BC848 series

30 V, 100 mA NPN general-purpose transistors

Rev. 06 — 3 February 2006 Product data sheet

1. Product profile

1.1 General description

NPN general-purpose transistors in Surface Mounted Device (SMD) plastic packages.

Table 1: Product overview

Type number	Package			PNP complement
	Philips	JEITA	JEDEC	
BC848B	SOT23	-	TO-236AB	BC858B
BC848W	SOT323	SC-70	-	BC858W

1.2 Features

- General-purpose transistors
- SMD plastic packages

1.3 Applications

- General-purpose switching and amplification

1.4 Quick reference data

Table 2: Quick reference data

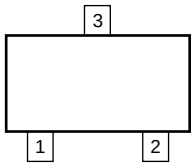
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	30	V
I_C	collector current		-	-	100	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 2 mA				
	BC848B		200	290	450	
	BC848W		110	-	800	

PHILIPS

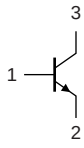
2. Pinning information

Table 3: Pinning

Pin	Description	Simplified outline	Symbol
1	base		
2	emitter		
3	collector		



006aaa144



sym021

3. Ordering information

Table 4: Ordering information

Type number	Package		
	Name	Description	Version
BC848B	-	plastic surface mounted package; 3 leads	SOT23
BC848W	SC-70	plastic surface mounted package; 3 leads	SOT323

4. Marking

Table 5: Marking codes

Type number	Marking code [1]
BC848B	1K*
BC848W	1M*

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

© Koninklijke Philips Electronics N.V. 2006. All rights reserved.

5. Limiting values

Table 6: Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	30	V
V_{CEO}	collector-emitter voltage	open base		-	30	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]			
	SOT23			-	250	mW
	SOT323			-	200	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.

6. Thermal characteristics

Table 7: Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]				
	SOT23			-	-	500	K/W
	SOT323			-	-	625	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

© Koninklijke Philips Electronics N.V. 2006. All rights reserved.

7. Characteristics

Table 8: Characteristics

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

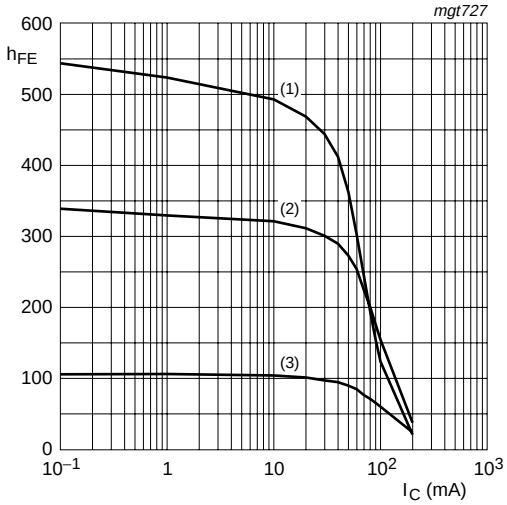
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 30 V; I_E = 0 A		-	-	15	nA
		V_{CB} = 30 V; I_E = 0 A; T_j = 150 °C		-	-	5	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_E = 0 A		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 10 µA		-	150	-	
		V_{CE} = 5 V; I_C = 2 mA					
		BC848B		200	290	450	
		BC848W		110	-	800	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA		-	90	250	mV
		I_C = 100 mA; I_B = 5 mA	[1]	-	200	600	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA	[2]	-	700	-	mV
		I_C = 100 mA; I_B = 5 mA	[2]	-	900	-	mV
V_{BE}	base-emitter voltage	I_C = 2 mA; V_{CE} = 5 V	[3]	580	660	700	mV
		I_C = 10 mA; V_{CE} = 5 V	[3]	-	-	770	mV
f_T	transition frequency	V_{CE} = 5 V; I_C = 10 mA; f = 100 MHz		100	-	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = i_e = 0 A; f = 1 MHz		-	2.5	3	pF
NF	noise figure	V_{CE} = 5 V; I_C = 200 µA; R_S = 2 kΩ; f = 1 kHz; B = 200 Hz		-	2	10	dB

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.

