



BC847xW series

45 V, 100 mA NPN general-purpose transistors

Rev. 13 — 1 July 2022

Product data sheet

1. General description

NPN general-purpose transistors in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number[1]	Package		PNP complement
	Nexperia	JEITA	
BC847W	SOT323	SC-70	BC857W
BC847AW			BC857AW
BC847BW			BC857BW
BC847CW			BC857CW

[1] Valid for all available selection groups.

2. Features and benefits

- General-purpose transistors
- SMD plastic packages
- Three different gain selections

3. Applications

- General-purpose switching and amplification

4. Quick reference data

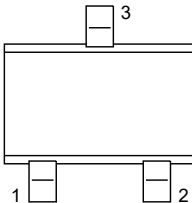
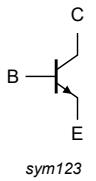
Table 2. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	45	V
I_C	collector current		-	-	100	mA
h_{FE}	DC current gain					
	BC847W	$V_{CE} = 5\text{ V};$ $I_C = 2\text{ mA}$	110	-	800	
	BC847AW		110	180	220	
	BC847BW		200	290	450	
	BC847CW		420	520	800	

5. Pinning information

Table 3. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC847W	SC-70	plastic surface-mounted package; 3 leads	SOT323
BC847AW			
BC847BW			
BC847CW			

7. Marking

Table 5. Marking codes

Type number		Marking code
BC847W	[1]	1H%
BC847AW	[1]	1E%
BC847BW	[1]	1F%
BC847CW	[1]	1G%

[1] % = placeholder for manufacturing site code

8. 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	-	50	V
V_{CEO}	collector-emitter voltage	open base	-	45	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	-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1] -	200	mW
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-65	150	°C
T_{stg}	storage temperature		-65	150	°C

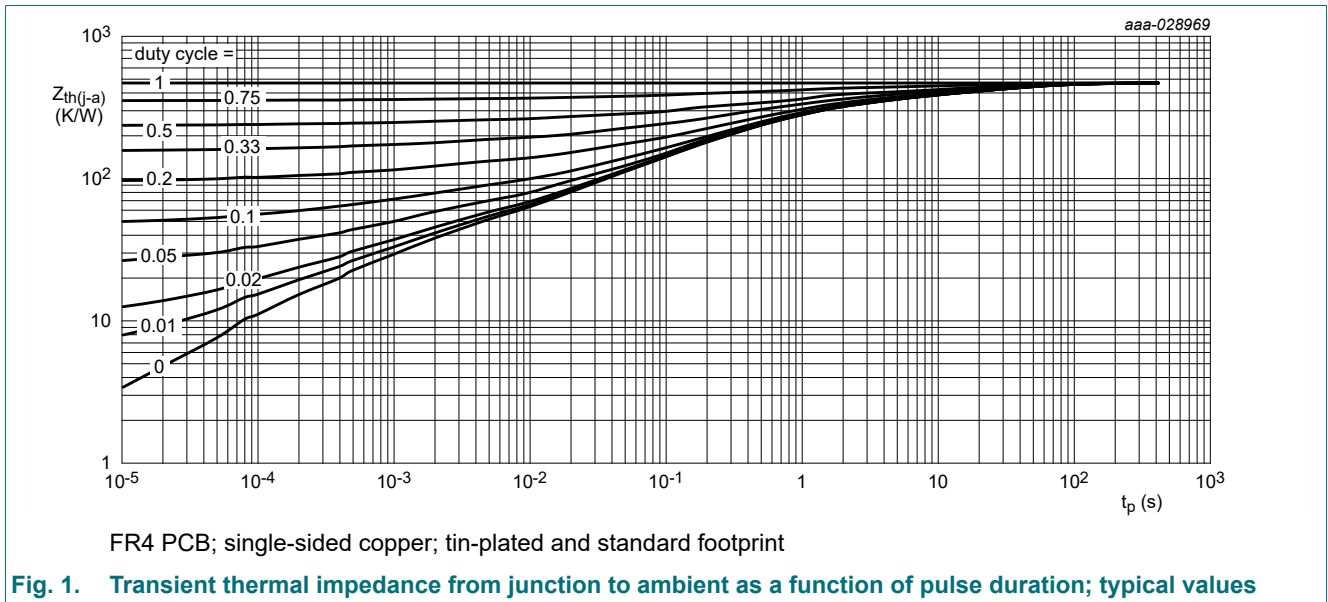
[1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.

