



# 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
<b>Per transistor</b>						
$V_{CEO}$	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	

## 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 <sup>[1]</sup>
BC847BS	1F*

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

## 5. Limiting values

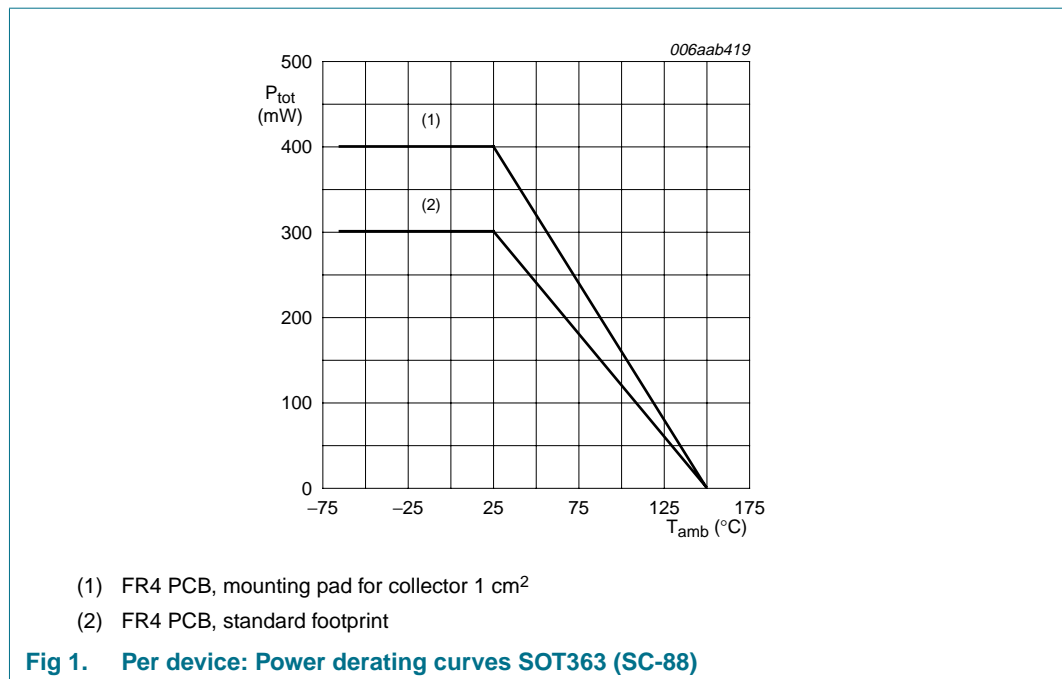
**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit	
<b>Per transistor</b>						
$V_{CBO}$	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; $t_p \leq 1$ 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]	-	220	mW
			[2]	-	250	mW
<b>Per device</b>						
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °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 cm<sup>2</sup>.



