



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/PNP complement	NPN/PNP complement
	Nexperia	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

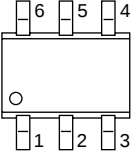
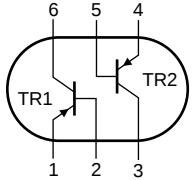
1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
V_{CE0}	collector-emitter voltage	open base	-	-	-65	V
I_C	collector current		-	-	-100	mA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V};$ $I_C = -2\text{ mA}$	200	290	450	

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	emitter TR1		 <i>sym018</i>
2	base TR1		
3	collector TR2		
4	emitter TR2		
5	base TR2		
6	collector TR1		

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

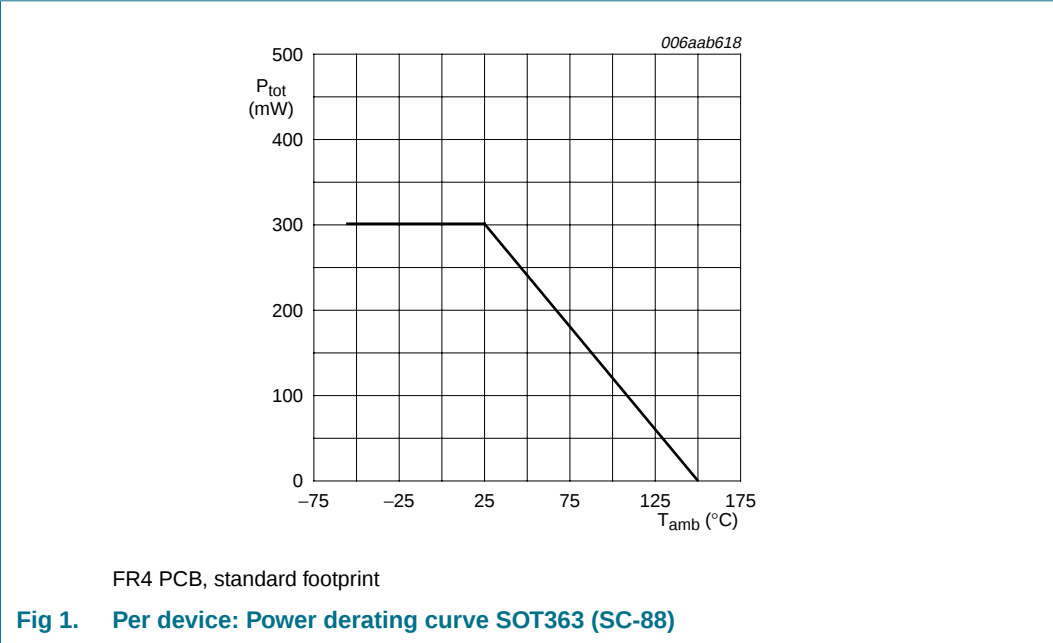
[1] * = -: made in Hong Kong
* = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

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 ≤ 1 ms	-	-200	mA
I _{BM}	peak base 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.

