

BC847BS

45 V, 100 mA NPN/NPN general-purpose transistor

Rev. 03 — 18 February 2009

Product data sheet

1. Product profile

1.1 General description

NPN/NPN general-purpose transistor pair in a very small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package.

PNP/PNP complement: BC857BS.

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

1.3 Applications

- General-purpose switching and amplification

1.4 Quick reference data

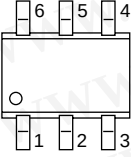
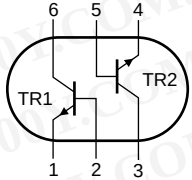
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
V_{CE0}	collector-emitter voltage	open base	-	-	45	V
I_C	collector current		-	-	100	mA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}; I_C = 2\text{ mA}$	200	-	450	

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2. Pinning information

Table 2. 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		

sym020

3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BC847BS	SC-88	plastic surface-mounted package; 6 leads	SOT363

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
BC847BS	1F*

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

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5. Limiting values

Table 5. Limiting values

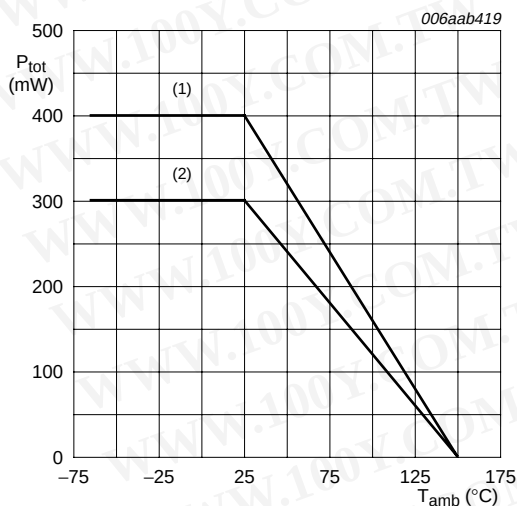
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	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] -	220	mW
			[2] -	250	mW
Per device					
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1] -	300	mW
			[2] -	400	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] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

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- (1) FR4 PCB, mounting pad for collector 1 cm²
 (2) FR4 PCB, standard footprint

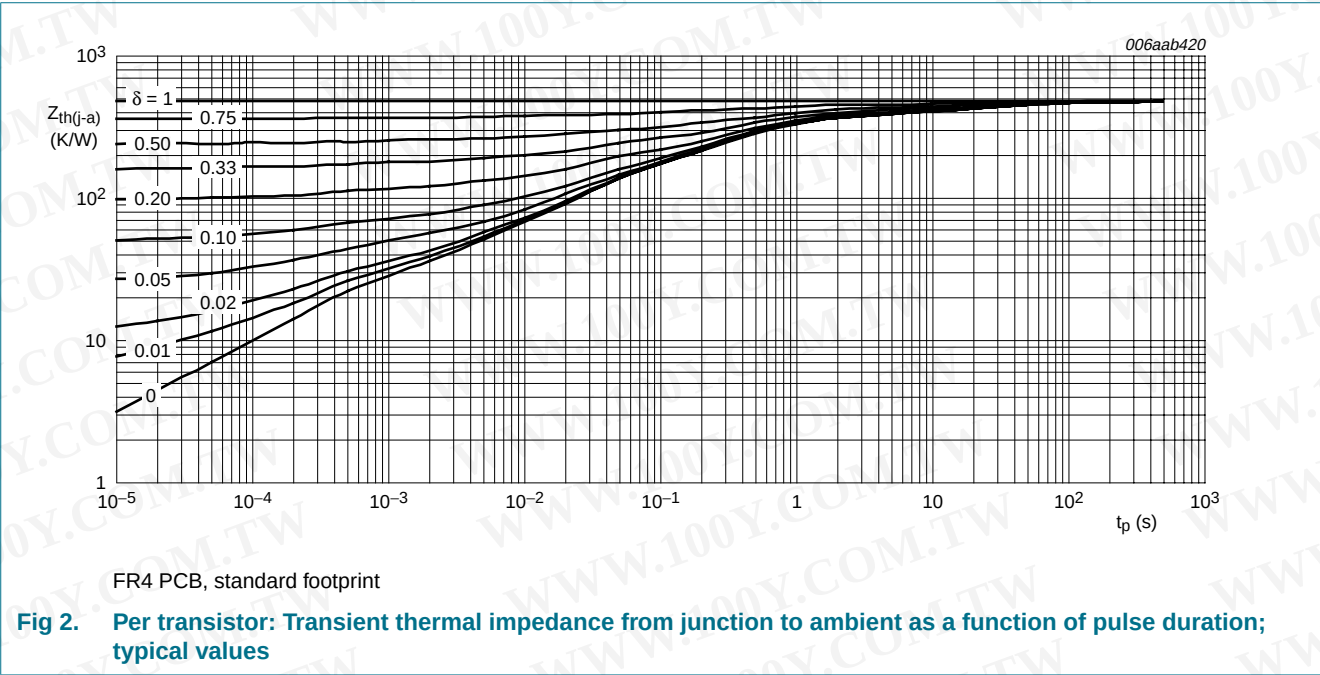
Fig 1. Per device: Power derating curves SOT363 (SC-88)