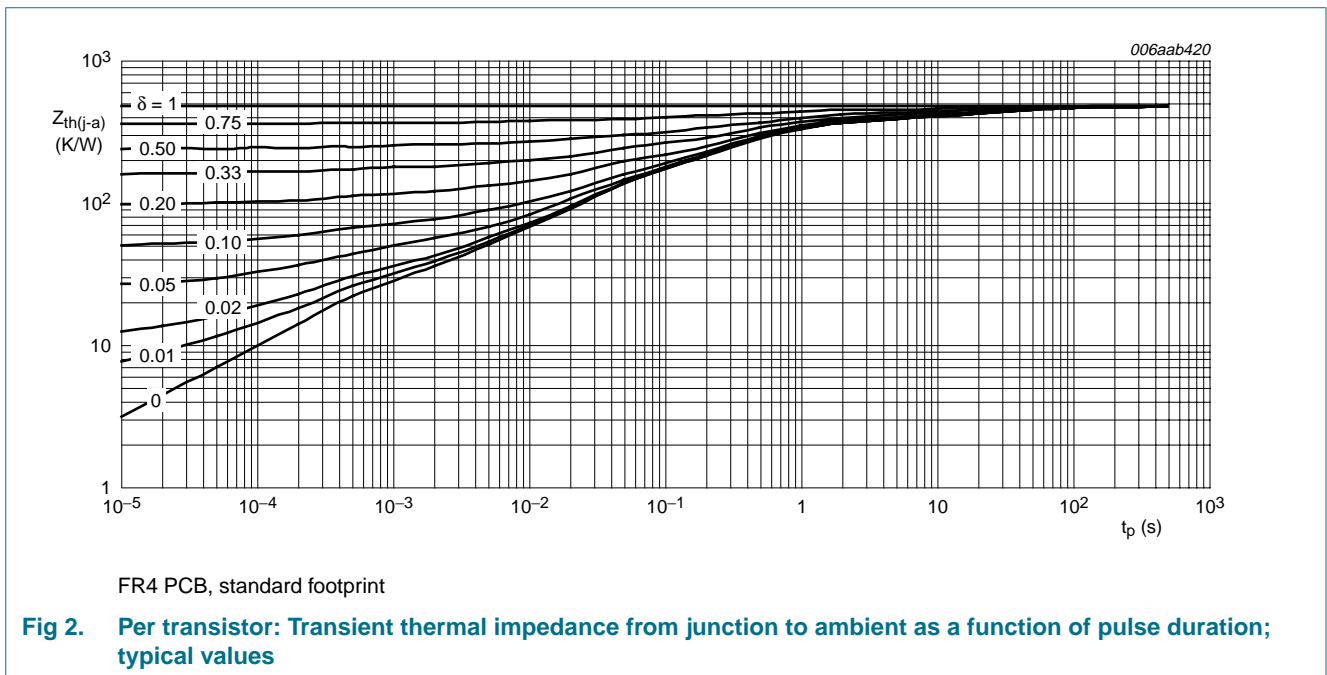
## 6. Thermal characteristics

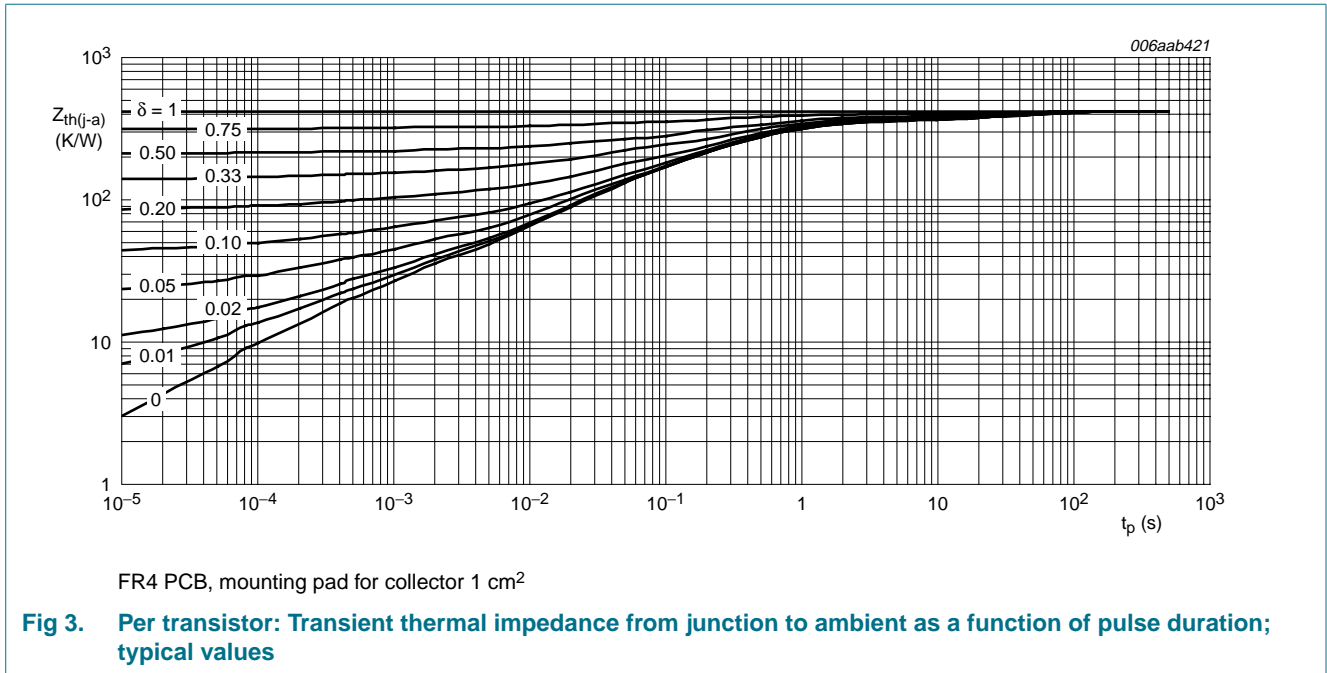
Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
$R_{th(j-a)}$	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
<b>Per device</b>						
$R_{th(j-a)}$	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 cm<sup>2</sup>.





