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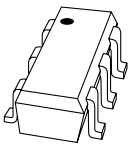


BC856BS

65 V, 100 mA PNP/PNP general-purpose transistor

Rev. 01 — 11 August 2009 Product data sheet

1. Product profile

1.1 General description

PNP/PNP general-purpose transistor pair in a very small Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		NPN/NPN complement	NPN/PNP complement
	NXP	JEITA		
BC856BS	SOT363	SC-88	BC846BS	BC846BPN

1.2 Features

- Low collector capacitance
- Low collector-emitter saturation voltage
- Closely matched current gain
- Reduces number of components and board space
- No mutual interference between the transistors
- AEC-Q101 qualified

1.3 Applications

- General-purpose switching and amplification

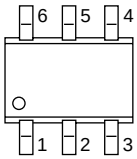
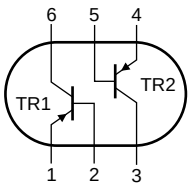
1.4 Quick reference data

Table 2. 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
h_{FE}	DC current gain	V_{CE} = –5 V; I_C = –2 mA	200	290	450	

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	emitter TR1		
2	base TR1		
3	collector TR2		
4	emitter TR2		
5	base TR2		
6	collector TR1		

sym018

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC856BS	SC-88	plastic surface-mounted package; 6 leads	SOT363

4. Marking

Table 5. Marking codes

Type number	Marking code[1]
BC856BS	*E6

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

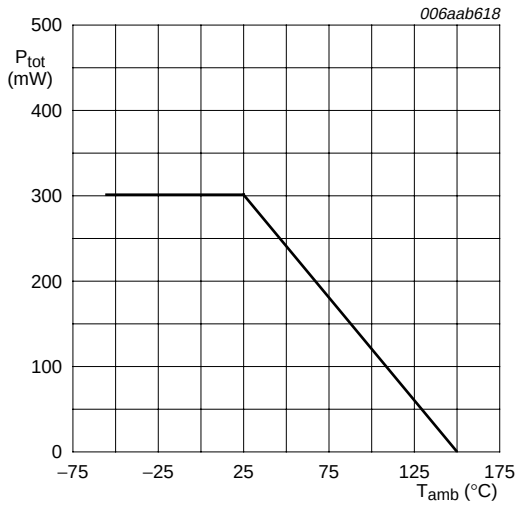
5. Limiting values

Table 6. 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
I_{BM}	peak base 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.



FR4 PCB, standard footprint

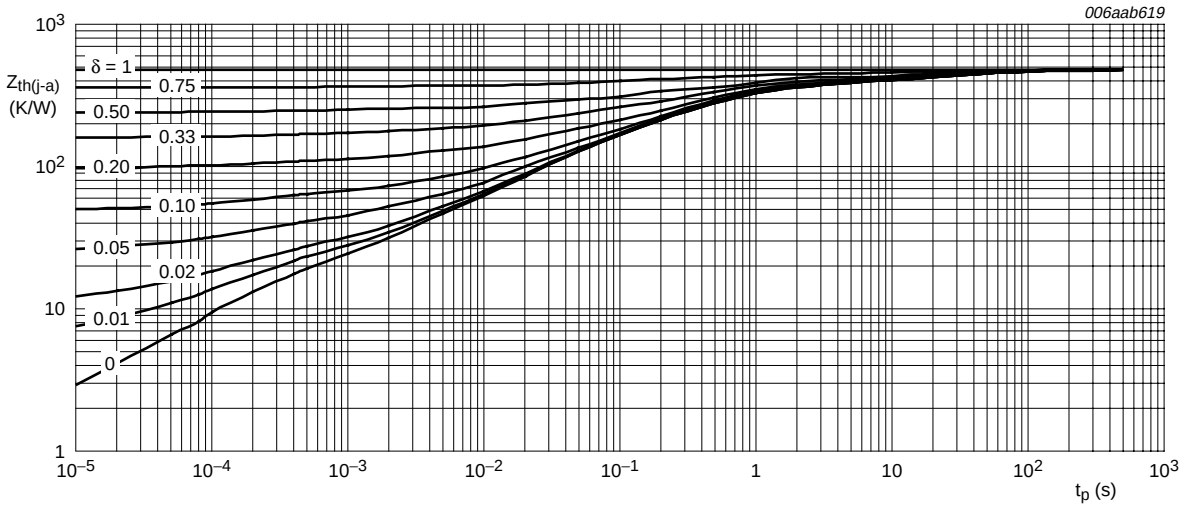
Fig 1. Per device: Power derating curve SOT363 (SC-88)

6. Thermal characteristics

Table 7. 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
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	230	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.