6. Thermal characteristics

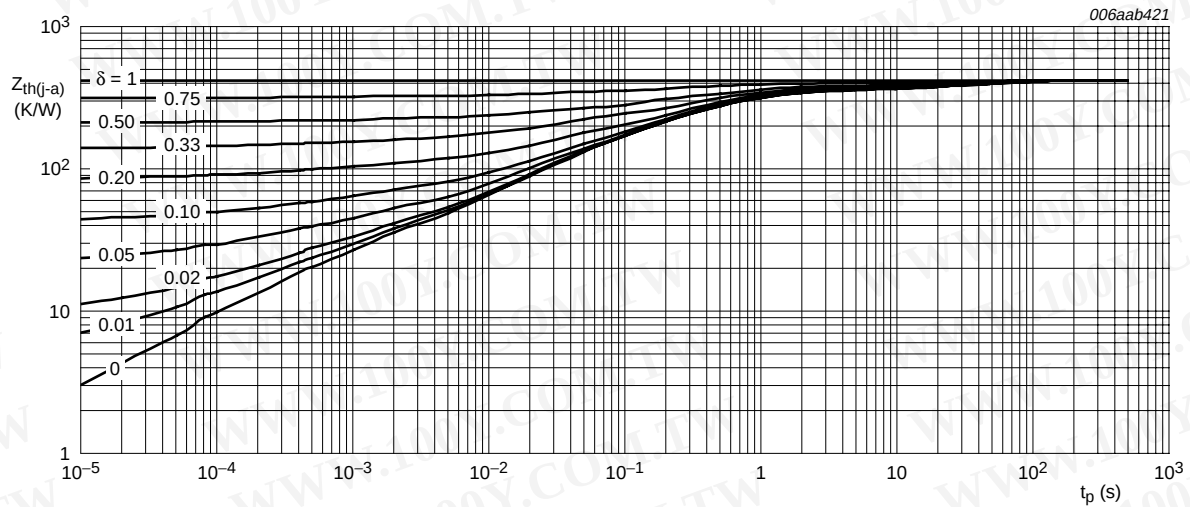
Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	568	K/W
			[2]	-	500	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
			[2]	-	313	K/W

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².



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FR4 PCB, mounting pad for collector 1 cm²

Fig 3. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

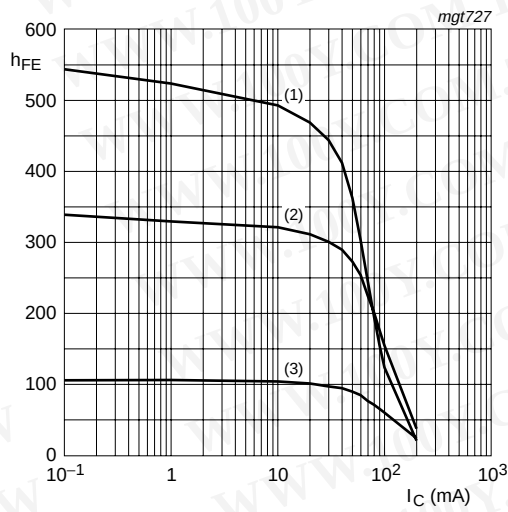
Table 7. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
I_{CBO}	collector-base cut-off current	$V_{CB} = 30\text{ V}; I_E = 0\text{ A}$	-	-	15	nA
		$V_{CB} = 30\text{ V}; I_E = 0\text{ A}; T_j = 150^{\circ}\text{C}$	-	-	5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	-	-	100	nA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}; I_C = 2\text{ mA}$	200	-	450	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$	-	-	100	mV
		$I_C = 100\text{ mA}; I_B = 5\text{ mA}$	[1]	-	300	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$	-	755	-	mV
V_{BE}	base-emitter voltage	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$	580	655	700	mV
C_c	collector capacitance	$I_E = I_C = 0\text{ A}; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$	-	-	1.5	pF
C_e	emitter capacitance	$I_C = I_E = 0\text{ A}; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	-	11	-	pF
f_T	transition frequency	$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$	100	-	-	MHz