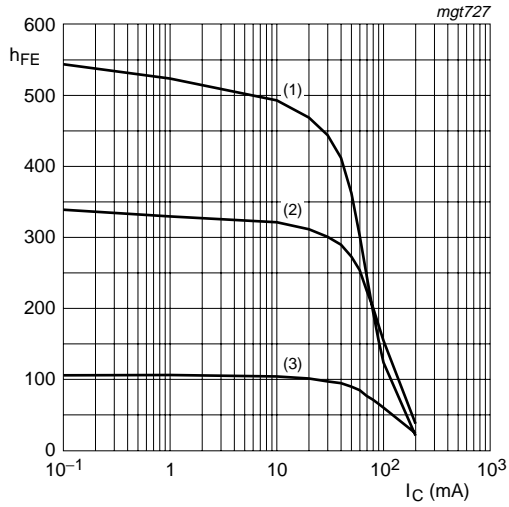
## 7. Characteristics

**Table 7. Characteristics**

*T<sub>amb</sub> = 25 °C unless otherwise specified.*

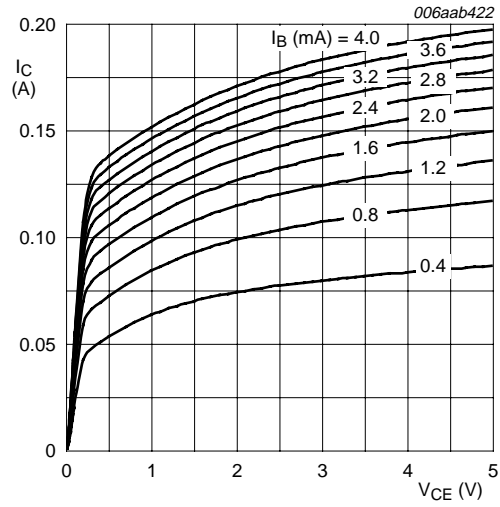
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = 30 V; I <sub>E</sub> = 0 A	-	-	15	nA
		V <sub>CB</sub> = 30 V; I <sub>E</sub> = 0 A; T <sub>j</sub> = 150 °C	-	-	5	μA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0 A	-	-	100	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = 5 V; I <sub>C</sub> = 2 mA	200	-	450	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.5 mA	-	-	100	mV
		I <sub>C</sub> = 100 mA; I <sub>B</sub> = 5 mA	[1]	-	300	mV
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = 10 mA; I <sub>B</sub> = 0.5 mA	-	755	-	mV
V <sub>BE</sub>	base-emitter voltage	I <sub>C</sub> = 2 mA; V <sub>CE</sub> = 5 V	580	655	700	mV
C <sub>c</sub>	collector capacitance	I <sub>E</sub> = I <sub>e</sub> = 0 A; V <sub>CB</sub> = 10 V; f = 1 MHz	-	-	1.5	pF
C <sub>e</sub>	emitter capacitance	I <sub>C</sub> = I <sub>c</sub> = 0 A; V <sub>EB</sub> = 0.5 V; f = 1 MHz	-	11	-	pF
f <sub>T</sub>	transition frequency	I <sub>C</sub> = 10 mA; V <sub>CE</sub> = 5 V; f = 100 MHz	100	-	-	MHz

[1] Pulse test: t<sub>p</sub> ≤ 300 μs; δ ≤ 0.02.



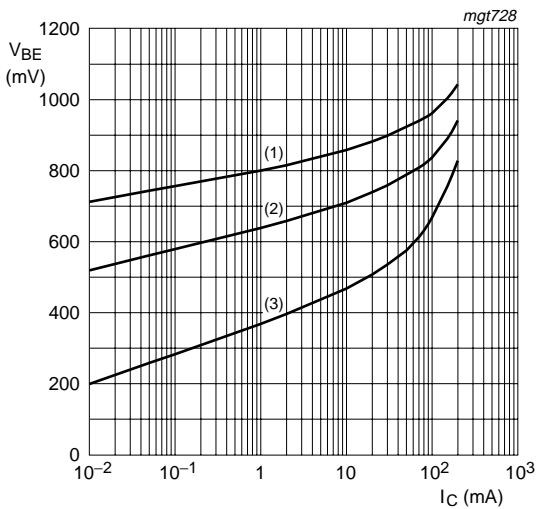
$V_{CE} = 5\text{ V}$   
 (1)  $T_{amb} = 150\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -55\text{ }^\circ\text{C}$