[2] V_{BEsat} decreases by approximately 1.7 mV/K with increasing temperature.

[3] V_{BE} decreases by approximately 2 mV/K with increasing temperature.

© Koninklijke Philips Electronics N.V. 2006. All rights reserved.



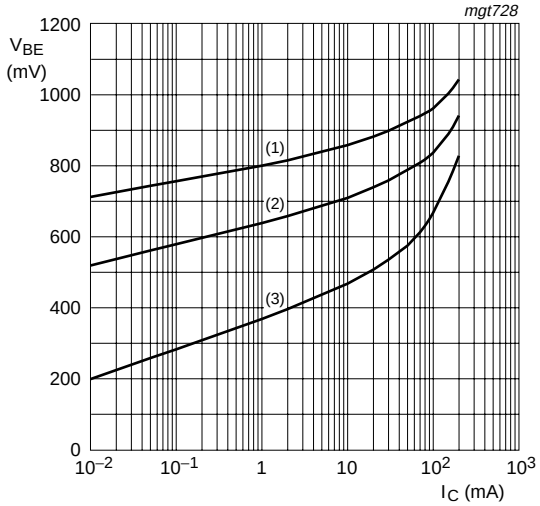
V_{CE} = 5 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = –55 °C

Fig 1. BC848B: DC current gain as a function of collector current; typical values



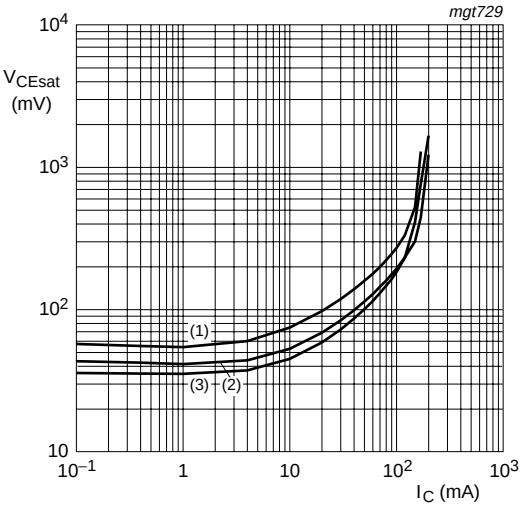
V_{CE} = 5 V

(1) T_{amb} = –55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 2. BC848B: Base-emitter voltage as a function of collector current; typical values



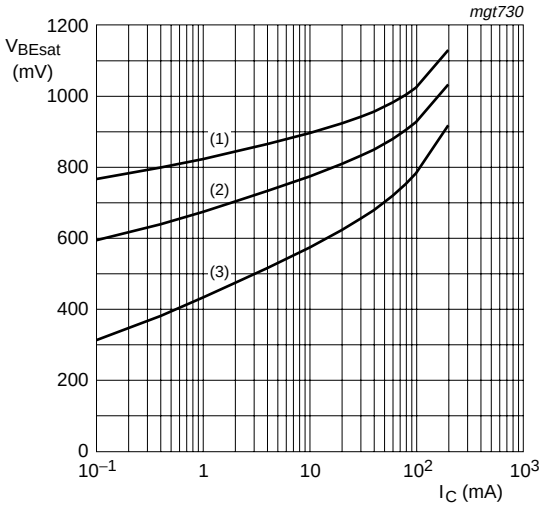
I_C/I_B = 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = –55 °C

Fig 3. BC848B: Collector-emitter saturation voltage as a function of collector current; typical values



I_C/I_B = 10

(1) T_{amb} = –55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 4. BC848B: Base-emitter saturation voltage as a function of collector current; typical values

© Koninklijke Philips Electronics N.V. 2006. All rights reserved.