9. 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] -	-	625	K/W

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



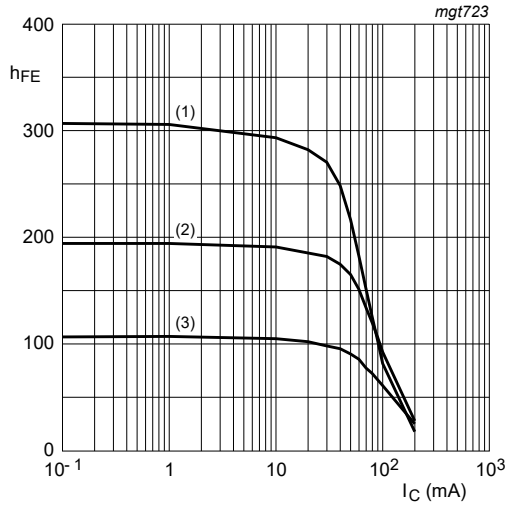
10. Characteristics

Table 8. Characteristics
 $T_{amb} = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\ \mu\text{A}$; $I_E = 0\ \text{A}$	50	-	-	V	
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 2\ \text{mA}$; $V_{BE} = 0\ \text{V}$	45	-	-	V	
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_C = 0\ \text{A}$; $I_E = 100\ \mu\text{A}$	6	-	-	V	
I_{CBO}	collector-base cut-off current	$V_{CB} = 30\ \text{V}$; $I_E = 0\ \text{A}$	-	-	15	nA	
		$V_{CB} = 30\ \text{V}$; $I_E = 0\ \text{A}$; $T_j = 150\text{ °C}$	-	-	5	μA	
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\ \text{V}$; $I_C = 0\ \text{A}$	-	-	100	nA	
h_{FE}	DC current gain						
	BC847AW	$V_{CE} = 5\ \text{V}$; $I_C = 10\ \mu\text{A}$	-	170	-		
	BC847BW		-	280	-		
	BC847CW		-	420	-		
	BC847W	$V_{CE} = 5\ \text{V}$; $I_C = 2\ \text{mA}$	110	-	800		
	BC847AW		110	180	220		
	BC847BW		200	290	450		
	BC847CW		420	520	800		
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\ \text{mA}$; $I_B = 0.5\ \text{mA}$	-	90	200	mV	
		$I_C = 100\ \text{mA}$; $I_B = 5\ \text{mA}$	[1]	-	200	400	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10\ \text{mA}$; $I_B = 0.5\ \text{mA}$	[2]	-	700	-	mV
		$I_C = 100\ \text{mA}$; $I_B = 5\ \text{mA}$	[2]	-	900	-	mV
V_{BE}	base-emitter voltage	$V_{CE} = 5\ \text{V}$; $I_C = 2\ \text{mA}$	[2]	580	660	700	mV
		$V_{CE} = 5\ \text{V}$; $I_C = 10\ \text{mA}$		-	-	770	mV
f_T	transition frequency	$V_{CE} = 5\ \text{V}$; $I_C = 10\ \text{mA}$; $f = 100\ \text{MHz}$	100	-	-	MHz	
C_c	collector capacitance	$V_{CB} = 10\ \text{V}$; $I_E = i_e = 0\ \text{A}$; $f = 1\ \text{MHz}$	-	-	1.5	pF	
C_e	emitter capacitance	$V_{EB} = 0.5\ \text{V}$; $I_C = i_c = 0\ \text{A}$; $f = 1\ \text{MHz}$	-	11	-	pF	
NF	noise figure	$I_C = 200\ \mu\text{A}$; $V_{CE} = 5\ \text{V}$; $R_S = 2\ \text{k}\Omega$; $f = 1\ \text{kHz}$; $B = 200\ \text{Hz}$	-	2	10	dB	