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



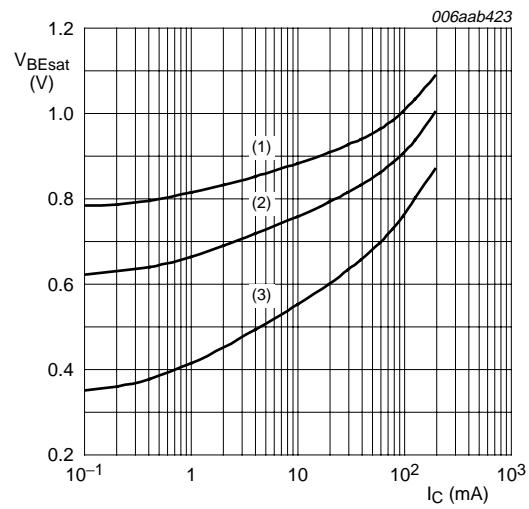
$T_{amb} = 25\text{ }^\circ\text{C}$

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



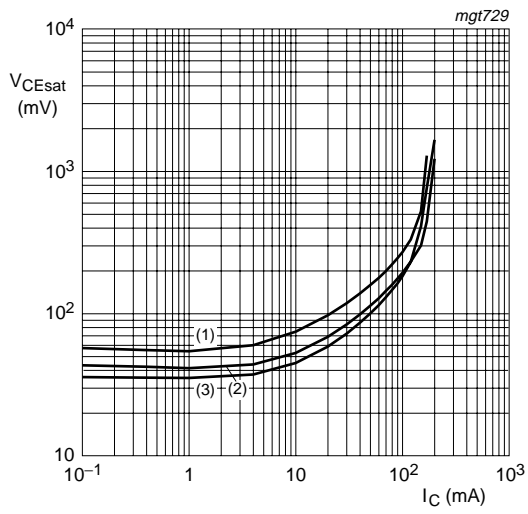
$V_{CE} = 5\text{ V}$   
 (1)  $T_{amb} = -55\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 150\text{ }^\circ\text{C}$

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



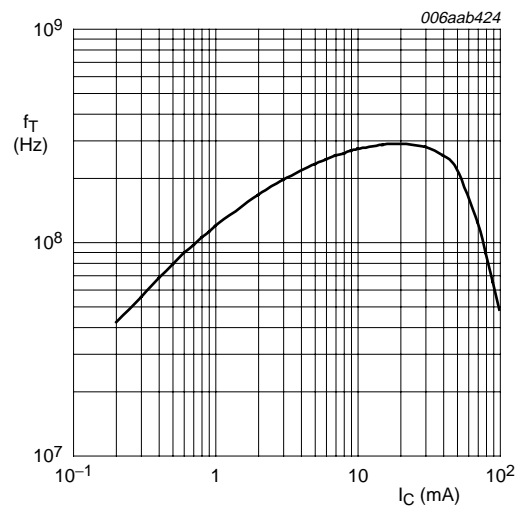
$I_C/I_B = 20$   
 (1)  $T_{amb} = -55\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 150\text{ }^\circ\text{C}$

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



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

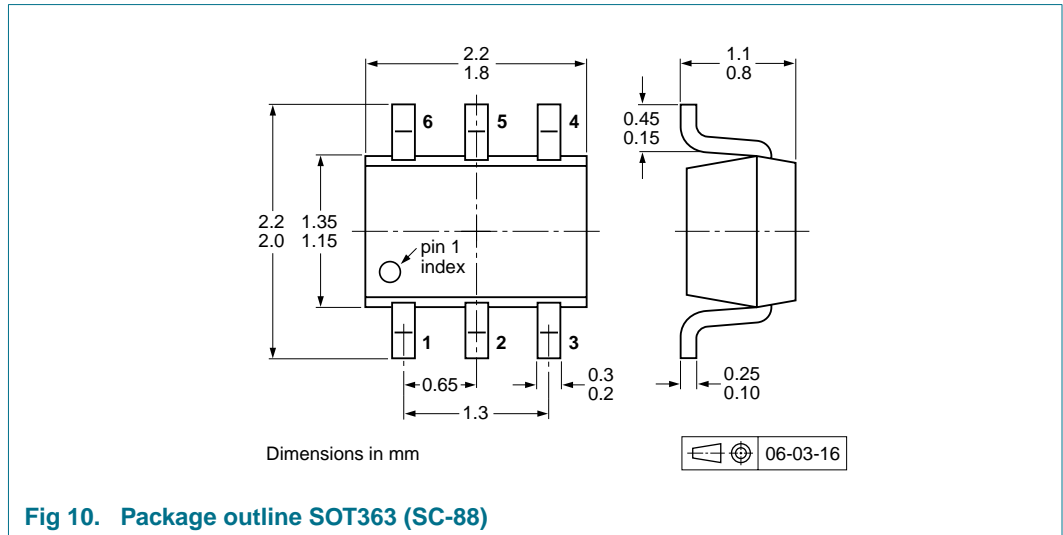
**Fig 8.** Per transistor: Collector-emitter saturation voltage as a function of collector current; typical values