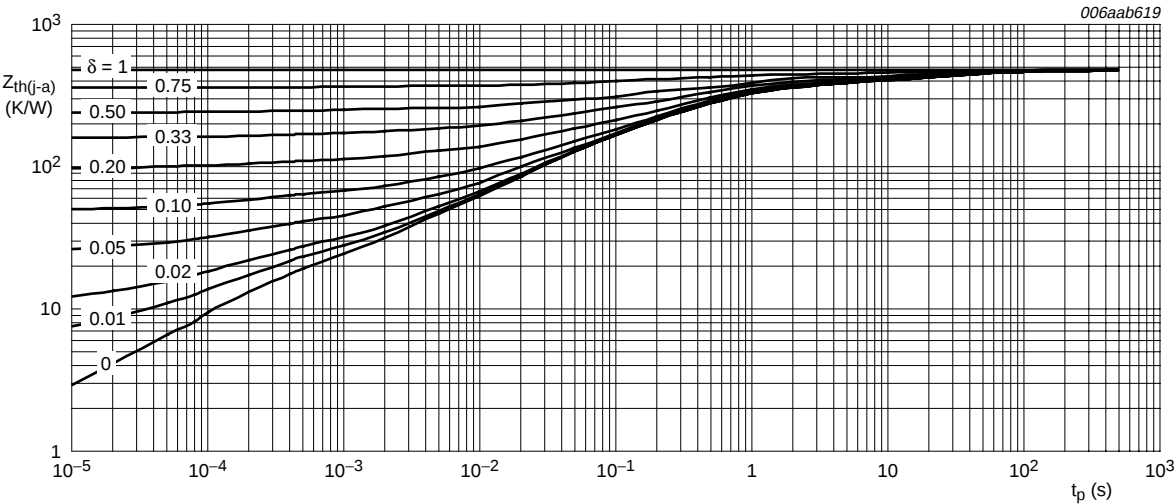


6. Thermal characteristics

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

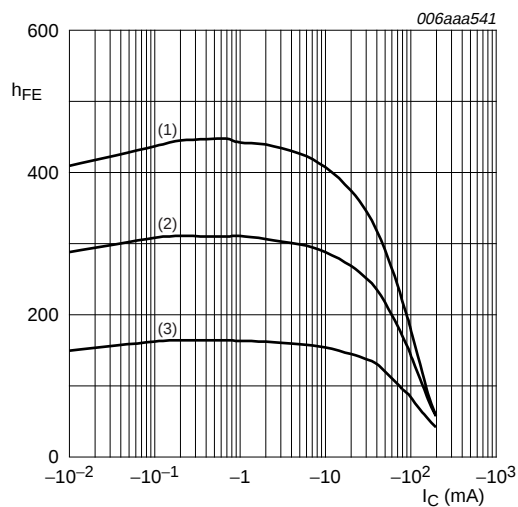
Fig 2. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 8. Characteristics

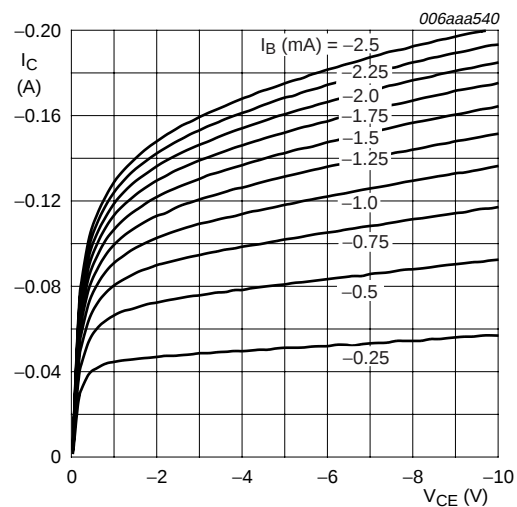
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
I_{CBO}	collector-base cut-off current	$V_{CB} = -50\text{ V}; I_E = 0\text{ A}$	-	-	-15	nA
		$V_{CB} = -30\text{ V}; I_E = 0\text{ A};$	-	-	-5	μA
		$T_j = 150\text{ }^{\circ}\text{C}$				
I_{EBO}	emitter-base cut-off current	$V_{EB} = -6\text{ V}; I_C = 0\text{ A}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V}$				
		$I_C = -10\text{ }\mu\text{A}$	-	270	-	
		$I_C = -2\text{ mA}$	200	290	450	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -10\text{ mA};$ $I_B = -0.5\text{ mA}$	-	-55	-100	mV
		$I_C = -100\text{ mA}; I_B = -5\text{ mA}$	-	-200	-300	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = -10\text{ mA};$ $I_B = -0.5\text{ mA}$	-	-755	-850	mV
		$I_C = -100\text{ mA}; I_B = -5\text{ mA}$	-	-900	-	mV
V_{BE}	base-emitter voltage	$V_{CE} = -5\text{ V}$				
		$I_C = -2\text{ mA}$	-600	-650	-750	mV
		$I_C = -10\text{ mA}$	-	-	-820	mV
C_c	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_C = 0\text{ A};$ $f = 1\text{ MHz}$	-	2.3	-	pF
C_e	emitter capacitance	$V_{EB} = -0.5\text{ V};$ $I_C = I_E = 0\text{ A}; f = 1\text{ MHz}$	-	10	-	pF
f_T	transition frequency	$V_{CE} = -5\text{ V}; I_C = -10\text{ mA};$ $f = 100\text{ MHz}$	100	-	-	MHz
NF	noise figure	$V_{CE} = -5\text{ V}; I_C = -0.2\text{ mA};$ $R_S = 2\text{ k}\Omega;$ $f = 10\text{ Hz to }15.7\text{ kHz}$	-	1.6	-	dB
		$V_{CE} = -5\text{ V}; I_C = -0.2\text{ mA};$ $R_S = 2\text{ k}\Omega; f = 1\text{ kHz};$ $B = 200\text{ Hz}$	-	2.9	-	dB