8. Package outline

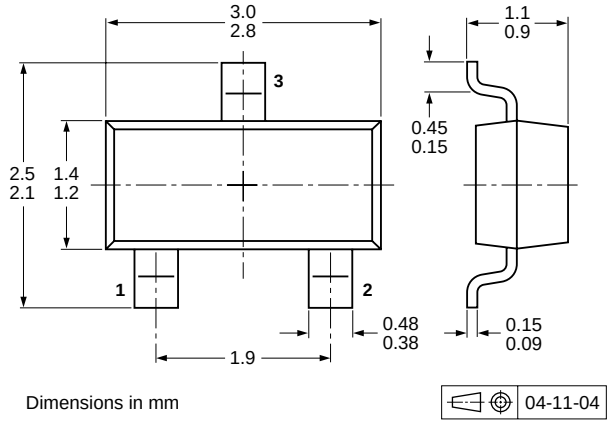


Fig 5. Package outline SOT23 (TO-236AB)

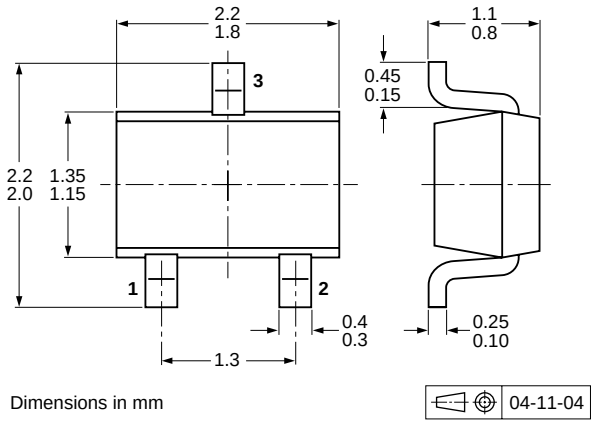


Fig 6. Package outline SOT323 (SC-70)

9. Packing information

Table 9: Packing methods

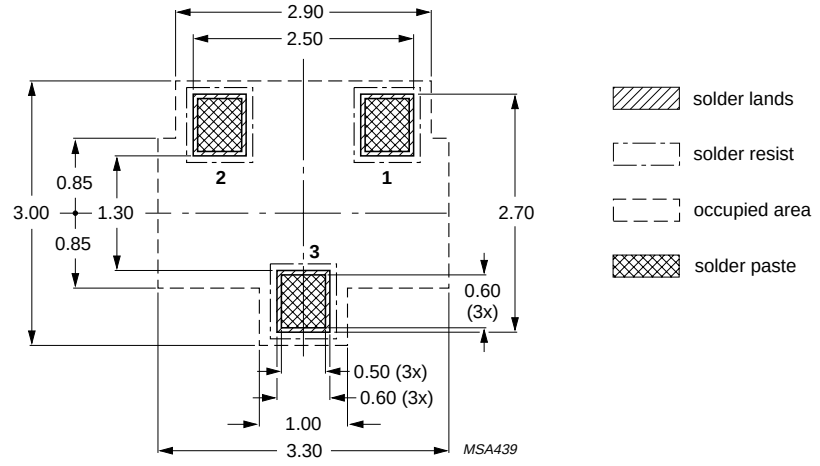
The indicated -xxx are the last three digits of the 12NC ordering code. [1]

Type number	Package	Description	Packing quantity	
			3000	10000
BC848B	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
BC848W	SOT323	4 mm pitch, 8 mm tape and reel	-115	-135

[1] For further information and the availability of packing methods, see Section 17.