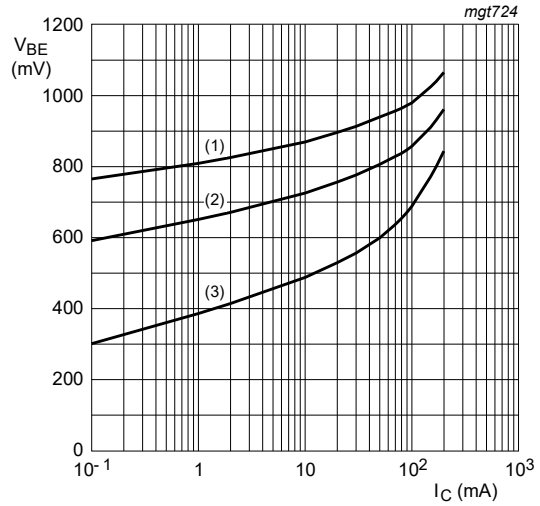
[1] pulsed; $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$

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



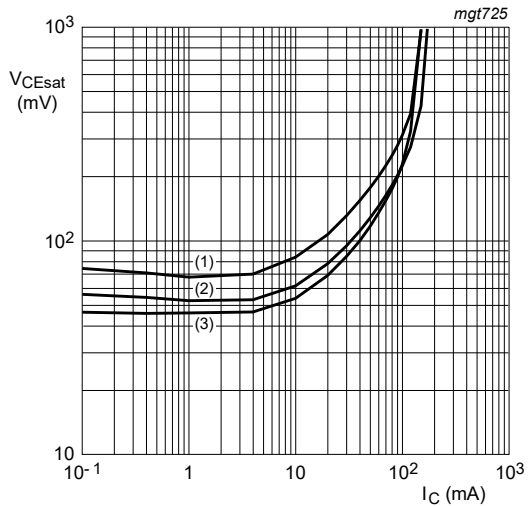
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 150\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

Fig. 2. BC847AW: DC current gain as a function of collector current; typical values



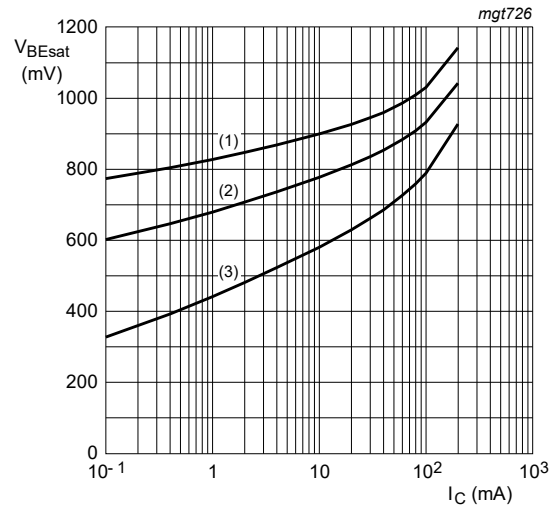
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 150\text{ }^{\circ}\text{C}$

Fig. 3. BC847AW: Base-emitter voltage as a function of collector current; typical values



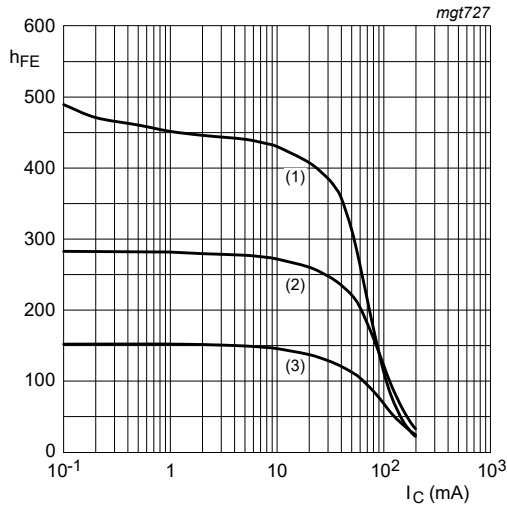
$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