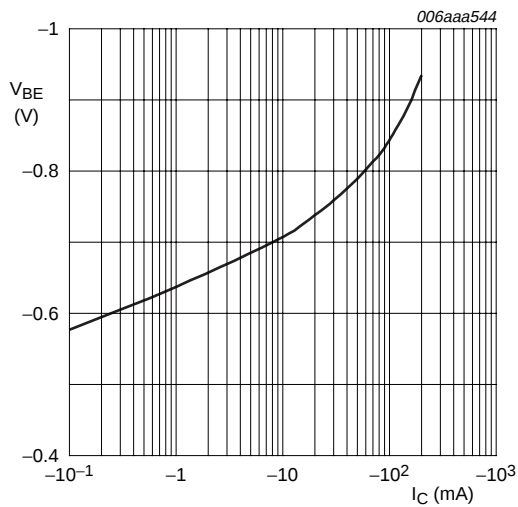
$V_{CE} = -5\text{ V}$
(1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



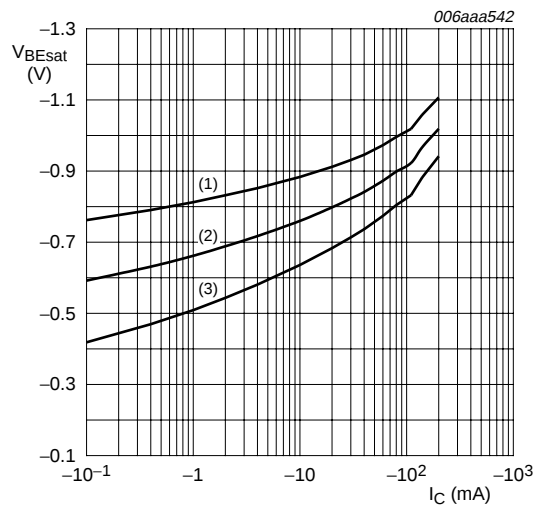
$T_{amb} = 25\text{ }^{\circ}\text{C}$

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



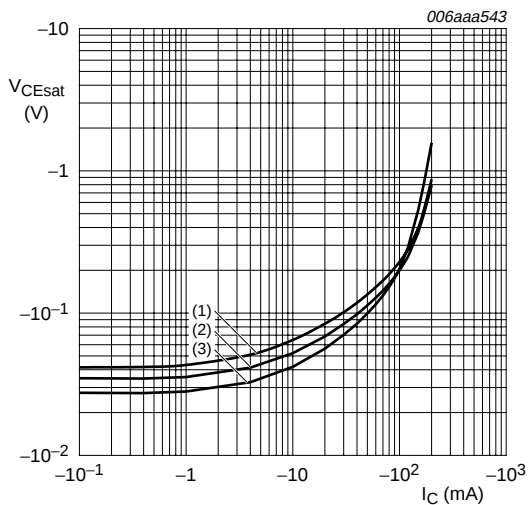
$V_{CE} = -5\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$

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



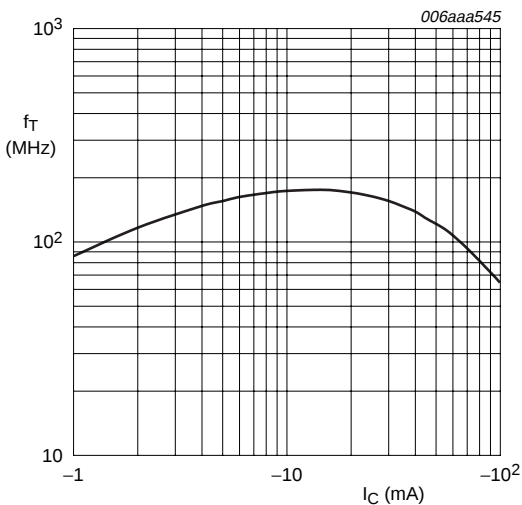
$I_C/I_B = 20$
(1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