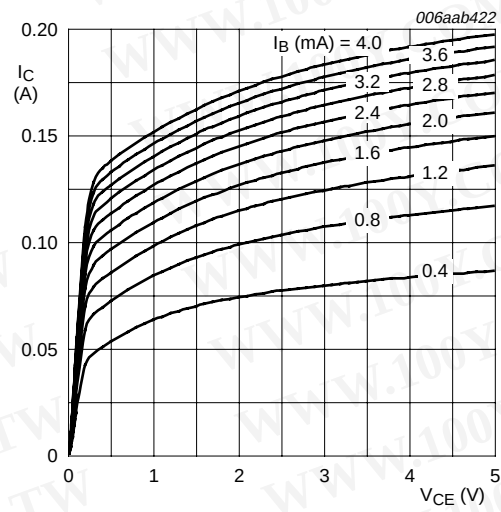
[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$.

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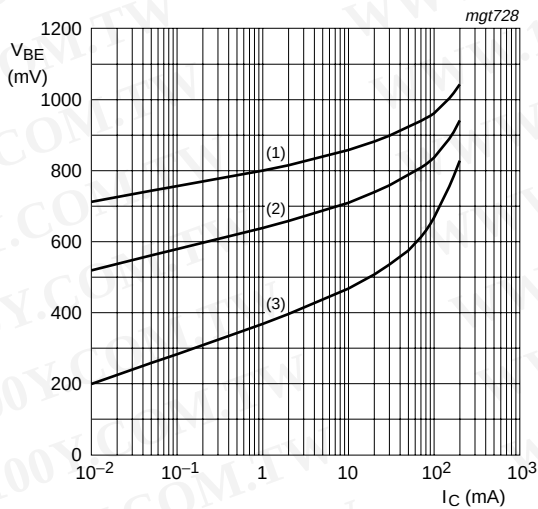
- $V_{CE} = 5 \text{ V}$
- (1) $T_{amb} = 150 \text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -55 \text{ }^{\circ}\text{C}$

Fig 4. Per transistor: DC current gain as a function of collector current; typical values