Fig. 4. BC847AW: Collector-emitter saturation voltage as a function of collector current; typical values



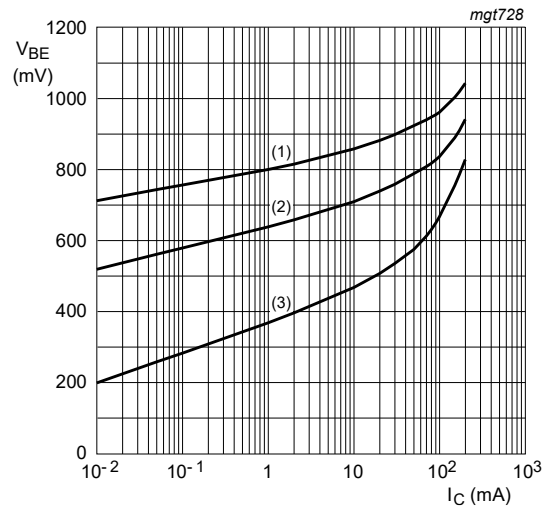
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 150\text{ }^{\circ}\text{C}$

Fig. 5. BC847AW: Base-emitter saturation voltage as a function of collector current; typical values



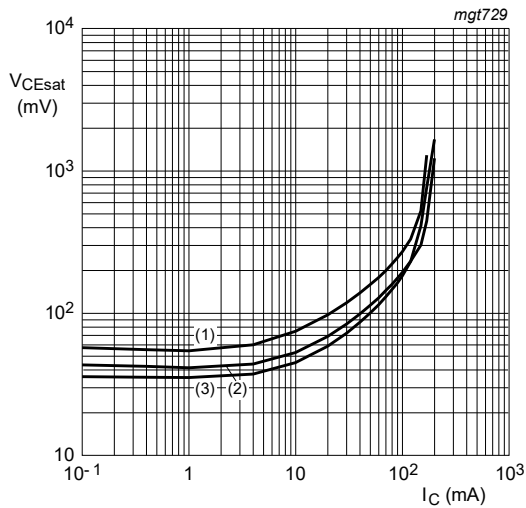
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 6. BC847BW: DC current gain as a function of collector current; typical values



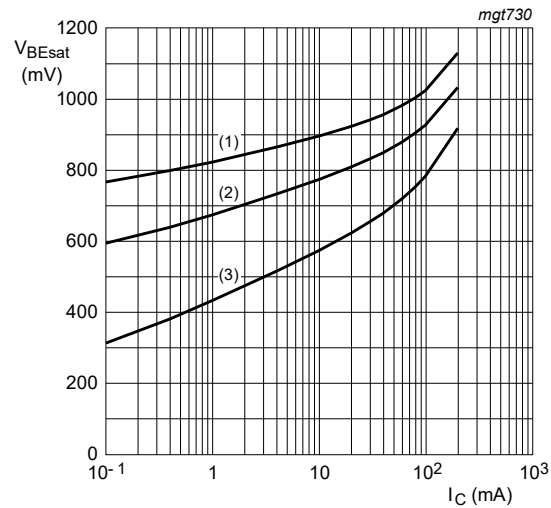
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig. 7. BC847BW: Base-emitter voltage as a function of collector current; typical values