FR4 PCB, standard footprint

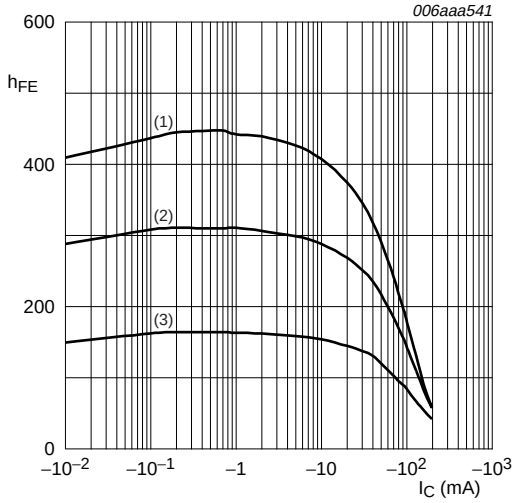
Fig 2. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 8. Characteristics

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
I_{CBO}	collector-base cut-off current	V_{CB} = –50 V; I_E = 0 A	-	-	–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} = –6 V; I_C = 0 A	-	-	–100	nA
h_{FE}	DC current gain	V_{CE} = –5 V				
		I_C = –10 µA	-	270	-	
		I_C = –2 mA	200	290	450	
V_{CEsat}	collector-emitter saturation voltage	I_C = –10 mA; I_B = –0.5 mA	-	–55	–100	mV
		I_C = –100 mA; I_B = –5 mA	-	–200	–300	mV
V_{BEsat}	base-emitter saturation voltage	I_C = –10 mA; I_B = –0.5 mA	-	–755	–850	mV
		I_C = –100 mA; I_B = –5 mA	-	–900	-	mV
V_{BE}	base-emitter voltage	V_{CE} = –5 V				
		I_C = –2 mA	–600	–650	–750	mV
		I_C = –10 mA	-	-	–820	mV
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0 A; f = 1 MHz	-	2.3	-	pF
C_e	emitter capacitance	V_{EB} = –0.5 V; I_C = i_c = 0 A; f = 1 MHz	-	10	-	pF
f_T	transition frequency	V_{CE} = –5 V; I_C = –10 mA; f = 100 MHz	100	-	-	MHz
NF	noise figure	V_{CE} = –5 V; I_C = –0.2 mA; R_S = 2 kΩ; f = 10 Hz to 15.7 kHz	-	1.6	-	dB
		V_{CE} = –5 V; I_C = –0.2 mA; R_S = 2 kΩ; f = 1 kHz; B = 200 Hz	-	2.9	-	dB



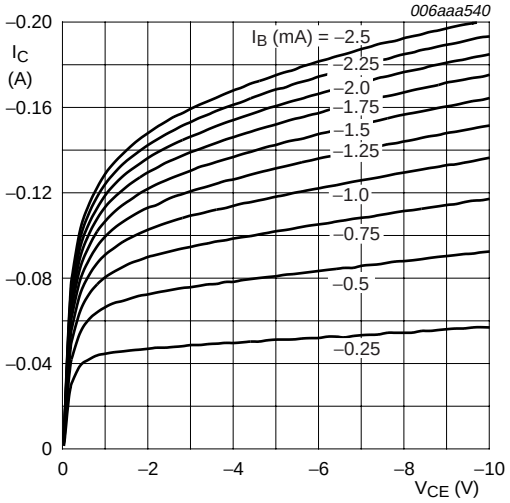
V_{CE} = −5 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

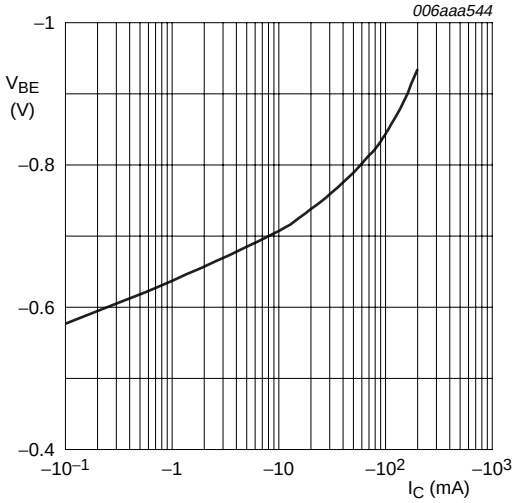
(3) T_{amb} = −55 °C

Fig 3. Per transistor: DC current gain as a function of collector current; typical values



