

BC846DS

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

Rev. 01 — 17 July 2009

Product data sheet

1. Product profile

1.1 General description

NPN/NPN general-purpose transistor pair in a small SOT457 (SC-74) Surface-Mounted Device (SMD) plastic package.

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

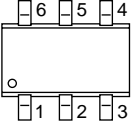
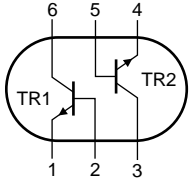
1.4 Quick reference data

Table 1. 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	300	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		
	Name	Description	Version
BC846DS	SC-74	plastic surface-mounted package (TSOP6); 6 leads	SOT457

4. Marking

Table 4. Marking codes

Type number	Marking code
BC846DS	ZK

5. Limiting values

Table 5. Limiting values

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

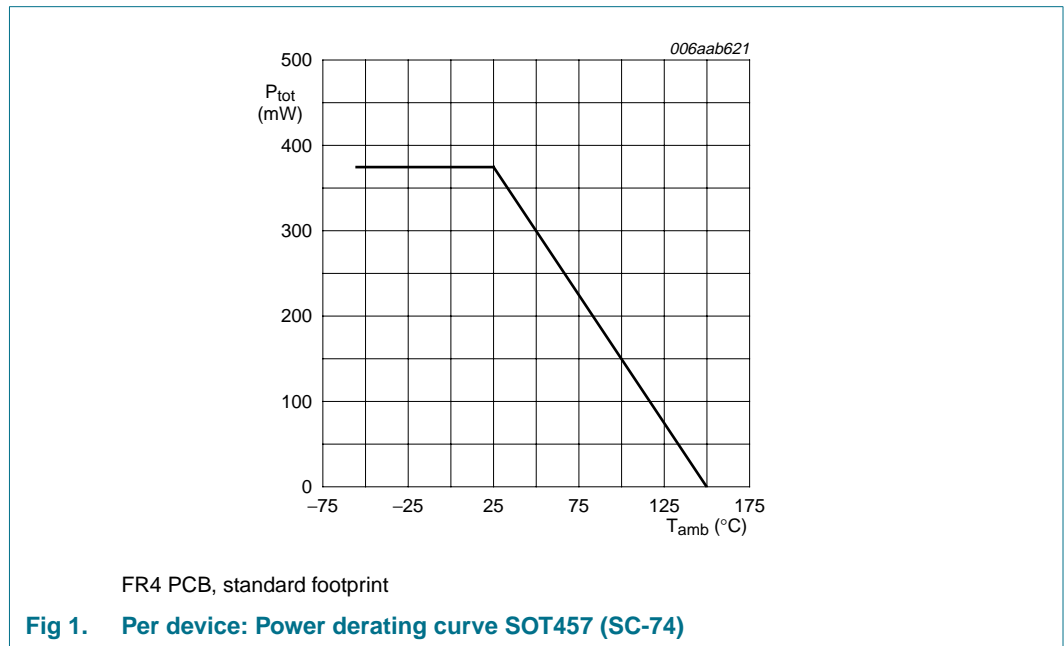
Symbol	Parameter	Conditions	Min	Max	Unit
Per transistor					
V_{CBO}	collector-base voltage	open emitter	-	80	V
V_{CEO}	collector-emitter voltage	open base	-	65	V
V_{EBO}	emitter-base voltage	open collector	-	6	V
I_C	collector current		-	100	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ 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]	250	mW
Per device					
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	380	mW

Table 5. Limiting values ...continued

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

Symbol	Parameter	Conditions	Min	Max	Unit
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.