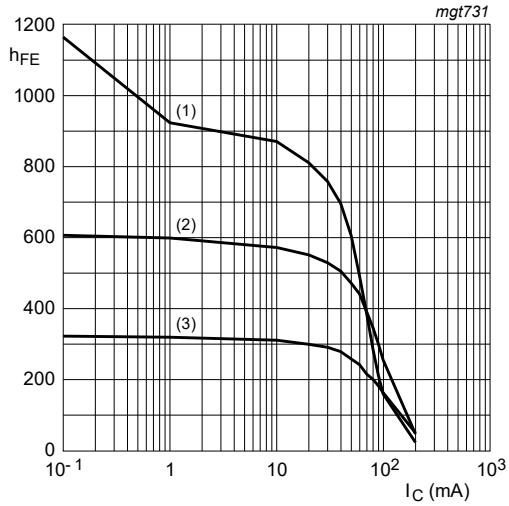
$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 8. BC847BW: Collector-emitter saturation voltage as a function of collector current; typical values



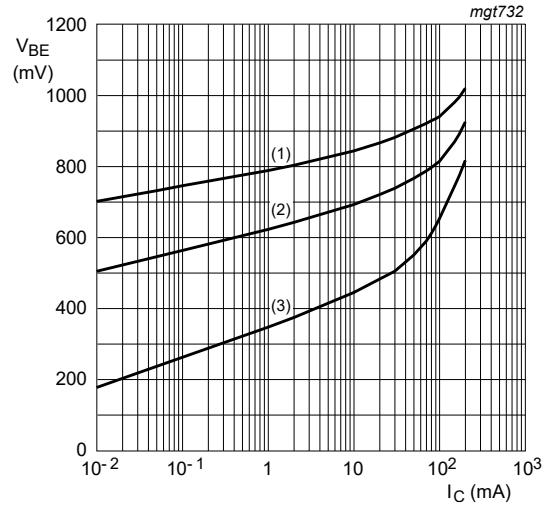
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig. 9. BC847BW: Base-emitter saturation voltage as a function of collector current; typical values



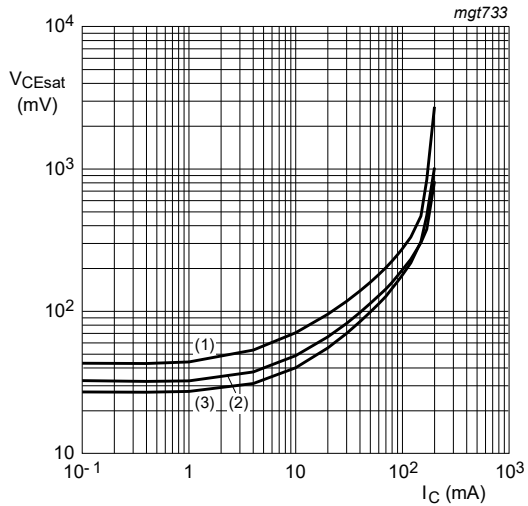
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig. 10. BC847CW: DC current gain as a function of collector current; typical values



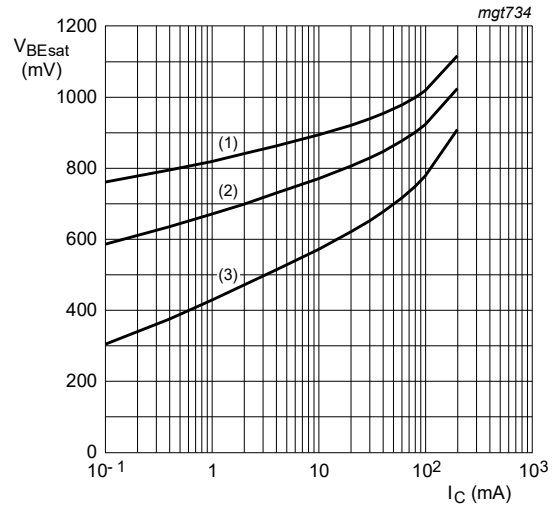
$V_{CE} = 5\text{ V}$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig. 11. BC847CW: Base-emitter voltage as a function of collector current; typical values



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

Fig. 12. BC847CW: Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

Fig. 13. BC847CW: Base-emitter saturation voltage as a function of collector current; typical values