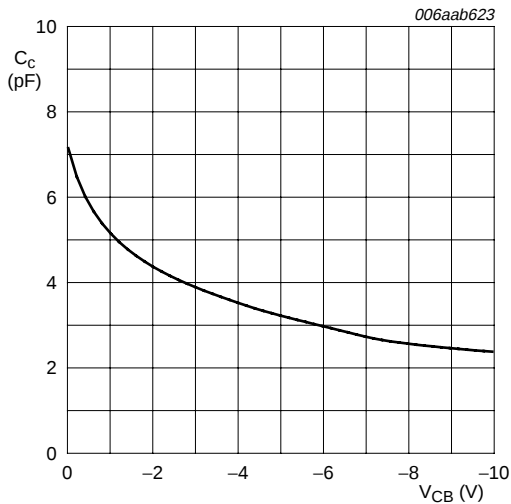
$I_C/I_B = 20$
(1) $T_{amb} = 100^\circ\text{C}$
(2) $T_{amb} = 25^\circ\text{C}$
(3) $T_{amb} = -55^\circ\text{C}$

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



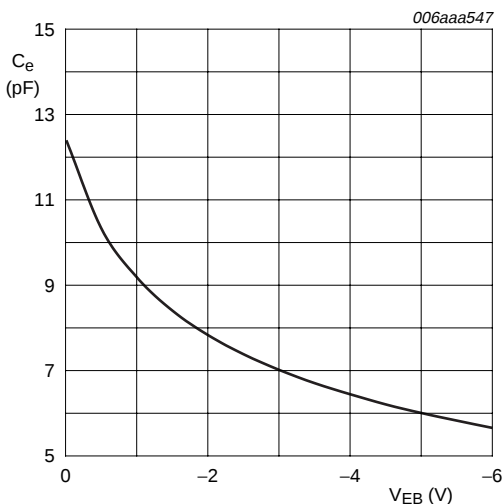
$V_{CE} = -5\text{ V}$; $T_{amb} = 25^\circ\text{C}$

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



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

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



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

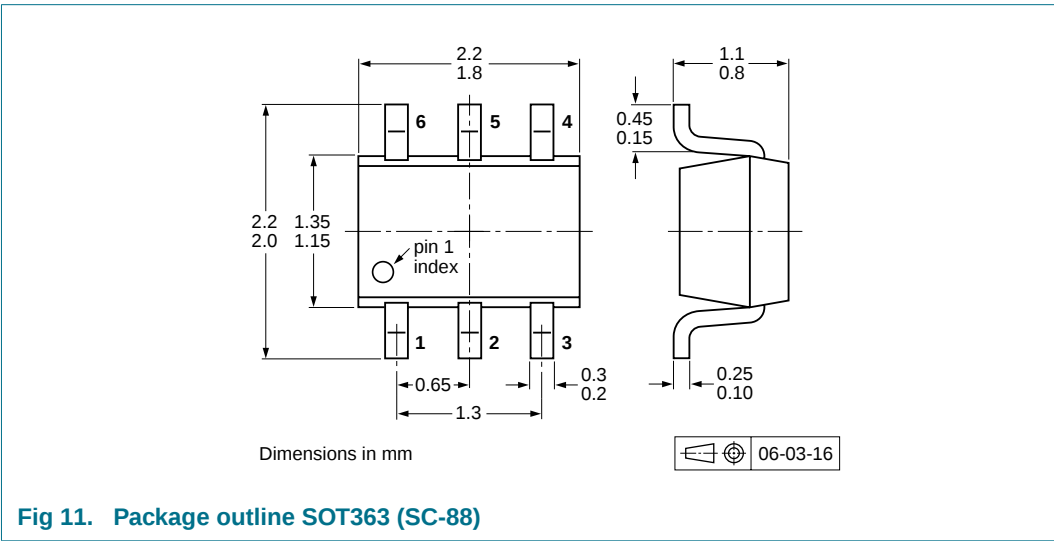
Fig 10. Per transistor: Emitter capacitance as a function of emitter-base voltage; typical values