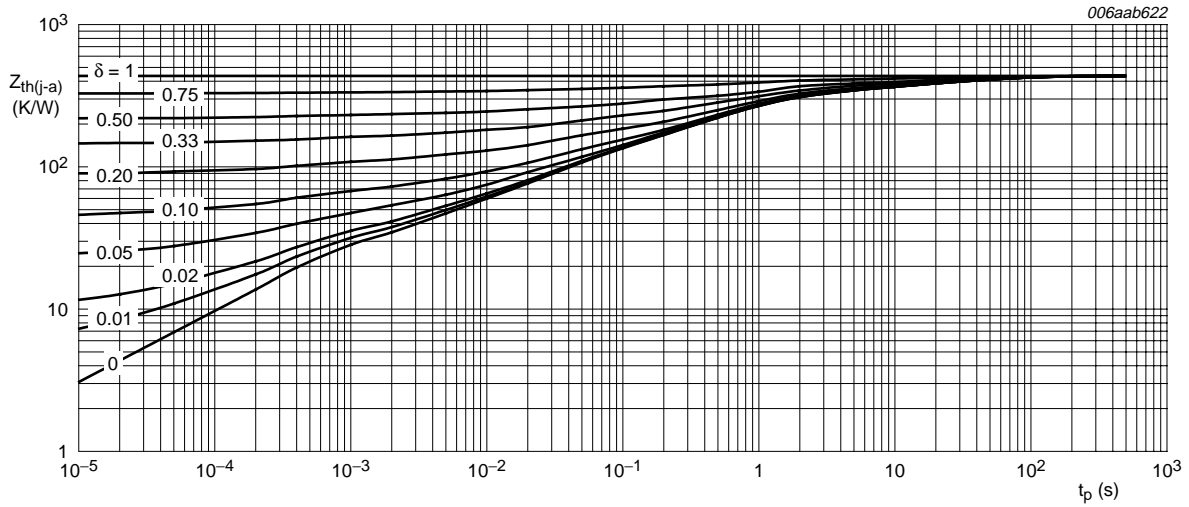


6. Thermal characteristics

Table 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]	-	500	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	250	K/W
Per device						
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	328	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 7. Characteristics

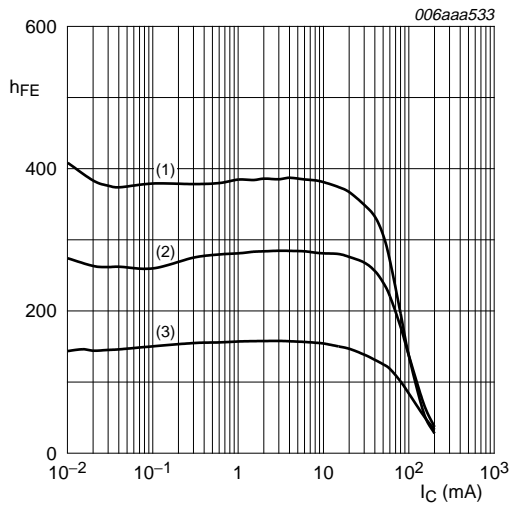
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

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
		$V_{CB} = 30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 6\text{ V}; I_C = 0\text{ A}$	-	-	100	nA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}$				
		$I_C = 10\text{ }\mu\text{A}$	-	280	-	
		$I_C = 2\text{ mA}$	200	300	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
		$I_C = 100\text{ mA}; I_B = 5\text{ mA}$	-	1000	-	mV
V_{BE}	base-emitter voltage	$V_{CE} = 5\text{ V}$				
		$I_C = 2\text{ mA}$	580	650	700	mV
		$I_C = 10\text{ mA}$	-	-	770	mV

Table 7. Characteristics ...continued

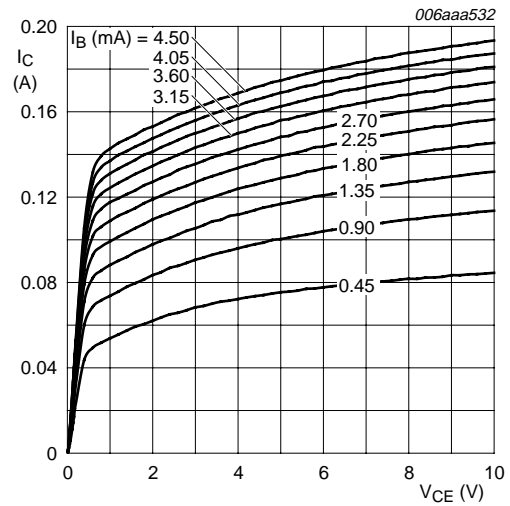
$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_c	collector capacitance	$V_{CB} = 10\text{ V}; I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	1.9	-	pF
C_e	emitter capacitance	$V_{EB} = 0.5\text{ V}; I_C = i_c = 0\text{ A};$ $f = 1\text{ MHz}$	-	11	-	pF
f_T	transition frequency	$V_{CE} = 5\text{ V}; I_C = 10\text{ mA};$ $f = 100\text{ MHz}$	100	-	-	MHz
NF	noise figure	$V_{CE} = 5\text{ V}; I_C = 0.2\text{ mA};$ $R_S = 2\text{ k}\Omega;$ $f = 10\text{ Hz to } 15.7\text{ kHz}$	-	1.9	-	dB
		$V_{CE} = 5\text{ V}; I_C = 0.2\text{ mA};$ $R_S = 2\text{ k}\Omega; f = 1\text{ kHz};$ $B = 200\text{ Hz}$	-	3.1	-	dB



