

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	

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

5. Limiting values

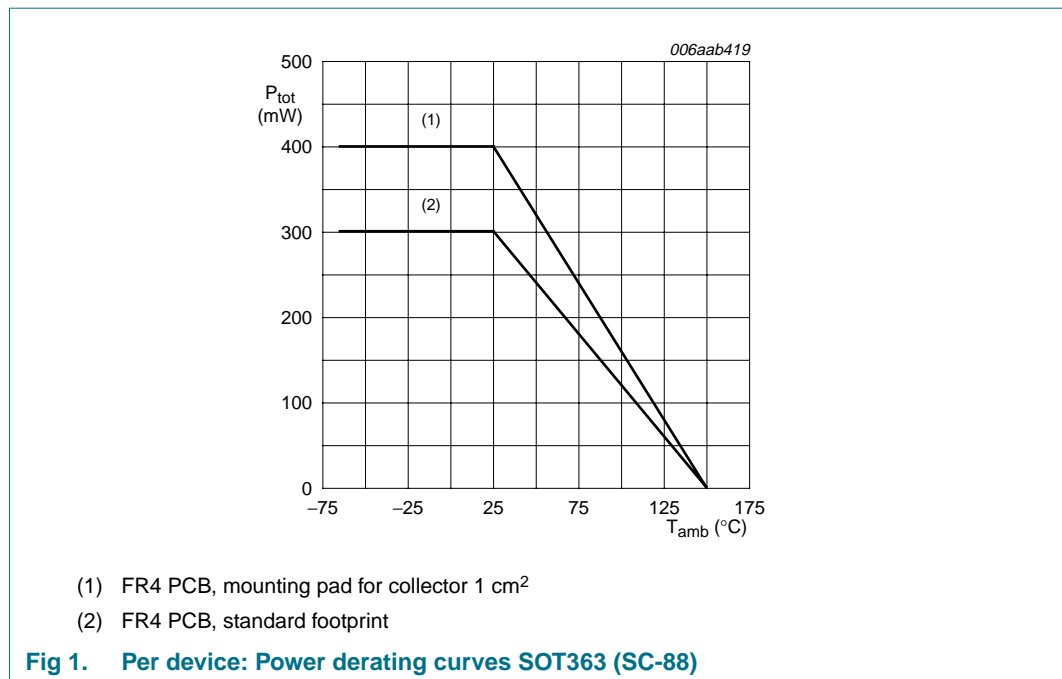
Table 5. Limiting values

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; $t_p \leq 1$ 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
Per device						
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 cm².