11. Package outline

Table 9. Package outline

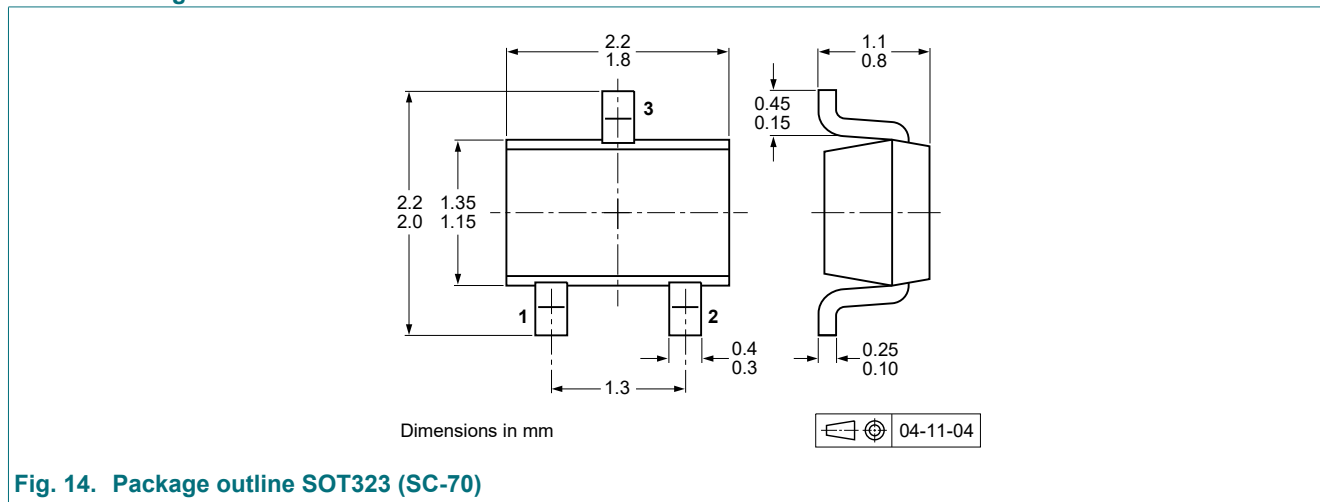


Fig. 14. Package outline SOT323 (SC-70)

