



THE DATASHEET OF BC846BW,135



BC846xW series

65 V, 100 mA NPN general-purpose transistors

Rev. 12 — 29 March 2023

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	Package		PNP complement
	Nexperia	JEDEC	
BC846W	SOT323	SC-70	BC856W
BC846AW			BC856AW
BC846BW			BC856BW

2. Features and benefits

- General-purpose transistors
- SMD plastic package
- Two different gain selections

3. Applications

- General-purpose switching and amplification

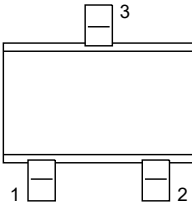
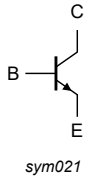
4. Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CE0}	collector-emitter voltage	open base	-	-	65	V
I_C	collector current		-	-	100	mA
	DCcurrent gain					
h_{FE}	BC846W	$V_{CE} = 5\text{ V}; I_C = 2\text{ mA}$	110	-	450	
	BC846AW		110	180	220	
	BC846BW		200	290	450	

5. Pinning information

Table 3. Pinning

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
BC846W	SC-70	Plastic surface-mounted package; 3 leads	SOT323
BC846AW			
BC846BW			

7. Marking

Table 5. Marking

Type number	Marking code[1]
BC846W	1D%
BC846AW	1A%
BC846BW	1B%

[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	-	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 ≤ 1 ms	-	200	mA
I _{BM}	peak base current	single pulse; t _p ≤ 1 ms	-	200	mA
P _{tot}	total power dissipation	T _{amb} ≤ 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

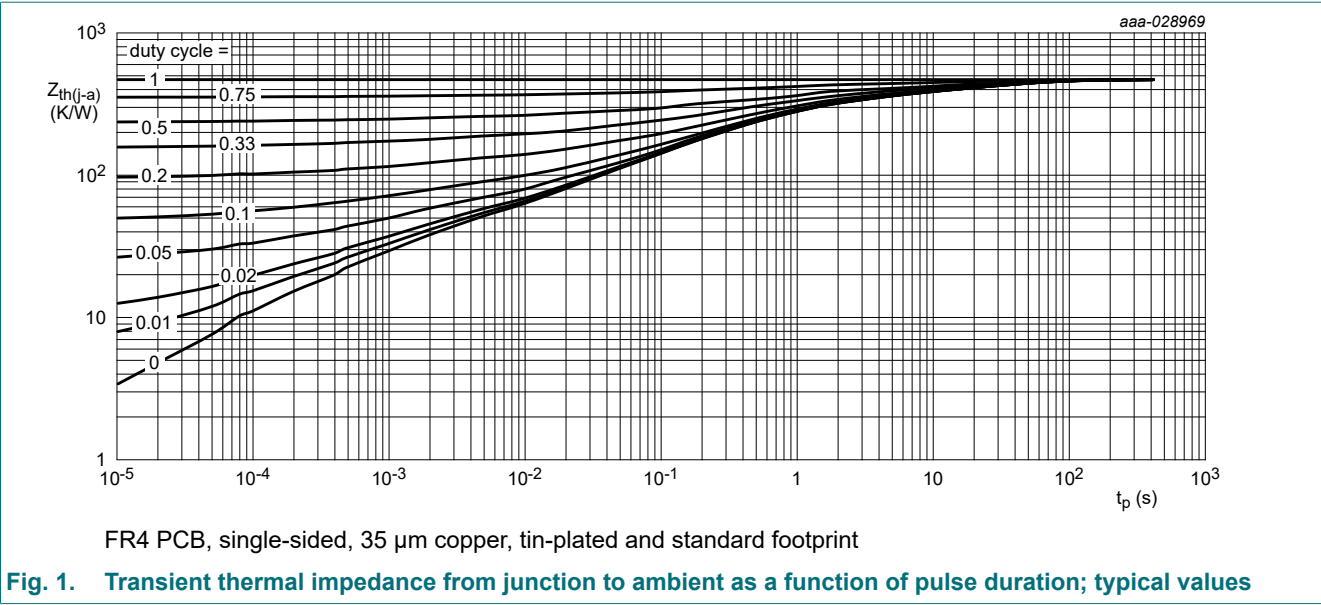
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

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] [2]		-	-	625	K/W

[1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided; 35 µm copper; tin-plated and standard footprint.
[2] Valid for all available selection groups.



10. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _{(BR)CBO}	collector-base breakdown voltage	I _C = 100 μA; I _E = 0 A; T _{amb} = 25 °C		80	-	-	V
V _{(BR)CEO}	collector-emitter breakdown voltage	I _C = 10 mA; I _E = 0 A; T _{amb} = 25 °C		65	-	-	V
V _{(BR)EBO}	emitter-base breakdown voltage	I _E = 100 μA; I _C = 0 A; T _{amb} = 25 °C		6	-	-	V
I _{CBO}	collector-base cut-off current	V _{CB} = 30 V; I _E = 0 A; T _{amb} = 25 °C		-	-	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 _C = 0 A; T _{amb} = 25 °C		-	-	100	nA
h _{FE}	DC current gain						
	BC846AW	V _{CE} = 5 V; I _C = 10 μA; T _{amb} = 25 °C		-	180	-	
	BC846BW			-	290	-	
	BC846W	V _{CE} = 5 V; I _C = 2 mA; T _{amb} = 25 °C		110	-	450	
	BC846AW			110	180	220	
	BC846BW			200	290	450	
V _{CEsat}	collector-emitter saturation voltage	I _C =10 mA; I _B = 0.5 mA; T _{amb} = 25 °C		-	90	200	mV
		I _C =100 mA; I _B = 5 mA; T _{amb} = 25 °C	[1]	-	200	400	mV
V _{BEsat}	base-emitter saturation voltage	I _C =10 mA; I _B = 0.5 mA; T _{amb} = 25 °C	[2]	-	760	-	mV
		I _C =100 mA; I _B = 5 mA; T _{amb} = 25 °C		-	900	-	mV
V _{BE}	base-emitter voltage	I _C = 2 mA; V _{CE} = 5 V; T _{amb} = 25 °C	[3]	580	660	700	mV
		I _C = 10 mA; V _{CE} = 5 V; T _{amb} = 25 °C	[4]	-	-	770	mV
f _T	transition frequency	V _{CE} = 5 V; I _C = 10 mA; f = 100 MHz; T _{amb} = 25 °C		100	-	-	MHz
C _c	collector capacitance	V _{CB} = 10 V; I _E = i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C		-	2	3	pF
C _e	emitter capacitance	V _{EB} = 0.5 V; I _C = i _c = 0 A; f = 1 MHz; T _{amb} = 25 °C		-	11	-	pF
NF	noise figure	I _C = 200 A; V _{CE} = 5 V; R _S = 2 kΩ; f = 1 kHz; B = 200 Hz; T _{amb} = 25 °C		-	2	10	dB

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

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

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

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

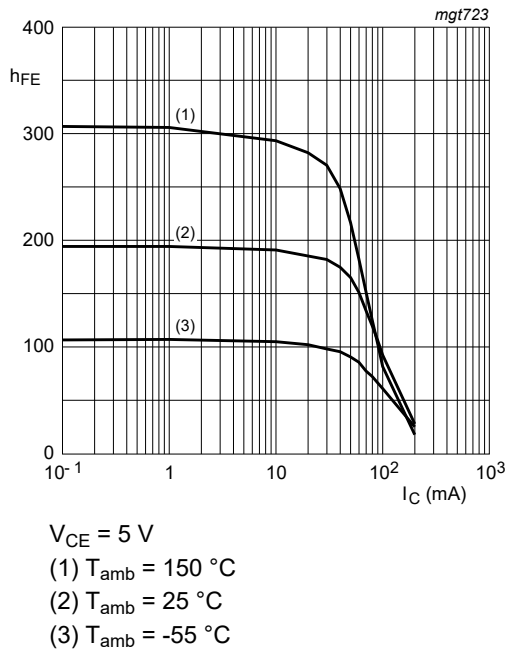


Fig. 2. Group A: DC current gain as a function of collector current; typical values