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

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

## 8. Package outline



## 9. Packing information

**Table 8. Packing methods**

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

Type number	Package	Description	Packing quantity	
			3000	10000
BC847BS	SOT363	4 mm pitch, 8 mm tape and reel; T1	<sup>[2]</sup> -115	-135
		4 mm pitch, 8 mm tape and reel; T2	<sup>[3]</sup> -125	-165

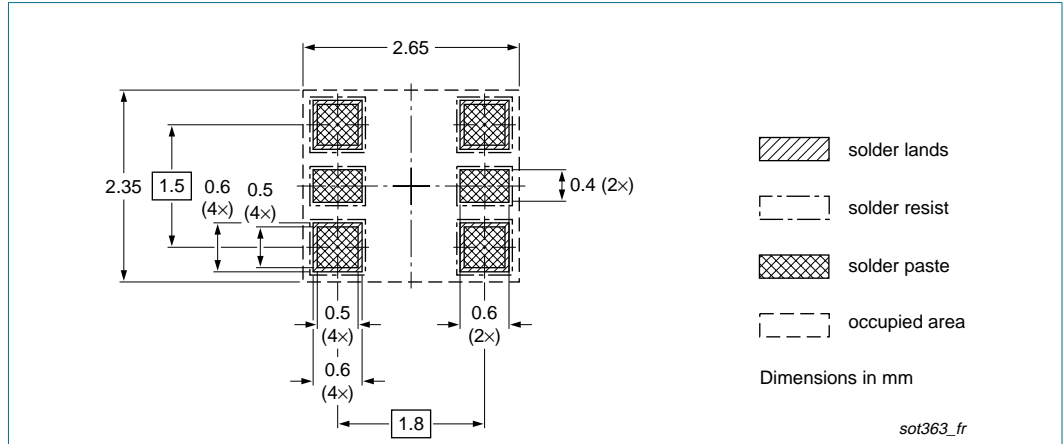
[1] For further information and the availability of packing methods, see [Section 13](#).

[2] T1: normal taping

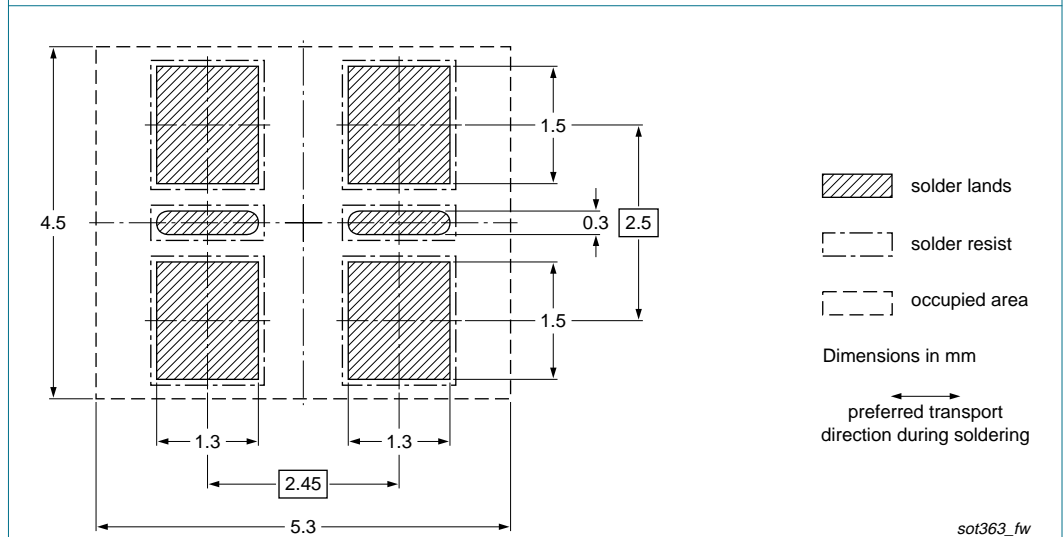
[3] T2: reverse taping



**10. Soldering**



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



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

## 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:	<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• <a href="#">Section 4 "Marking"</a>: updated</li><li>• <a href="#">Section 7 "Characteristics"</a>: enhanced</li><li>• <a href="#">Section 9 "Packing information"</a>: added</li><li>• <a href="#">Section 10 "Soldering"</a>: added</li><li>• <a href="#">Section 12 "Legal information"</a>: updated</li></ul>			
BC847BS_2	19990428	Product specification	-	BC847BS_1
BC847BS_1	19970714	Product specification	-	-

## 12. Legal information

### 12.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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