12. Soldering

Table 10. Soldering

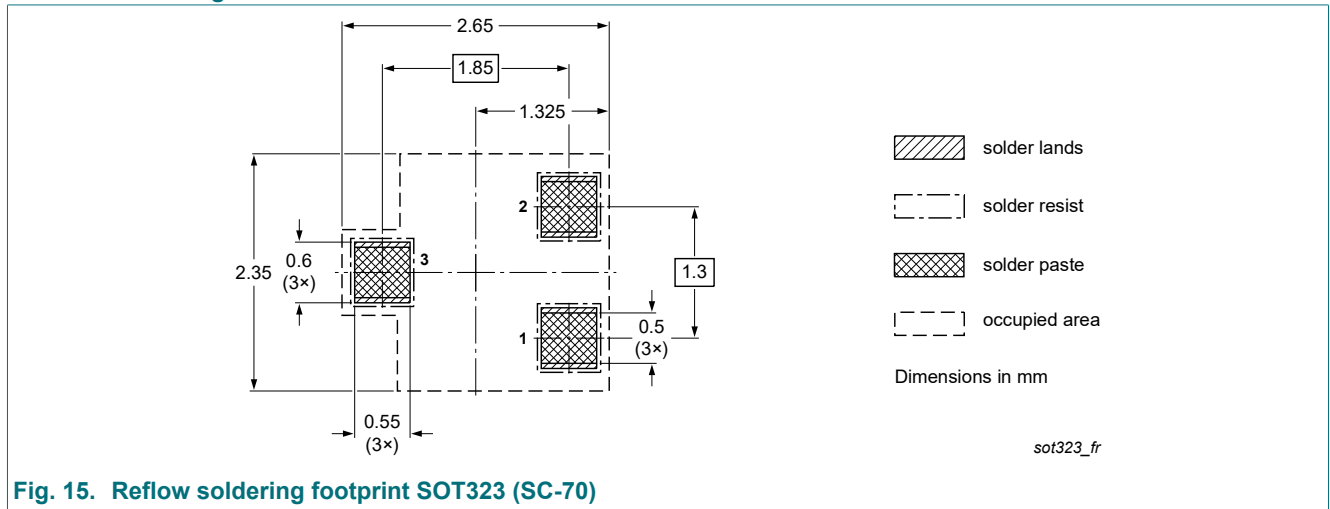


Fig. 15. Reflow soldering footprint SOT323 (SC-70)

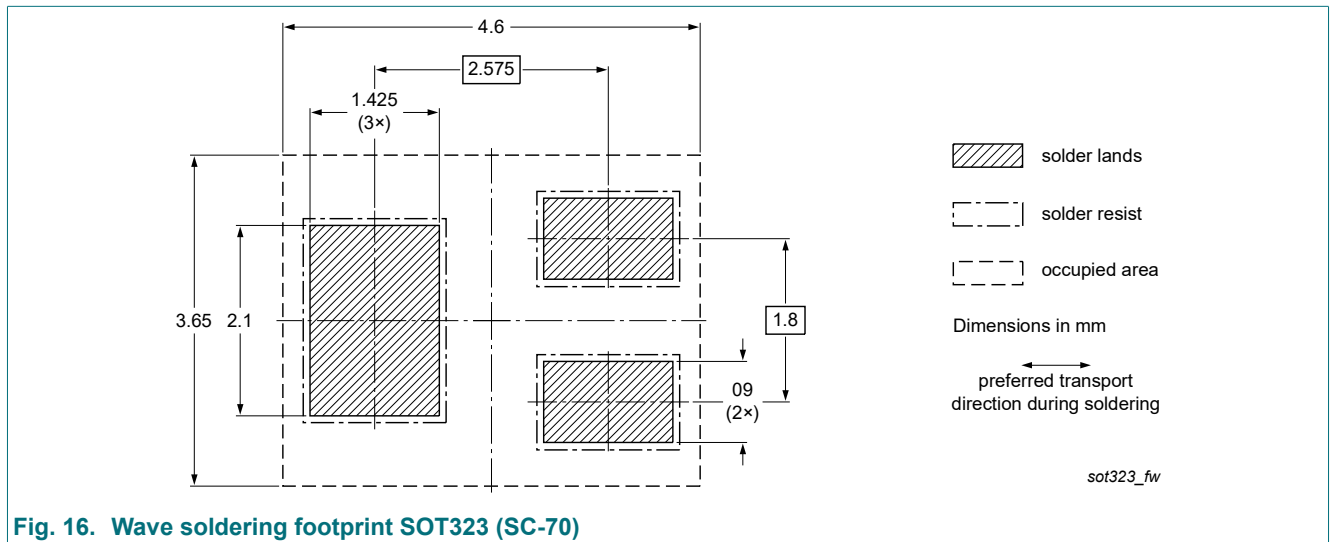


Fig. 16. Wave soldering footprint SOT323 (SC-70)

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC847XW_SER v.13	20220701	Product data sheet	-	BC847_SER v.12
Modifications:	<ul style="list-style-type: none"> Series data sheet reduced to 3 data sheets per package Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s). 			
BC847_SER v.12	20191024	Product data sheet	-	BC847_SER v.11
BC847_SER v.11	20181205	Product data sheet	-	BC847_SER v.10
BC847_SER v.10	20180302	Product data sheet	-	BC847_SER v.9
BC847_SER v.9	20140923	Product data sheet	-	BC847_SER v.8
BC847_SER v.8	20120820	Product data sheet	-	BC847_BC547_SER v.7
BC847_BC547_SER v.7	20081210	Product data sheet	-	BC847_BC547_SER v.6
BC847_BC547_SER v.6	20050519	Product data sheet	-	-

14. Legal information

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 <https://www.nexperia.com>.

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