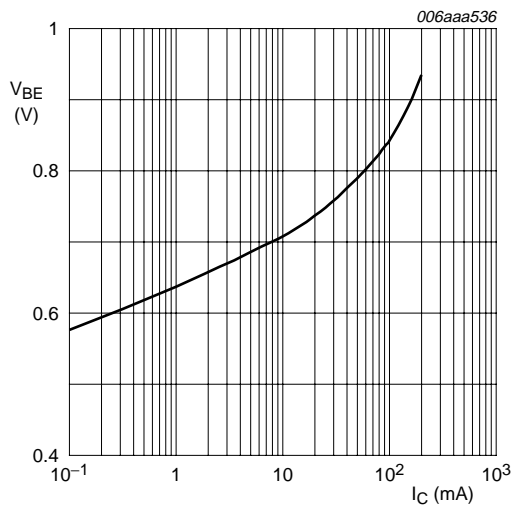
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



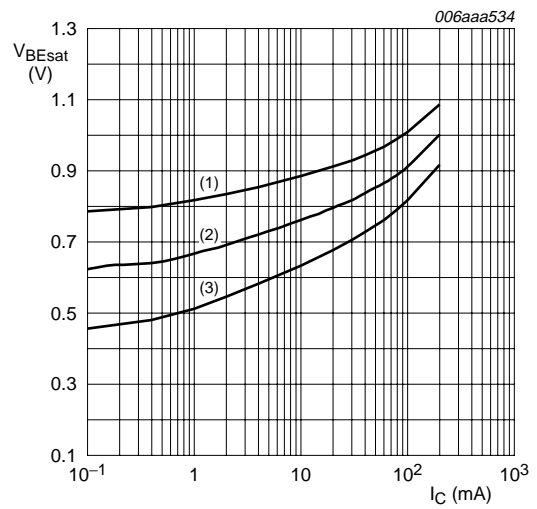
$T_{amb} = 25\text{ }^{\circ}\text{C}$

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



$V_{CE} = 5$ V; $T_{amb} = 25$ °C

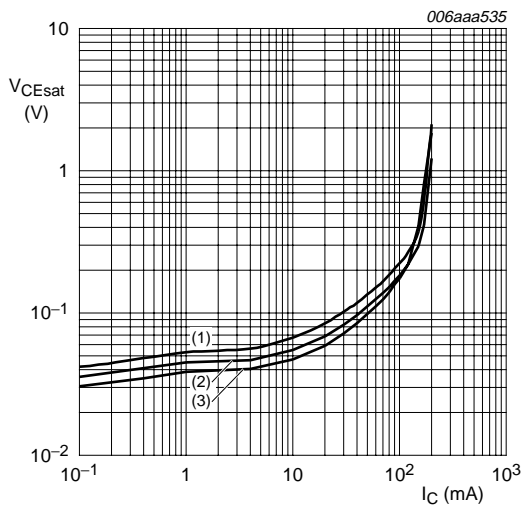
Fig 5. Per transistor: Base-emitter voltage as a function of collector current; typical values



$I_C/I_B = 20$

- (1) $T_{amb} = -55$ °C
- (2) $T_{amb} = 25$ °C
- (3) $T_{amb} = 100$ °C

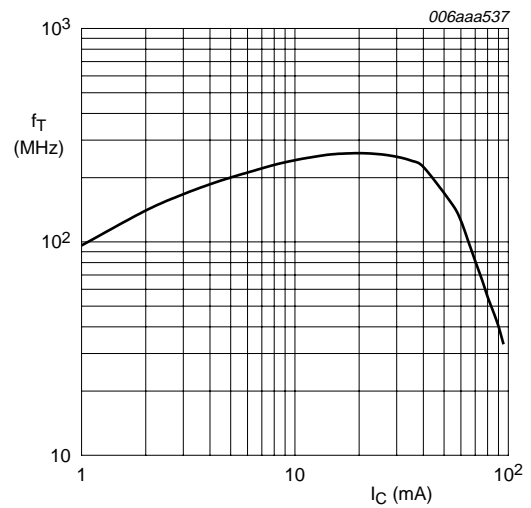
Fig 6. Per transistor: Base-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$

