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

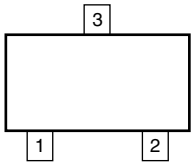
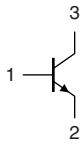
1.4 Quick reference data

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	

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

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.

7. Characteristics

Table 8. Characteristics

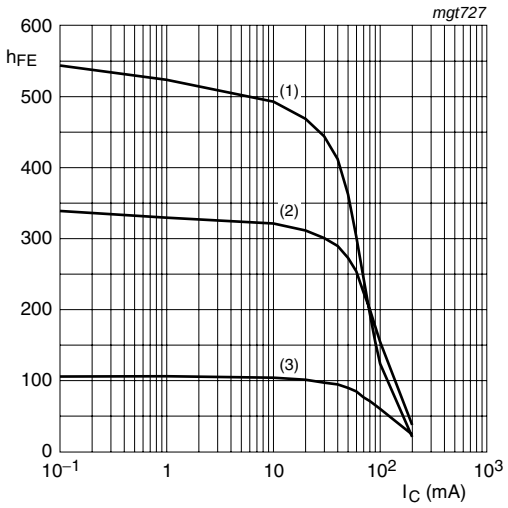
T_{amb} = 25 °C unless otherwise specified.

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.



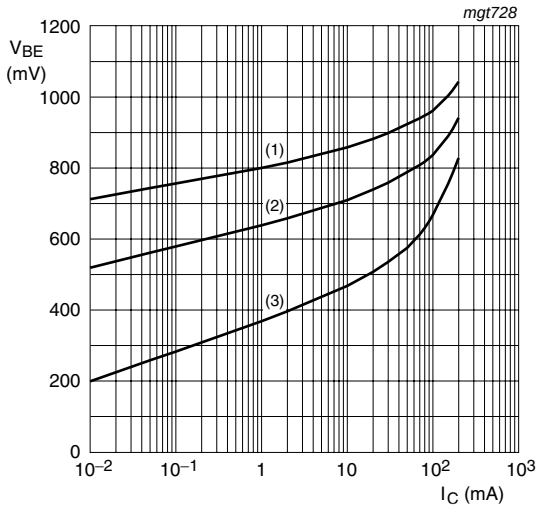
V_{CE} = 5 V

(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



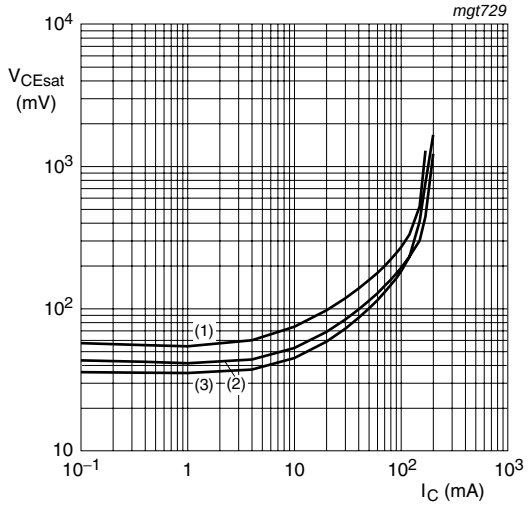
V_{CE} = 5 V

(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



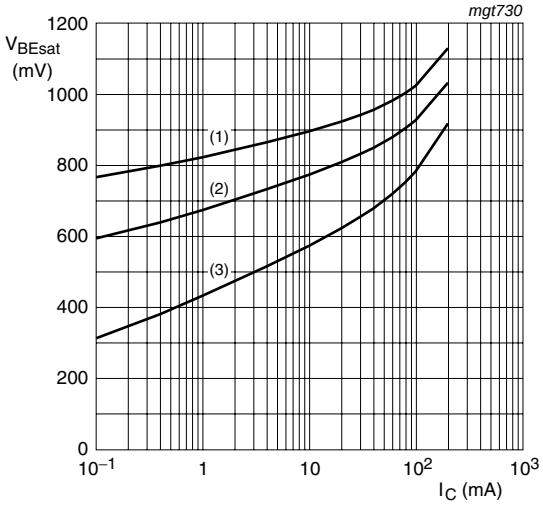
I_C/I_B = 20

(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

8. Package outline

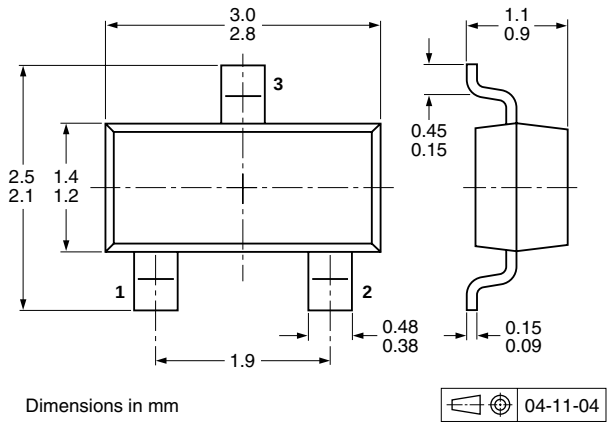


Fig 5. Package outline SOT23 (TO-236AB)