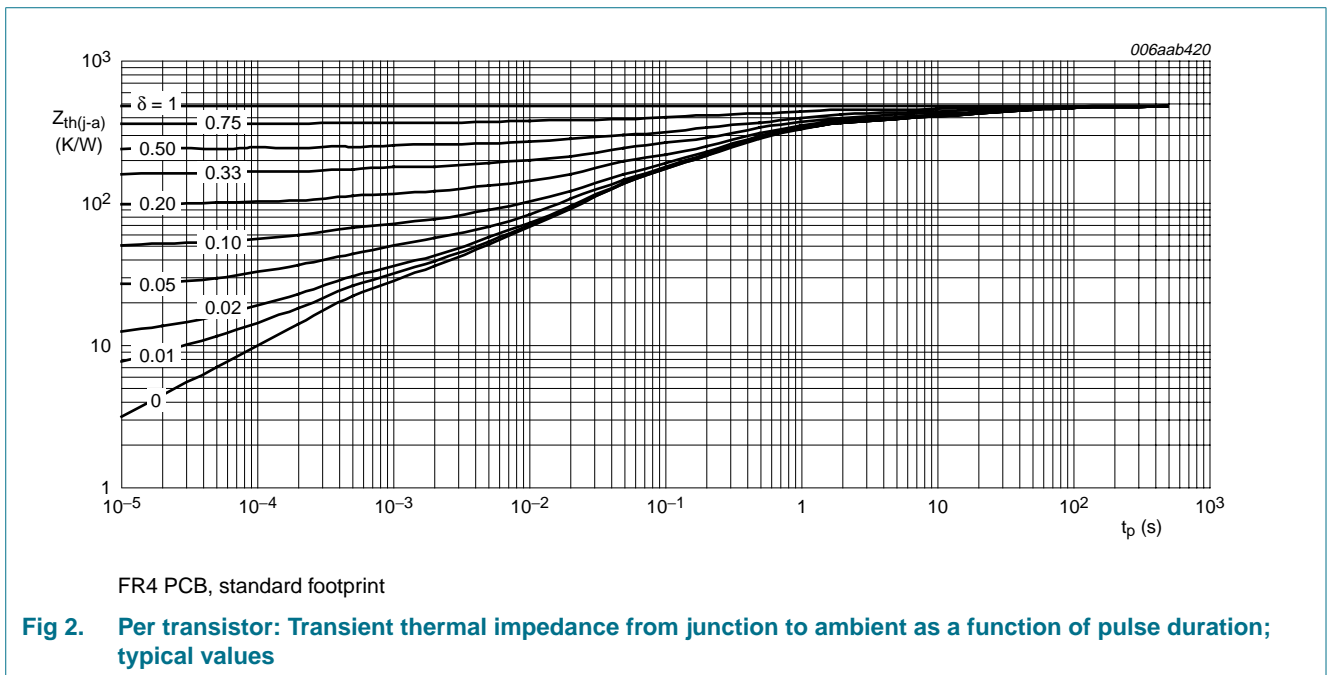
6. Thermal characteristics

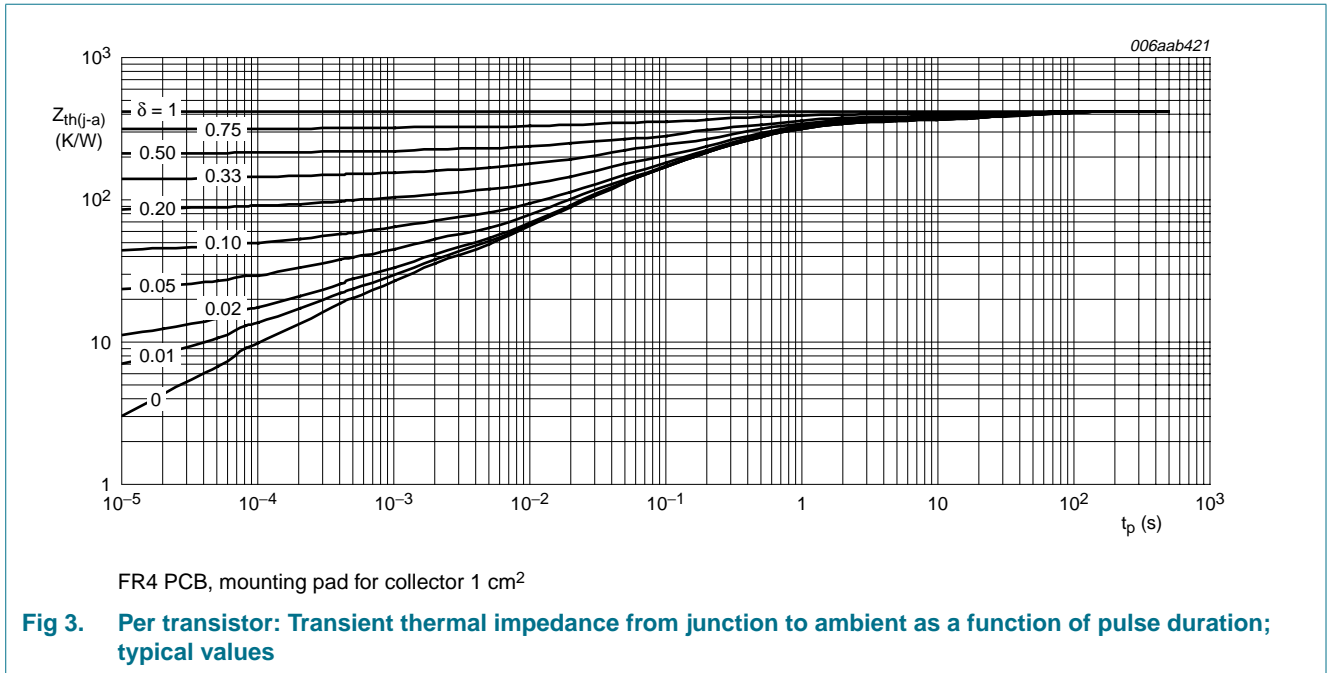
Table 6. Thermal characteristics

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.





