BC848 series

30 V, 100 mA NPN general-purpose transistors

Rev. 07 — 17 November 2009 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
	NXP	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

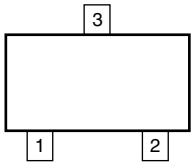
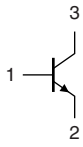
Table 2. Quick reference data

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	

founded by 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

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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.

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7. Characteristics

Table 8. Characteristics

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

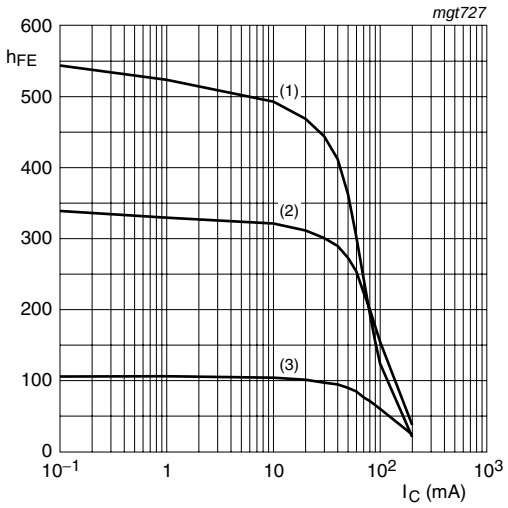
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 30 V; I_E = 0 A		-	-	15	nA
		V_{CB} = 30 V; I_E = 0 A; T_j = 150 °C		-	-	5	μA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_E = 0 A		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 10 μA		-	150	-	
		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.

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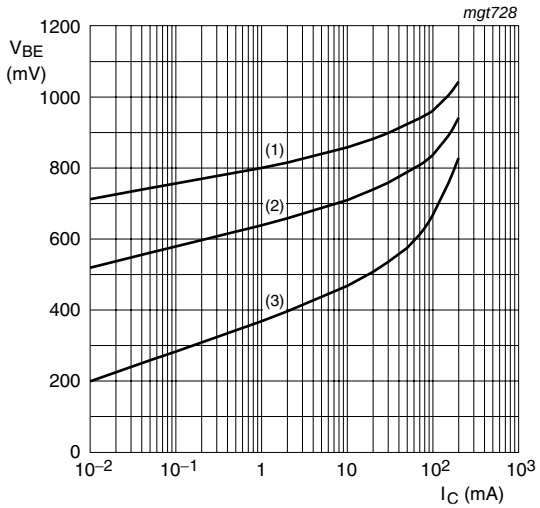
V_{CE} = 5 V

(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



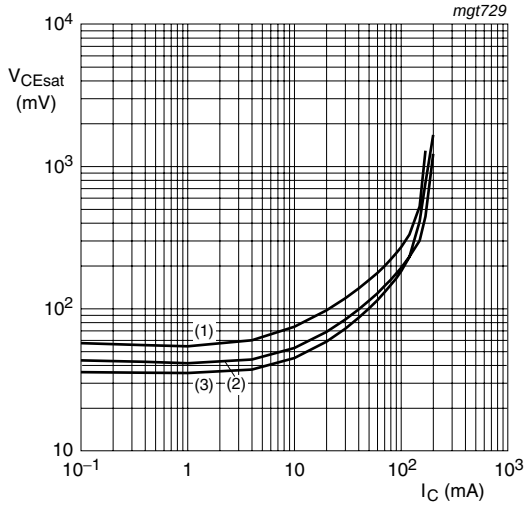
V_{CE} = 5 V

(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



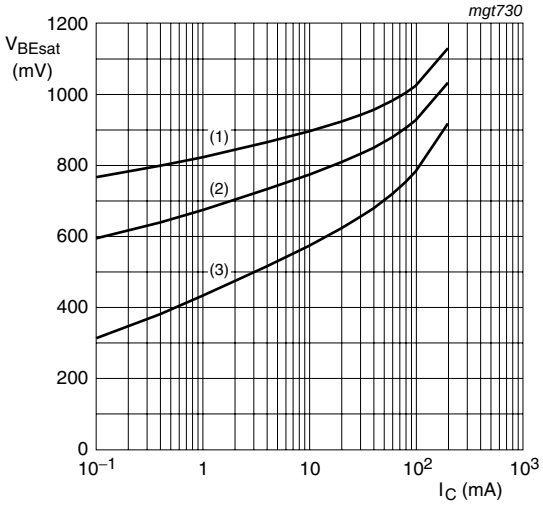
I_C/I_B = 20

(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

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8. Package outline

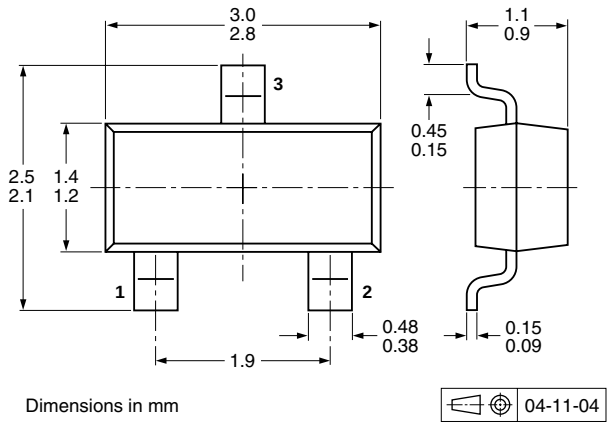


Fig 5. Package outline SOT23 (TO-236AB)