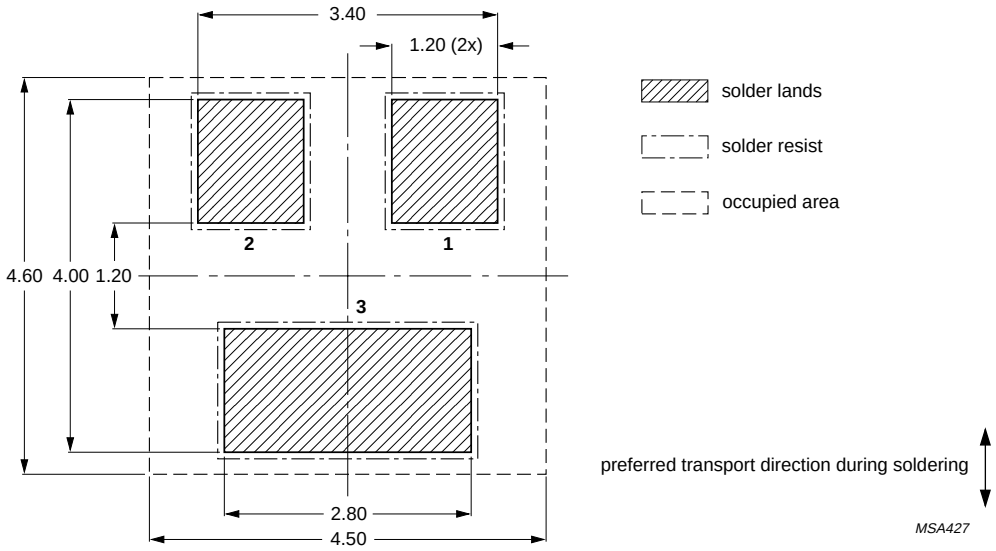
© Koninklijke Philips Electronics N.V. 2006. All rights reserved.

10. Soldering



Dimensions in mm

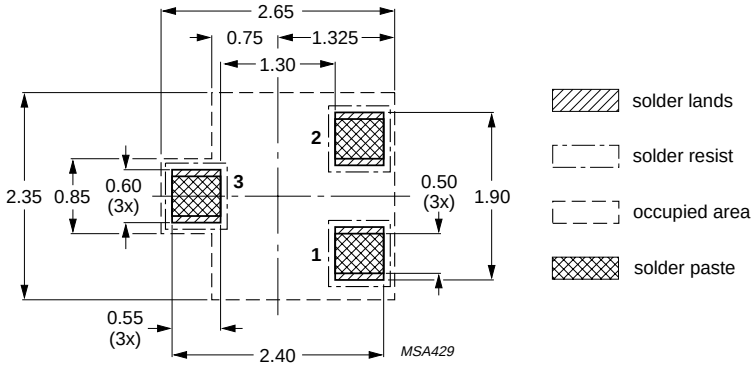
Fig 7. Reflow soldering footprint SOT23 (TO-236AB)



Dimensions in mm

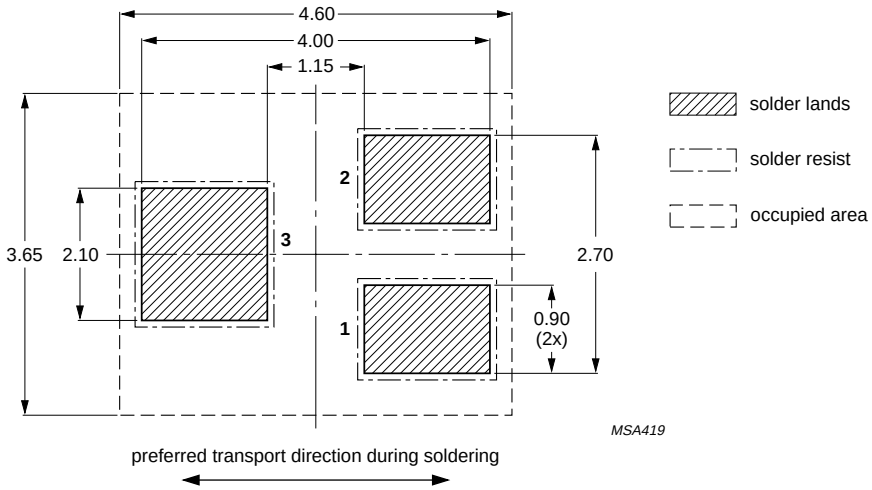
Fig 8. Wave soldering footprint SOT23 (TO-236AB)

© Koninklijke Philips Electronics N.V. 2006. All rights reserved.