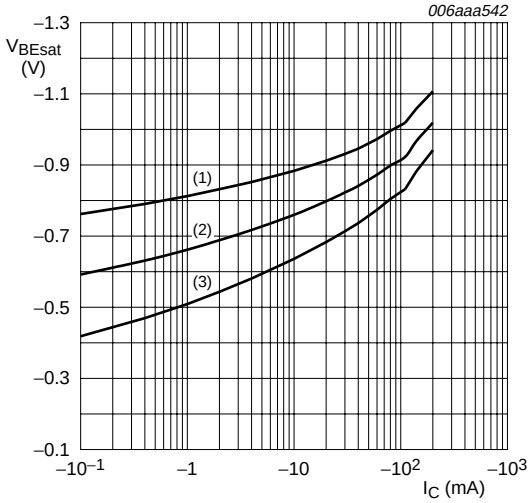
T_{amb} = 25 °C

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



V_{CE} = −5 V; T_{amb} = 25 °C

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



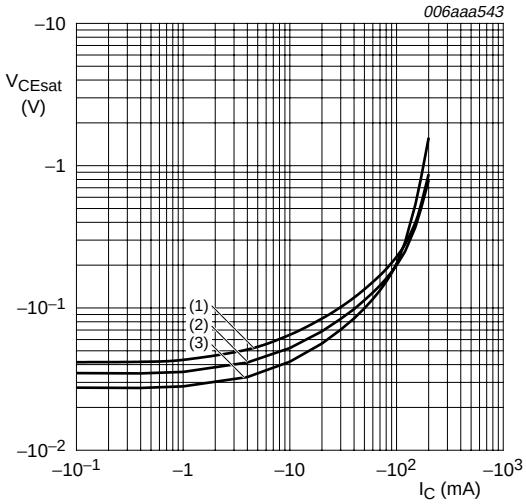
I_C/I_B = 20

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

Fig 6. Per transistor: Base-emitter saturation voltage as a function of collector current; typical values



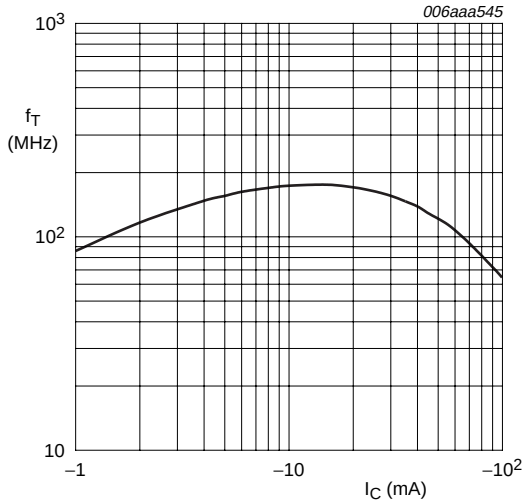
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

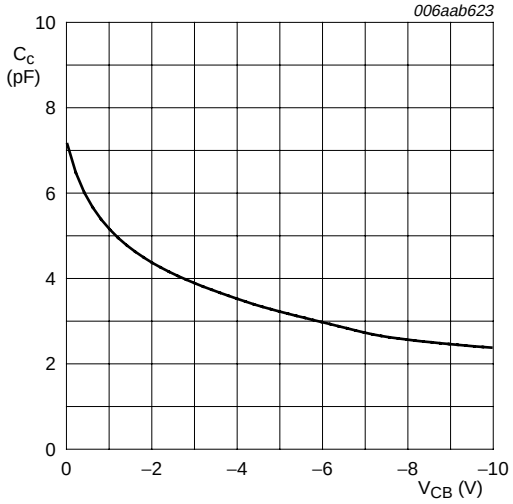
(3) T_{amb} = −55 °C

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



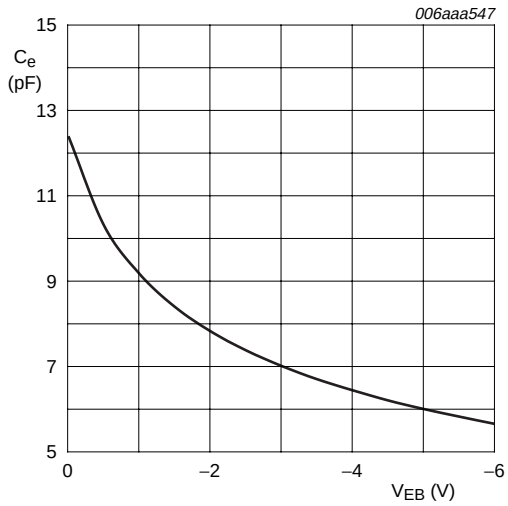
V_{CE} = −5 V; T_{amb} = 25 °C

Fig 8. Per transistor: Transition frequency as a function of collector current; typical values



f = 1 MHz; T_{amb} = 25 °C

Fig 9. Per transistor: Collector capacitance as a function of collector-base voltage; typical values



f = 1 MHz; T_{amb} = 25 °C

Fig 10. Per transistor: Emitter capacitance as a function of emitter-base voltage; typical values