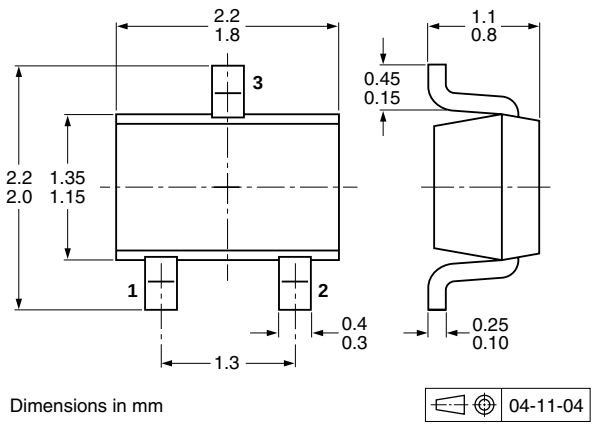


Fig 6. Package outline SOT323 (SC-70)

9. Packing information

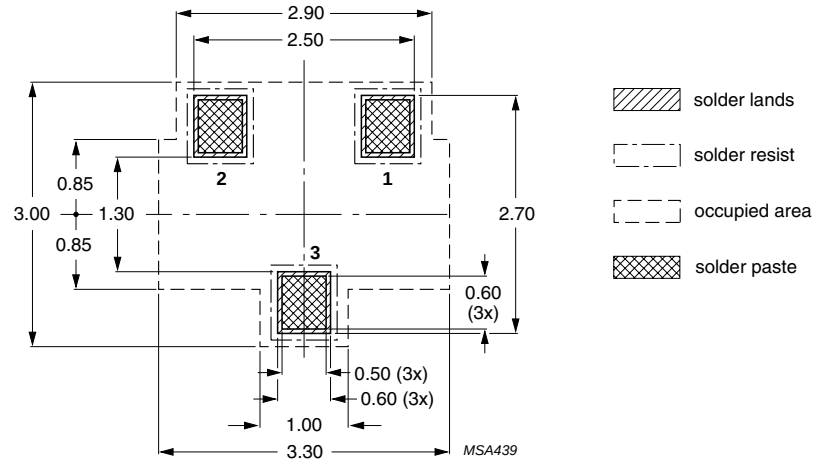
Table 9. Packing methods

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

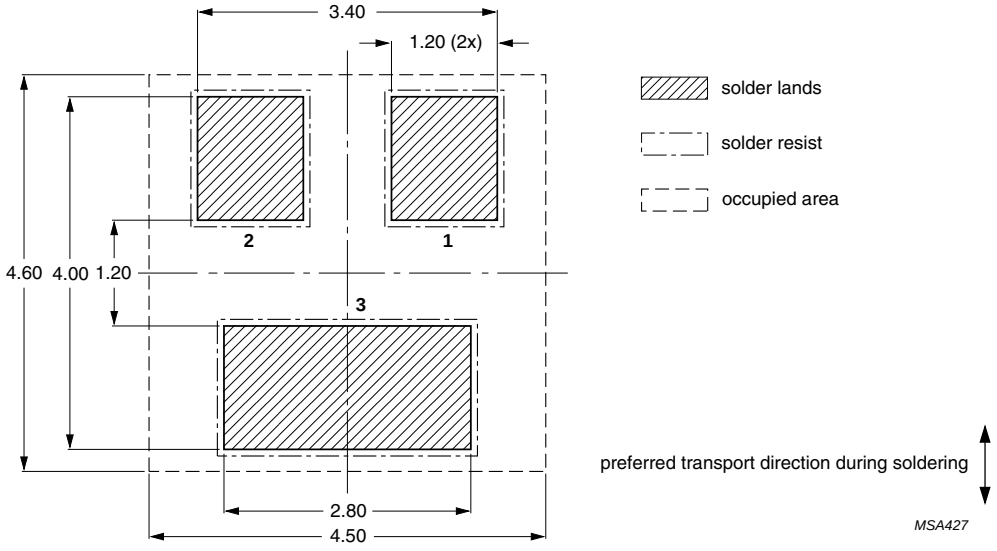
[1] For further information and the availability of packing methods, see Section 14.