Dimensions in mm

Fig 9. Reflow soldering footprint SOT323 (SC-70)

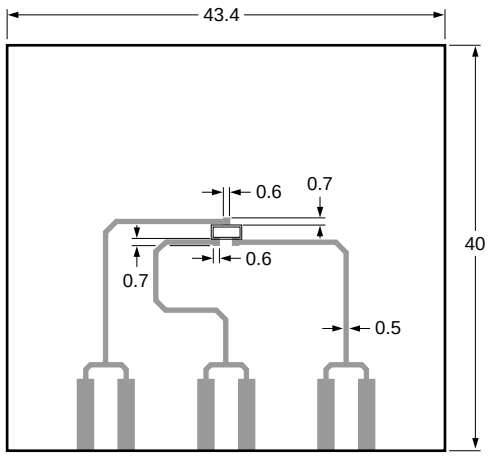


Dimensions in mm

Fig 10. Wave soldering footprint SOT323 (SC-70)

© Koninklijke Philips Electronics N.V. 2006. All rights reserved.

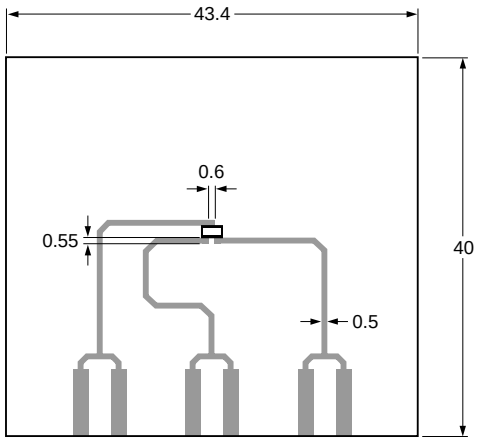
11. Mounting



PCB thickness:

FR4 PCB = 1.6 mm

Fig 11. FR4 PCB, standard footprint SOT23 (TO-236AB)



PCB thickness:

FR4 PCB = 1.6 mm

Fig 12. FR4 PCB, standard footprint SOT323 (SC-70)

© Koninklijke Philips Electronics N.V. 2006. All rights reserved.

12. Revision history

Table 10: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
BC848_SER_6	20060203	Product data sheet	-	-	BC846_BC847_ BC848_5 BC846W_BC847W_ BC848W_4
Modifications:	• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors. • This data sheet is a type combination out of the previous data sheets BC846_BC847_BC848_5 and BC846W_BC847W_BC848W_4. • Table 8 “Characteristics”: F redefined to NF noise figure				
BC846_BC847_BC848_5	20040206	Product specification	-	9397 750 12395	BC846_BC847_ BC848_4
BC846W_BC847W_ BC848W_4	20020204	Product specification	-	9397 750 09166	BC846W_847W_3

© Koninklijke Philips Electronics N.V. 2006. All rights reserved.

13. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

14. Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

15. Disclaimers

Life support — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves the right to make changes in the products - including circuits, standard cells, and/or software - described or contained herein in order to improve design and/or performance. When the product is in full production (status 'Production'), relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no license or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

16. Trademarks

Notice — All referenced brands, product names, service names and trademarks are the property of their respective owners.

17. Contact information

For additional information, please visit: **http://www.semiconductors.philips.com**

For sales office addresses, send an email to: **sales.addresses@www.semiconductors.philips.com**

© Koninklijke Philips Electronics N.V. 2006. All rights reserved.

18. Contents

© Koninklijke Philips Electronics N.V. 2006

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Date of release: 3 February 2006
Document number: BC848_SER_6

Published in The Netherlands