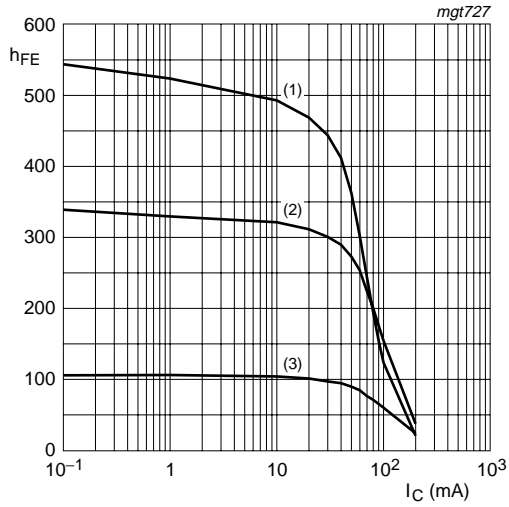
7. Characteristics

Table 7. Characteristics

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

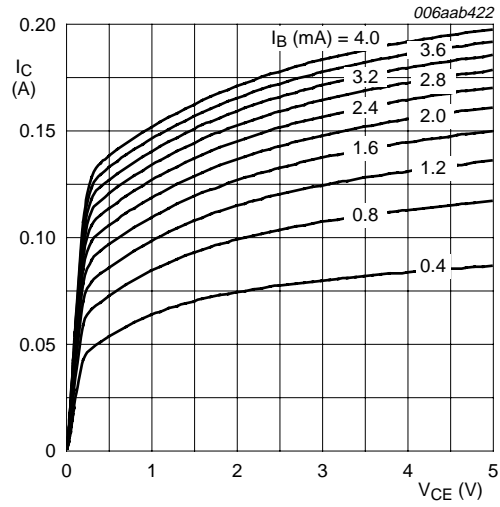
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
I _{CBO}	collector-base cut-off current	V _{CB} = 30 V; I _E = 0 A	-	-	15	nA
		V _{CB} = 30 V; I _E = 0 A; T _j = 150 °C	-	-	5	μA
I _{EBO}	emitter-base cut-off current	V _{EB} = 5 V; I _C = 0 A	-	-	100	nA
h _{FE}	DC current gain	V _{CE} = 5 V; I _C = 2 mA	200	-	450	
V _{CEsat}	collector-emitter saturation voltage	I _C = 10 mA; I _B = 0.5 mA	-	-	100	mV
		I _C = 100 mA; I _B = 5 mA	[1]	-	300	mV
V _{BEsat}	base-emitter saturation voltage	I _C = 10 mA; I _B = 0.5 mA	-	755	-	mV
V _{BE}	base-emitter voltage	I _C = 2 mA; V _{CE} = 5 V	580	655	700	mV
C _c	collector capacitance	I _E = I _e = 0 A; V _{CB} = 10 V; f = 1 MHz	-	-	1.5	pF
C _e	emitter capacitance	I _C = I _c = 0 A; V _{EB} = 0.5 V; f = 1 MHz	-	11	-	pF
f _T	transition frequency	I _C = 10 mA; V _{CE} = 5 V; f = 100 MHz	100	-	-	MHz

[1] Pulse test: t_p ≤ 300 μs; δ ≤ 0.02.



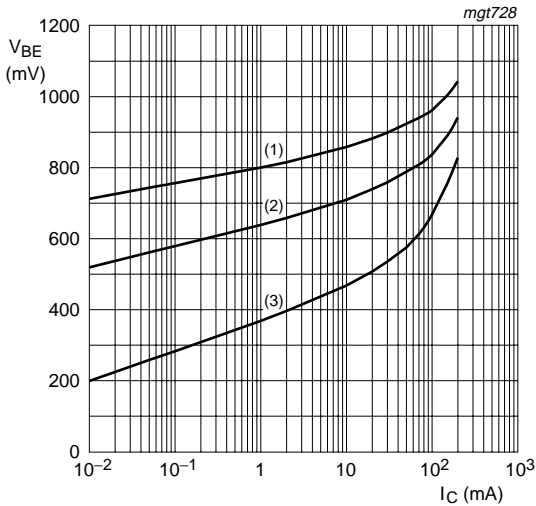
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 150\text{ }^\circ\text{C}$
 (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 (3) $T_{amb} = -55\text{ }^\circ\text{C}$