8. Test information

8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

9. Package outline

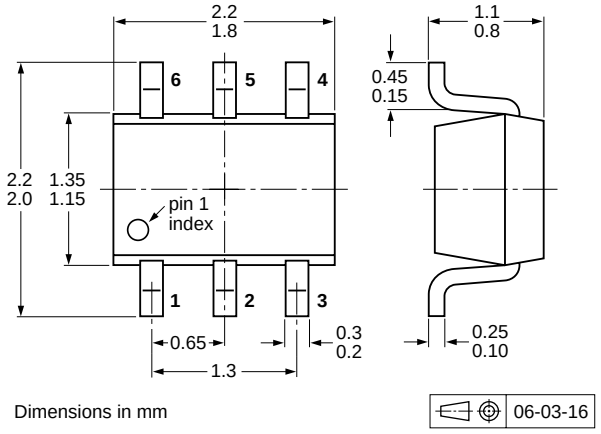


Fig 11. Package outline SOT363 (SC-88)

10. Packing information

Table 9. Packing methods

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

Type number	Package	Description		Packing quantity	
				3000	10000
BC856BS	SOT363	4 mm pitch, 8 mm tape and reel; T1	[2]	-115	-135
		4 mm pitch, 8 mm tape and reel; T2	[3]	-125	-165

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

[2] T1: normal taping

[3] T2: reverse taping

11. Soldering

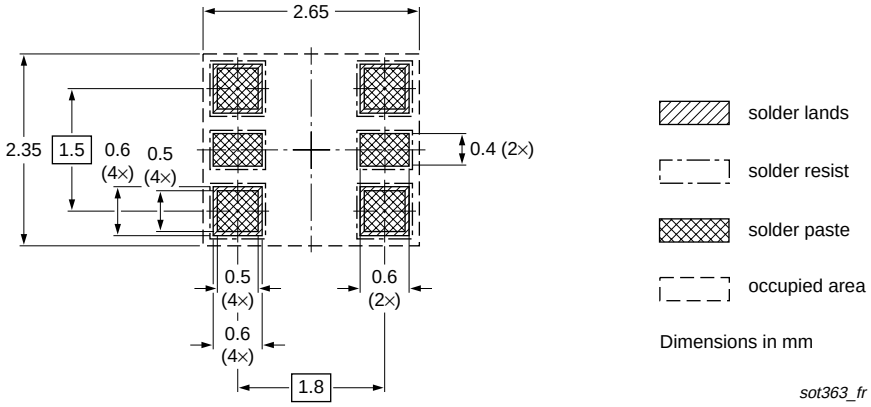


Fig 12. Reflow soldering footprint SOT363 (SC-88)

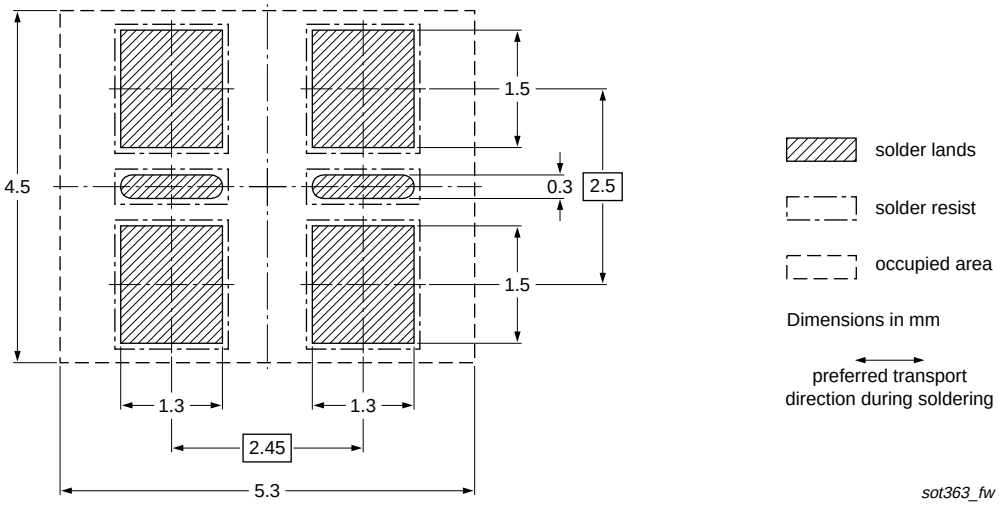


Fig 13. Wave soldering footprint SOT363 (SC-88)

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC856BS_1	20090811	Product data sheet	-	-

13. Legal information

13.1 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.

[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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