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



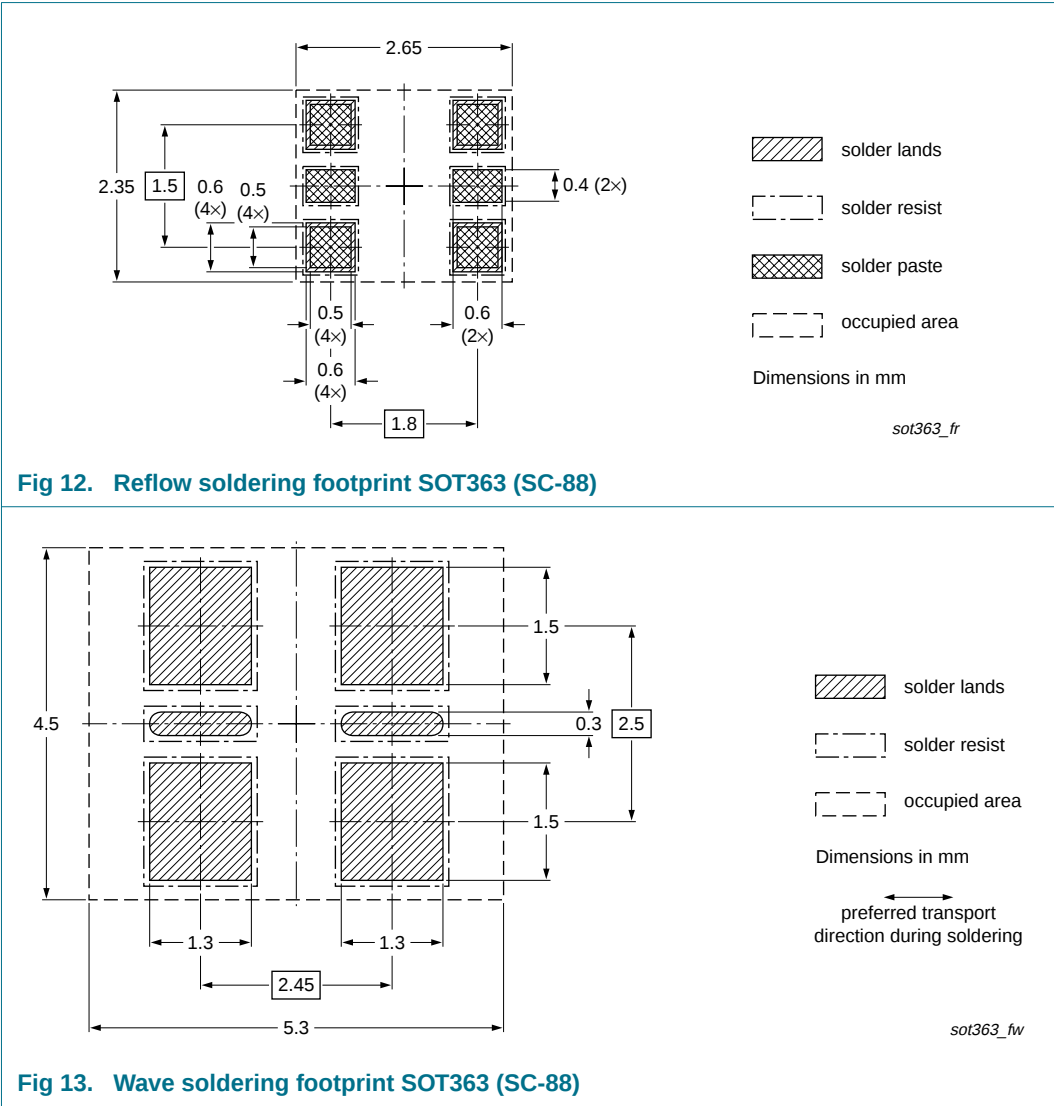
10. Packing information

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



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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15. Contents

1	Product profile	1
1.1	General description.	1
1.2	Features	1
1.3	Applications	1
1.4	Quick reference data.	1
2	Pinning information	2
3	Ordering information	2
4	Marking	2
5	Limiting values	3
6	Thermal characteristics	4
7	Characteristics	5
8	Test information	8
8.1	Quality information	8
9	Package outline	8
10	Packing information	8
11	Soldering	9
12	Revision history	10
13	Legal information	11
13.1	Data sheet status	11
13.2	Definitions.	11
13.3	Disclaimers	11
13.4	Trademarks.	11
14	Contact information	11
15	Contents	12