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



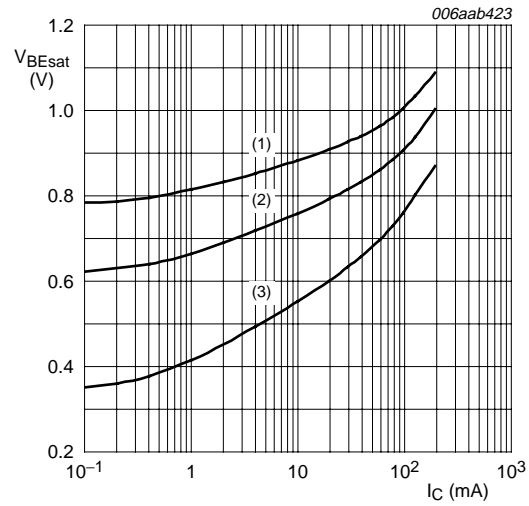
$T_{amb} = 25\text{ }^\circ\text{C}$

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



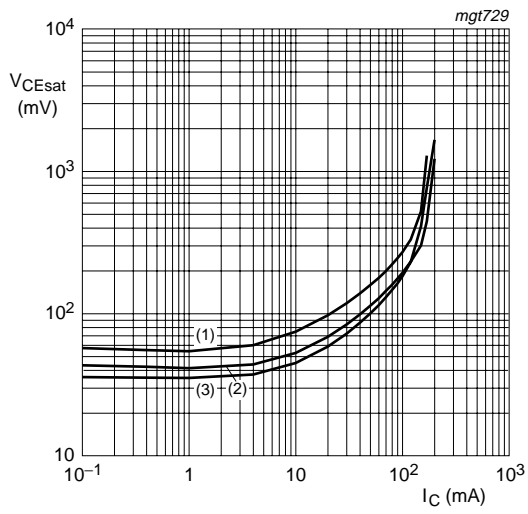
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = -55\text{ }^\circ\text{C}$
 (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 (3) $T_{amb} = 150\text{ }^\circ\text{C}$

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



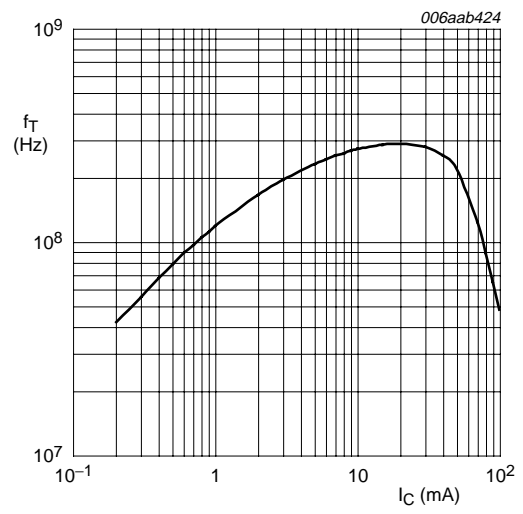
$I_C/I_B = 20$
 (1) $T_{amb} = -55\text{ }^\circ\text{C}$
 (2) $T_{amb} = 25\text{ }^\circ\text{C}$
 (3) $T_{amb} = 150\text{ }^\circ\text{C}$

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



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

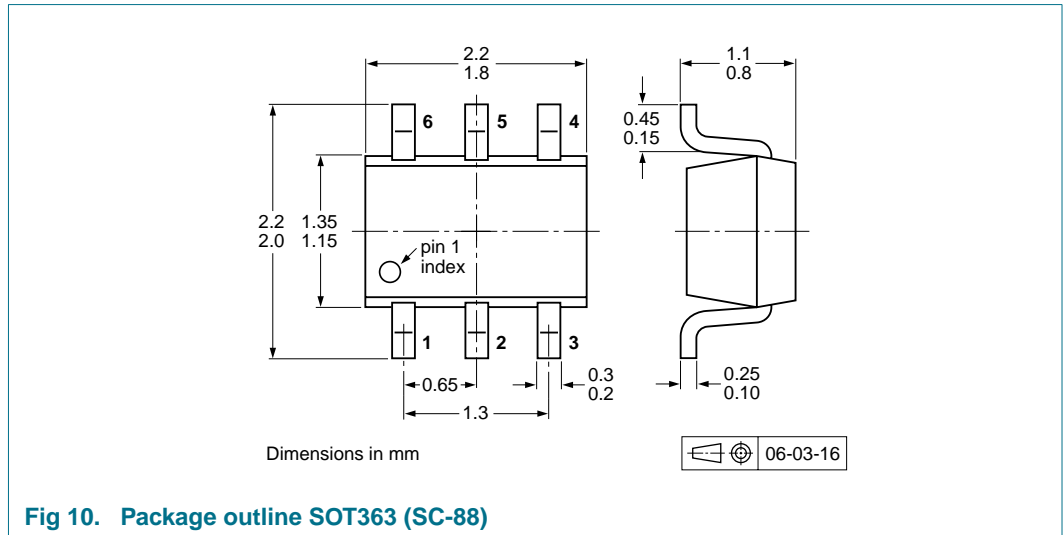
Fig 8. Per transistor: Collector-emitter saturation voltage as a function of collector current; typical values



