

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

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11. Package outline

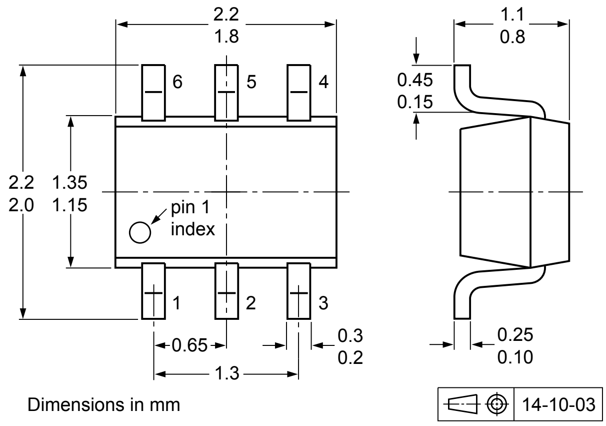

Fig. 9. Package outline TSSOP6 (SOT363)

12. Soldering

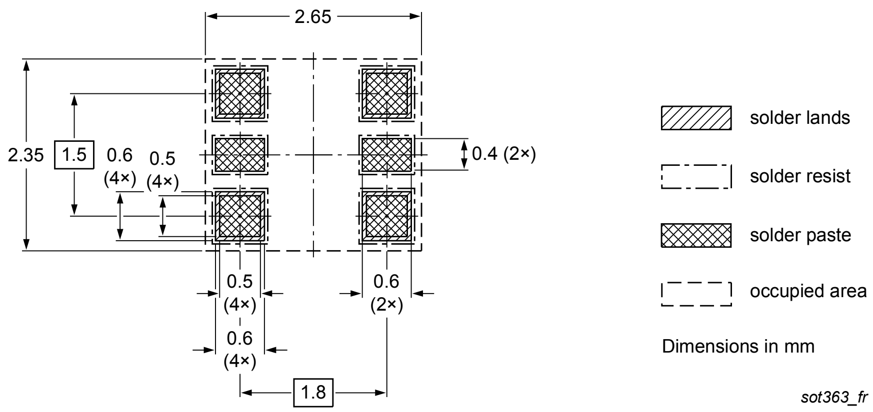

Fig. 10. Reflow soldering footprint for TSSOP6 (SOT363)

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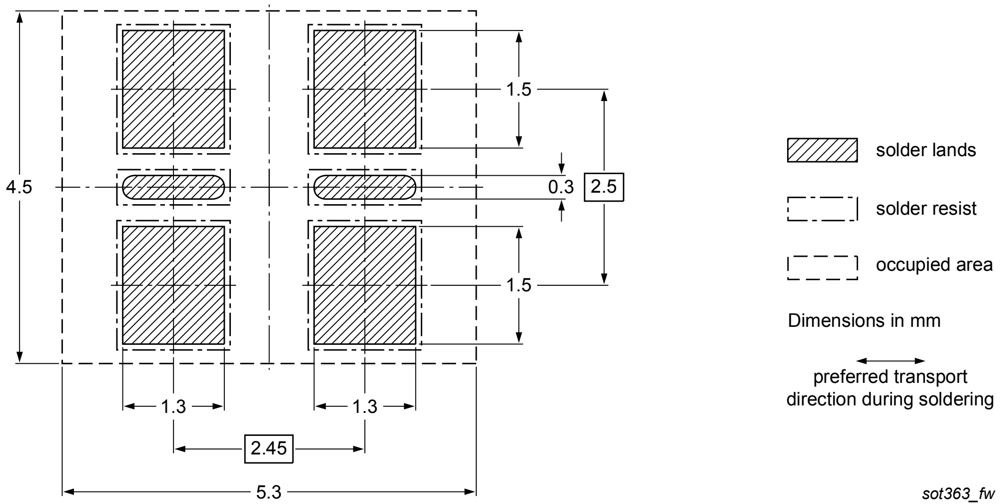

Fig. 11. Wave soldering footprint for TSSOP6 (SOT363)

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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:	• Product status changed			
BCM846BS v.1	20150424	Objective data sheet	-	-

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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