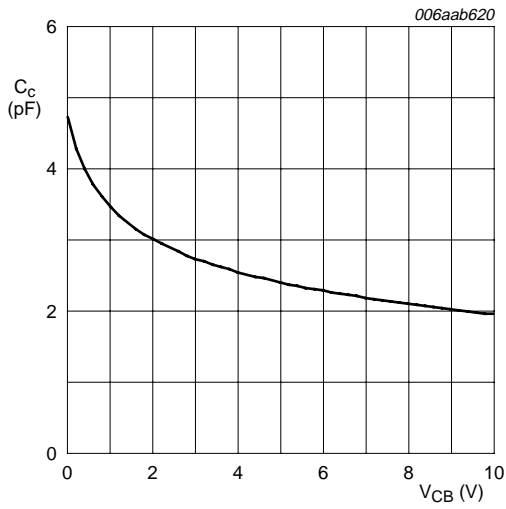
- (1) $T_{amb} = 100$ °C
- (2) $T_{amb} = 25$ °C
- (3) $T_{amb} = -55$ °C

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



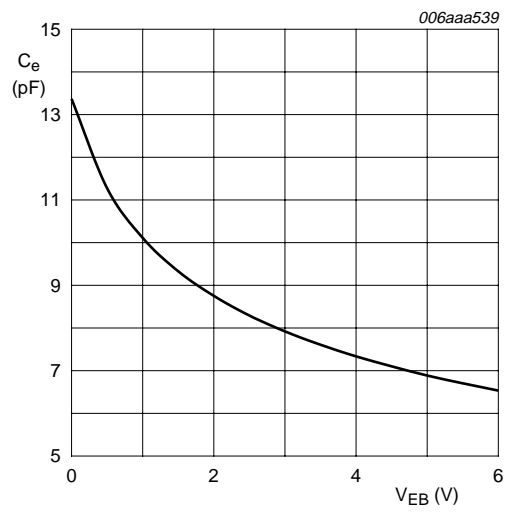
$V_{CE} = 5$ V; $T_{amb} = 25$ °C

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



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

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



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

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

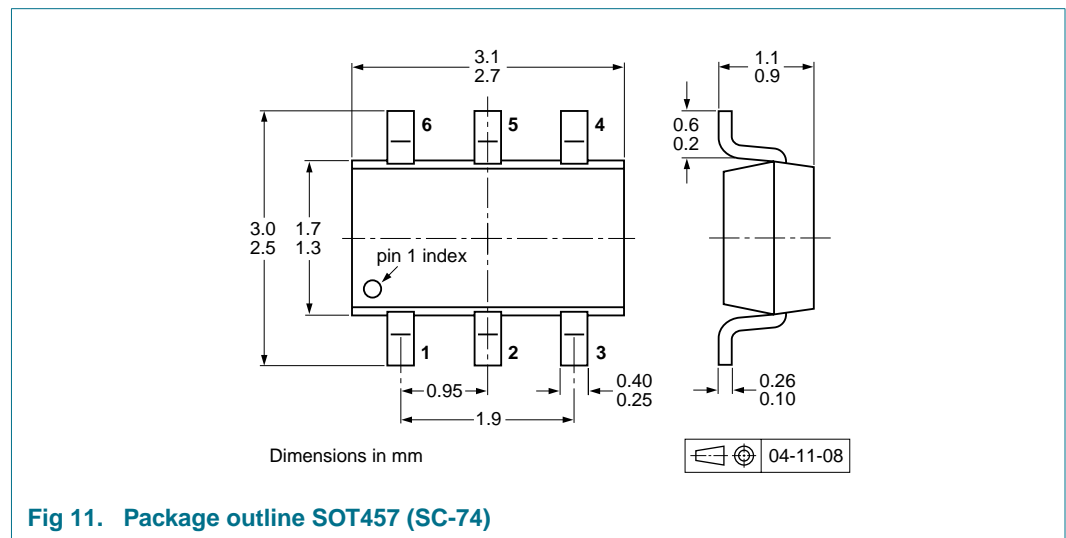


Fig 11. Package outline SOT457 (SC-74)

10. 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
BC846DS	SOT457	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