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

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

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

10. Soldering

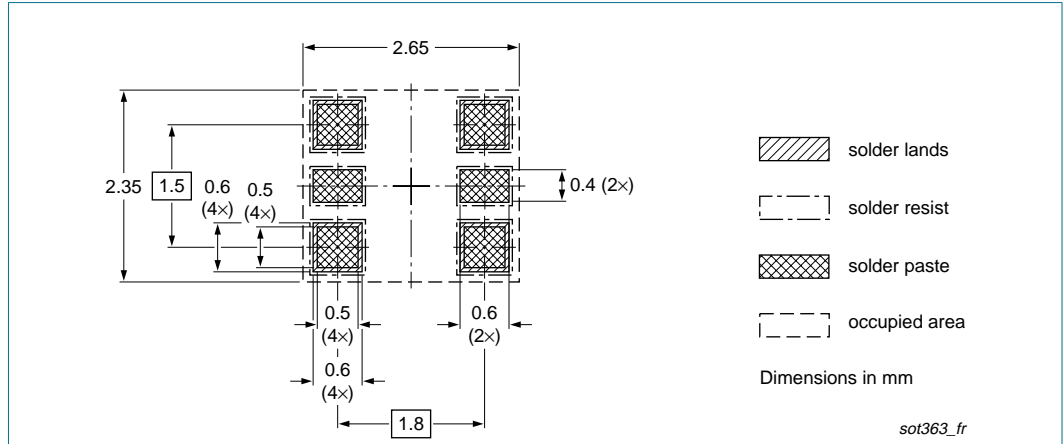


Fig 11. Reflow soldering footprint SOT363 (SC-88)

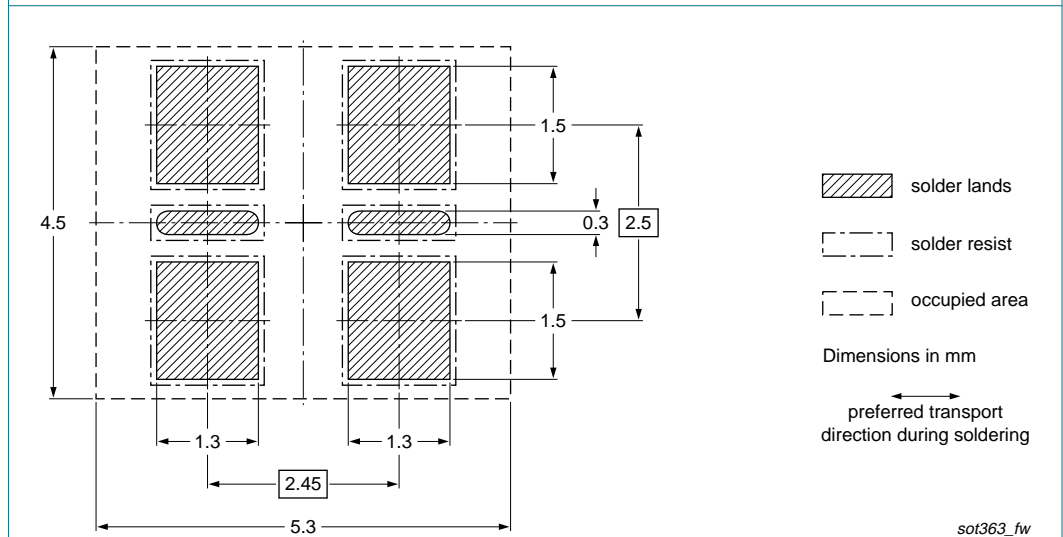


Fig 12. Wave soldering footprint SOT363 (SC-88)