10. Soldering



Dimensions in mm

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



Dimensions in mm

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

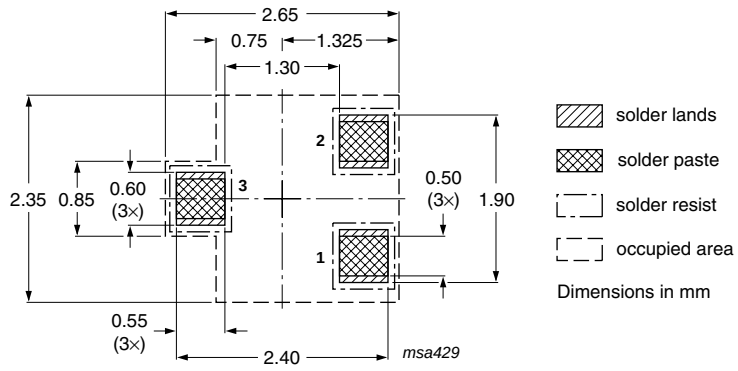


Fig 9. Reflow soldering footprint SOT323 (SC-70)

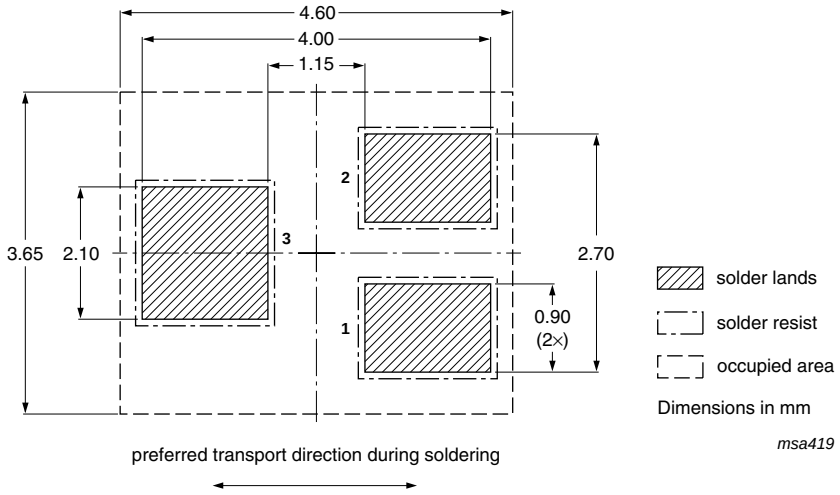
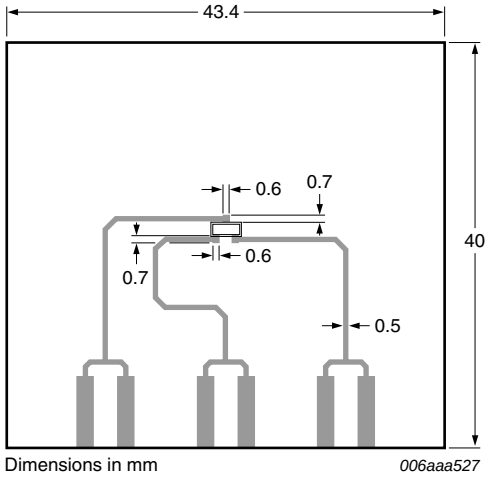


Fig 10. Wave soldering footprint SOT323 (SC-70)

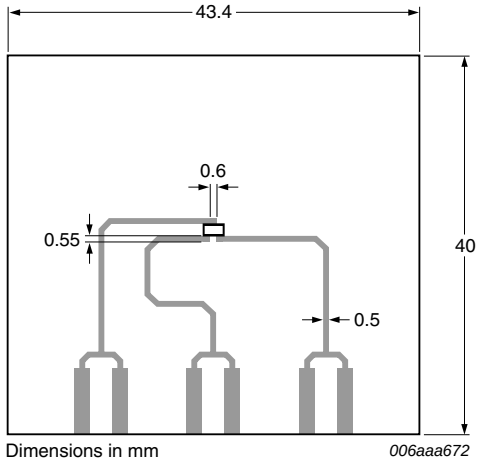
11. Mounting



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)

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

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".

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15. Contents

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