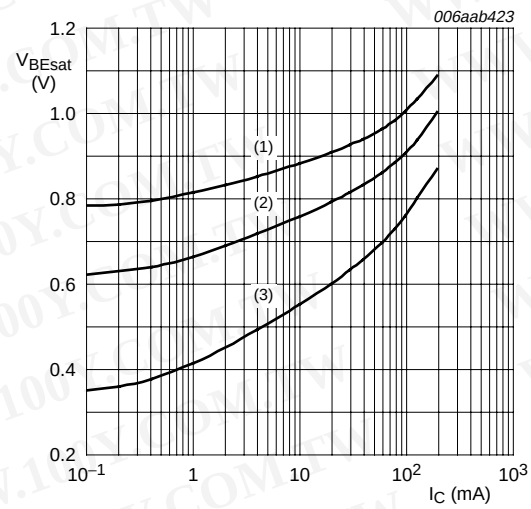
$T_{amb} = 25 \text{ }^{\circ}\text{C}$

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



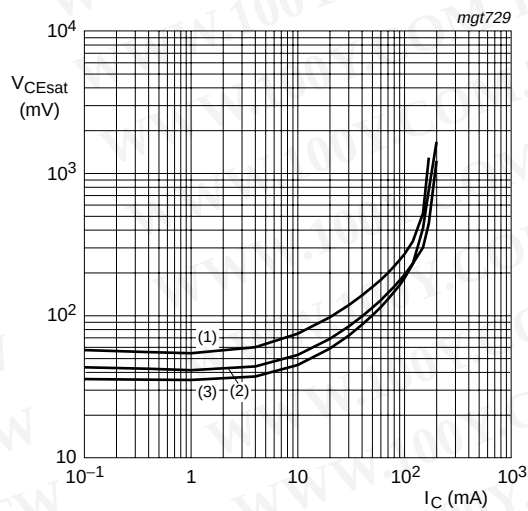
- $V_{CE} = 5 \text{ V}$
- (1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = 150 \text{ }^{\circ}\text{C}$

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



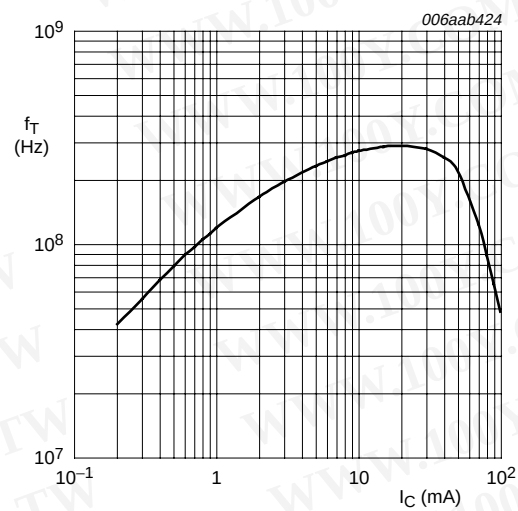
- $I_C/I_B = 20$
- (1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = 150 \text{ }^{\circ}\text{C}$

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



- $I_C/I_B = 20$
- (1) $T_{amb} = 150\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

Fig 8. Per transistor: Collector-emitter saturation voltage as a function of collector current; typical values

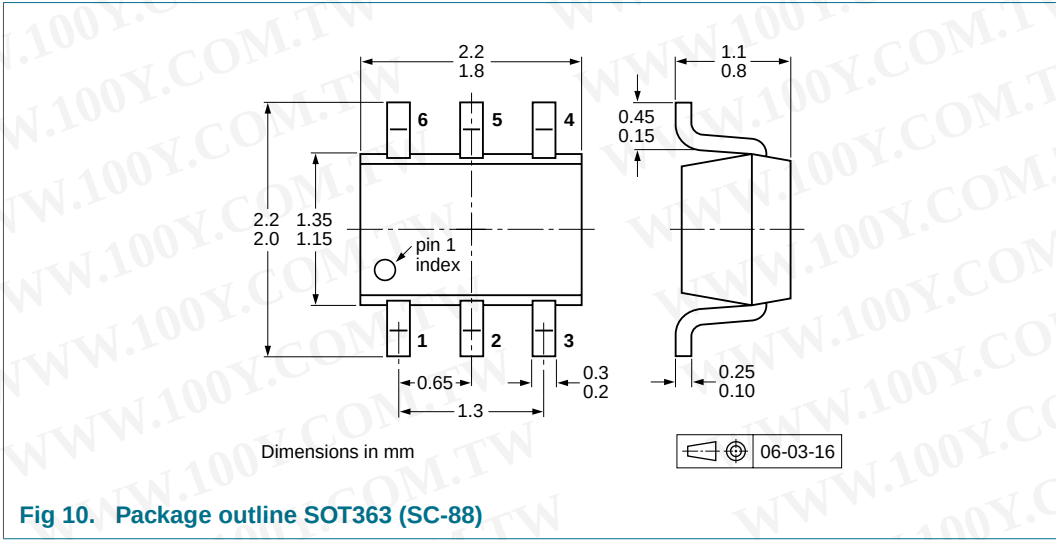


$V_{CE} = 5\text{ V}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig 9. Per transistor: Transition frequency as a function of collector current; typical values

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8. Package outline



9. Packing information

Table 8. Packing methods
The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity	
			3000	10000
BC847BS	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 13](#).
[2] T1: normal taping
[3] T2: reverse taping