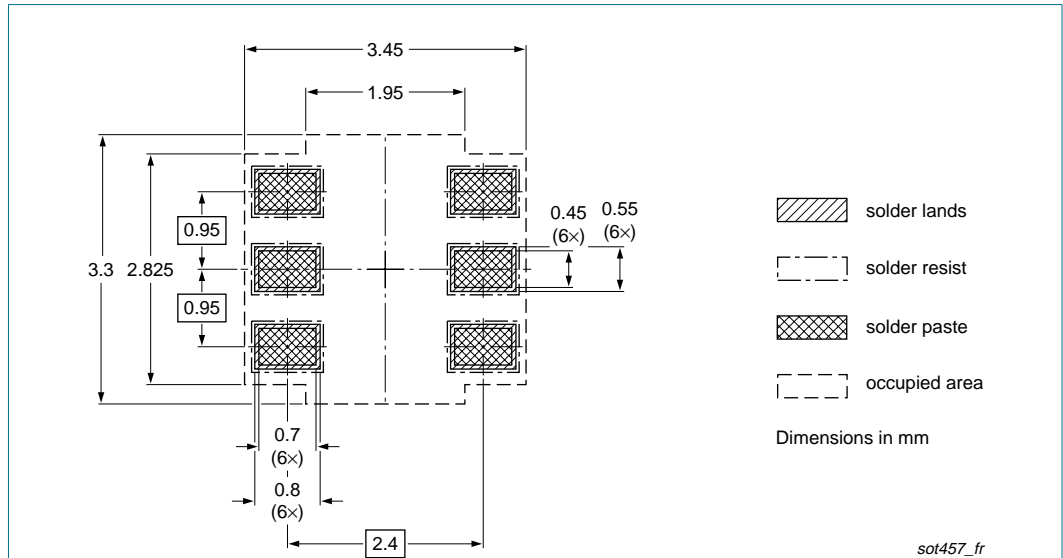


Fig 12. Reflow soldering footprint SOT457 (SC-74)

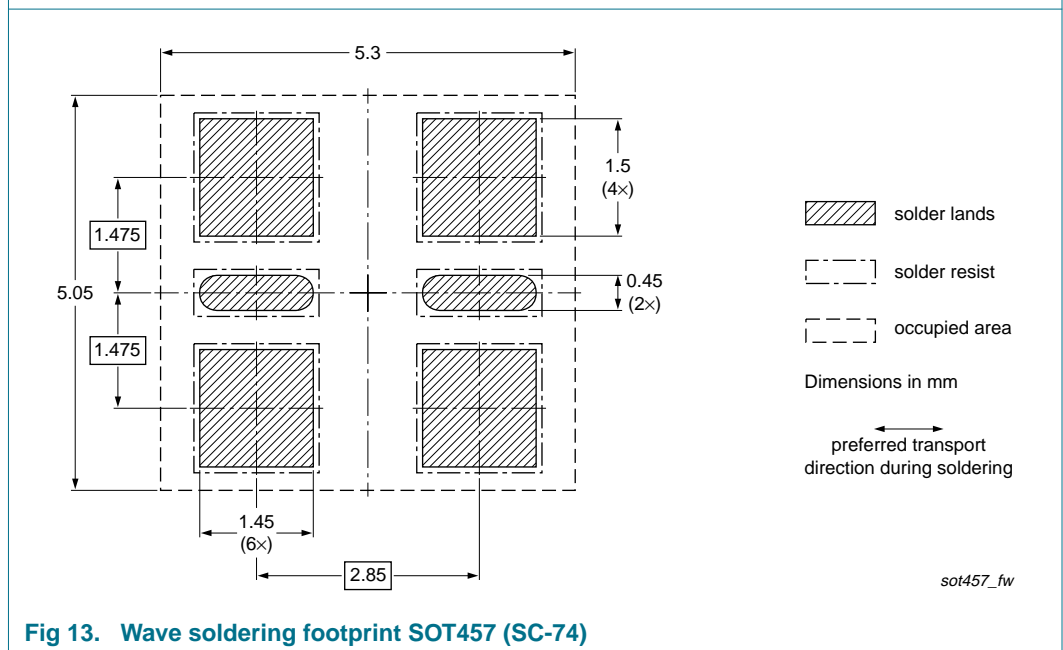


Fig 13. Wave soldering footprint SOT457 (SC-74)

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC846DS_1	20090717	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.
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[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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