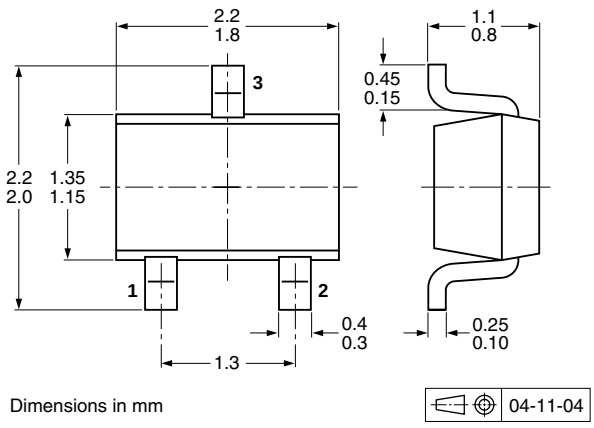


Fig 6. Package outline SOT323 (SC-70)

9. Packing information

Table 9. Packing methods

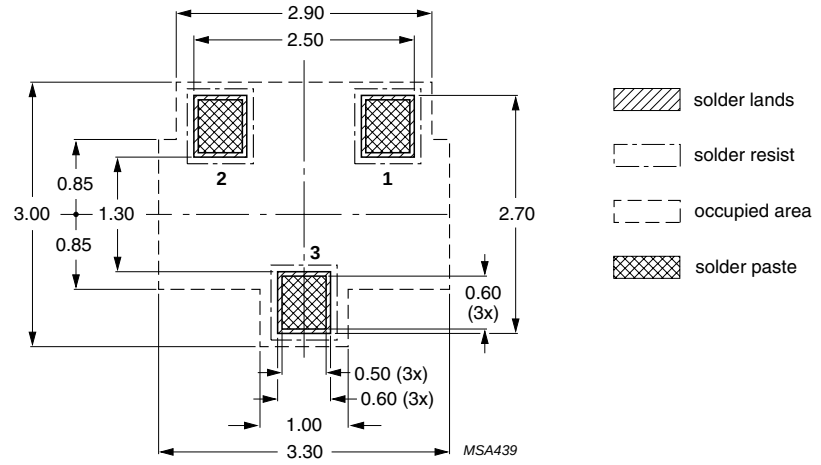
The indicated -xxx are the last three digits of the 12NC ordering code.[1]

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 14.

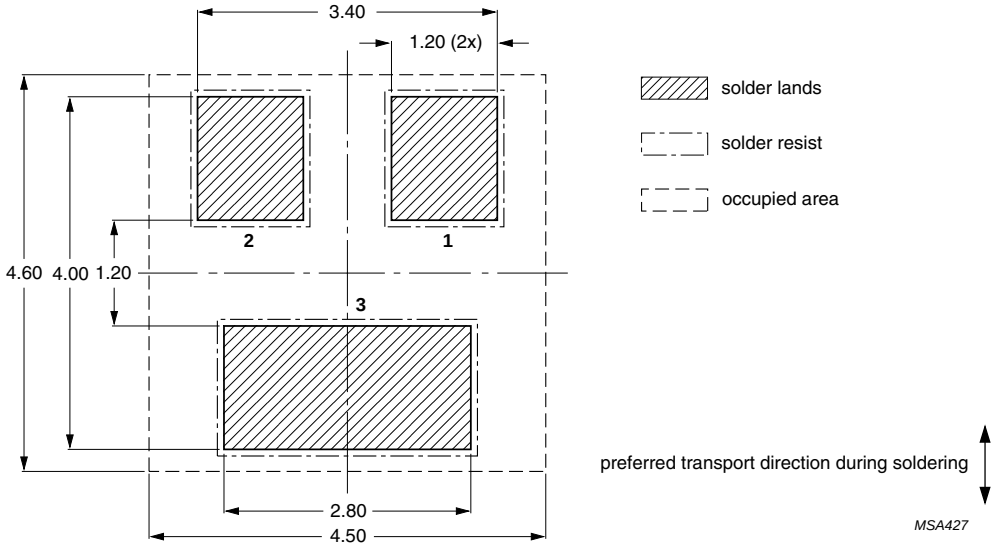
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10. Soldering