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10. Soldering

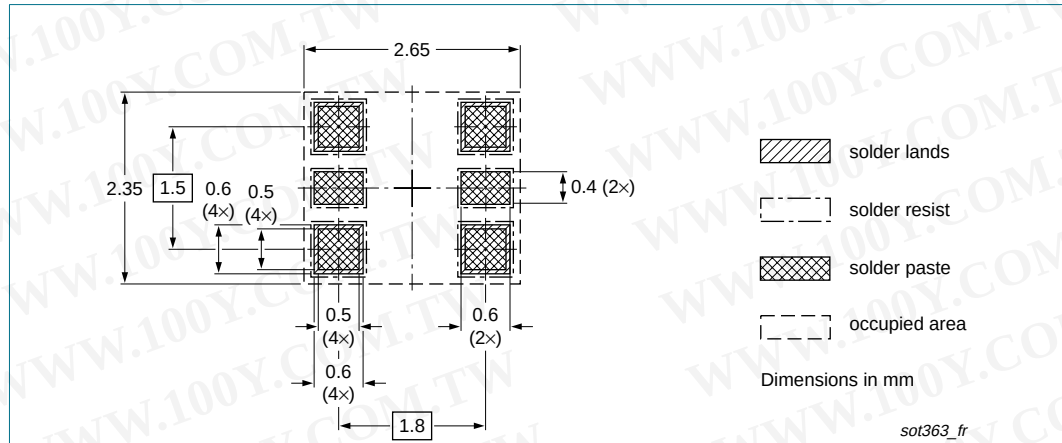


Fig 11. Reflow soldering footprint SOT363 (SC-88)

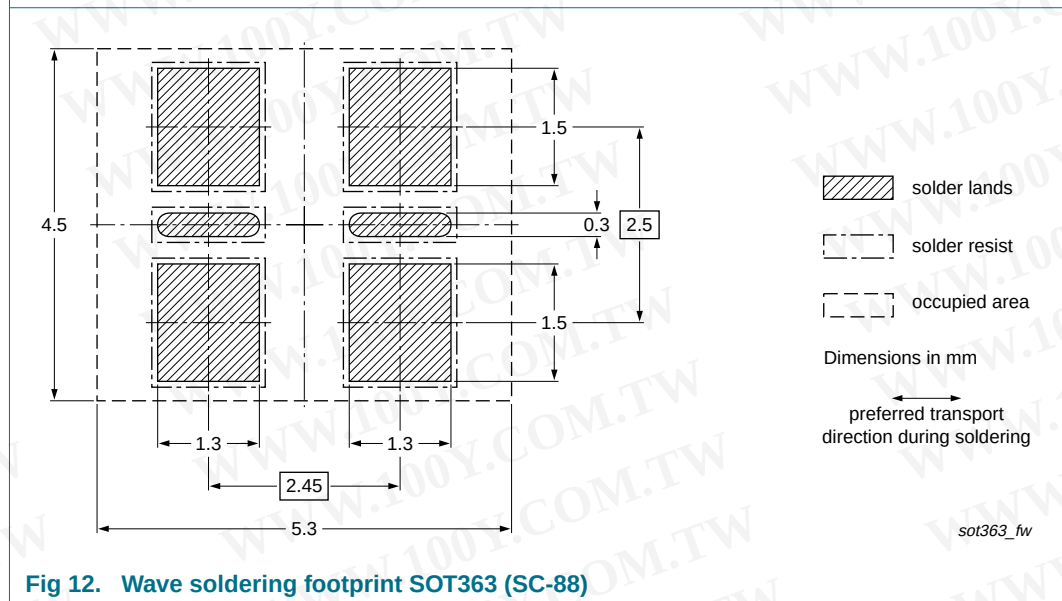


Fig 12. Wave soldering footprint SOT363 (SC-88)

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11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC847BS_3	20090218	Product data sheet	-	BC847BS_2
Modifications:				
• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Section 4 "Marking": updated • Section 7 "Characteristics": enhanced • Section 9 "Packing information": added • Section 10 "Soldering": added • Section 12 "Legal information": updated				
BC847BS_2	19990428	Product specification	-	BC847BS_1
BC847BS_1	19970714	Product specification	-	-

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12. Legal information

12.1 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".

[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 URL <http://www.nxp.com>.

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