Dimensions in mm

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



Dimensions in mm

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

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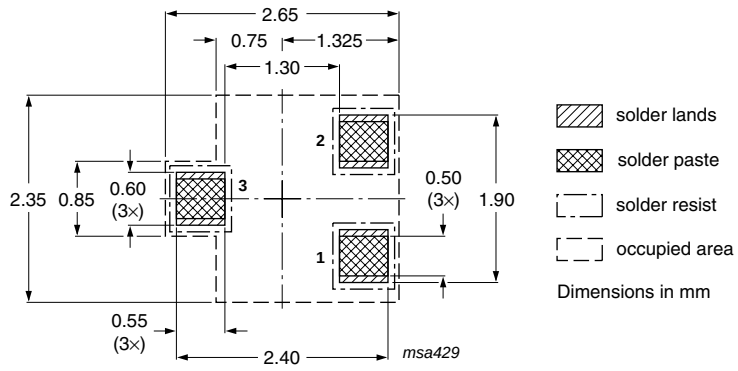


Fig 9. Reflow soldering footprint SOT323 (SC-70)

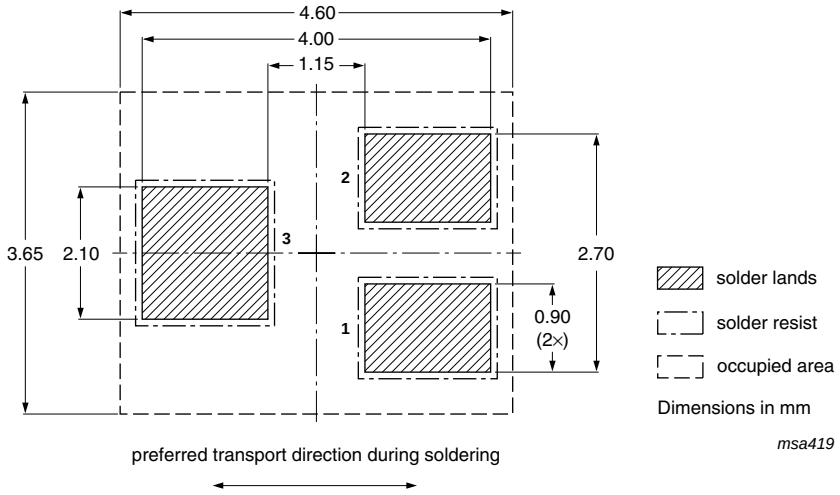
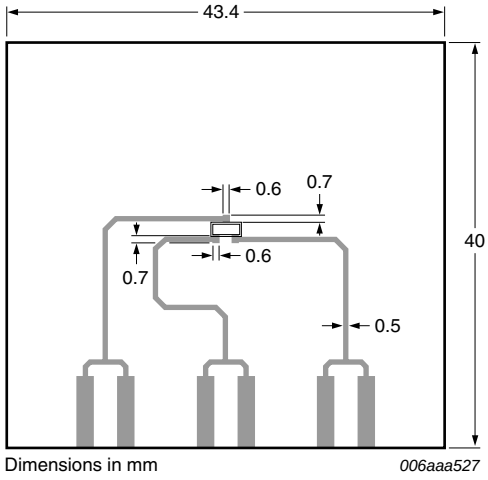


Fig 10. Wave soldering footprint SOT323 (SC-70)

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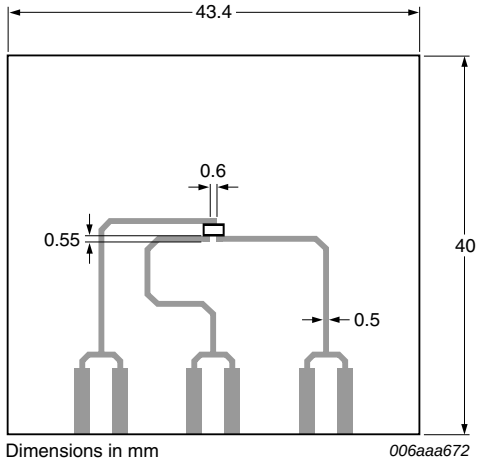
11. Mounting



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)

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12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC848_SER_7	20091117	Product data sheet	-	BC848_SER_6
Modifications:	• This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content. • Figure 9 “Reflow soldering footprint SOT323 (SC-70)”: updated • Figure 10 “Wave soldering footprint SOT323 (SC-70)”: updated			
BC848_SER_6	20060203	Product data sheet	-	BC846_BC847_ BC848_5 BC846W_BC847W_ BC848W_4
BC846_BC847_BC848_5	20040206	Product specification	-	BC846_BC847_ BC848_4
BC846W_BC847W_ BC848W_4	20020204	Product specification	-	BC846W_847W_3

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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.
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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