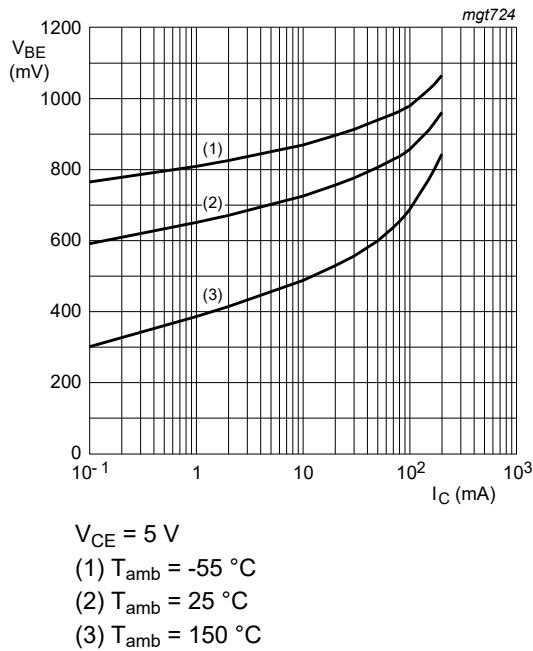


Fig. 3. Group A: Base-emitter voltage as a function of collector current; typical values

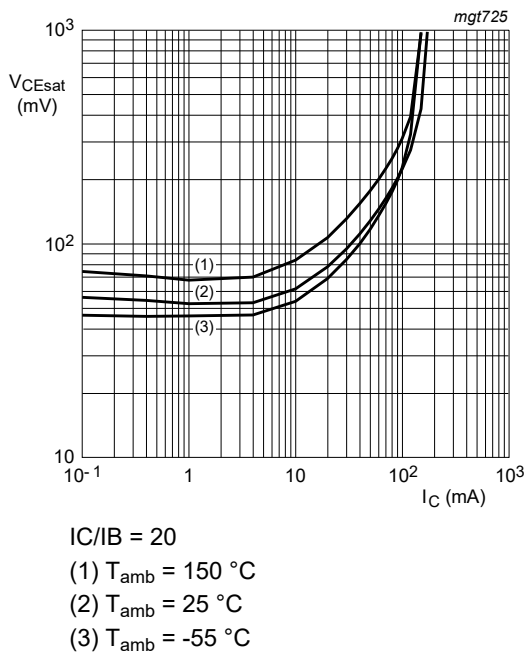


Fig. 4. Group A: Collector-emitter saturation voltage as a function of collector current; typical values

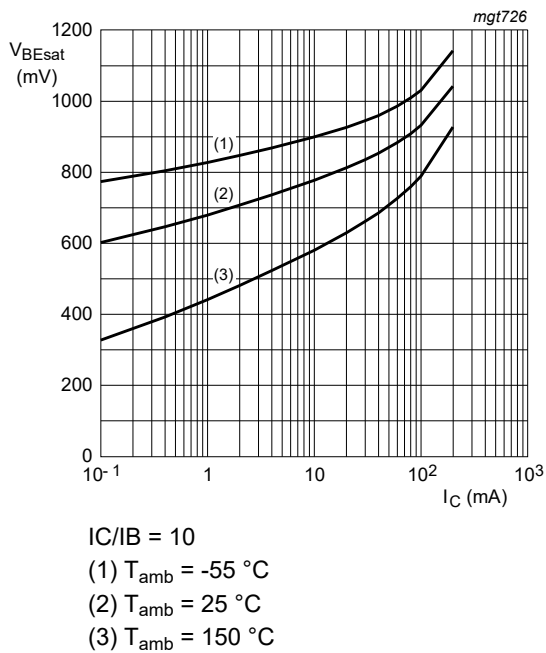


Fig. 5. Group A: Base-emitter saturation voltage as a function of collector current; typical values

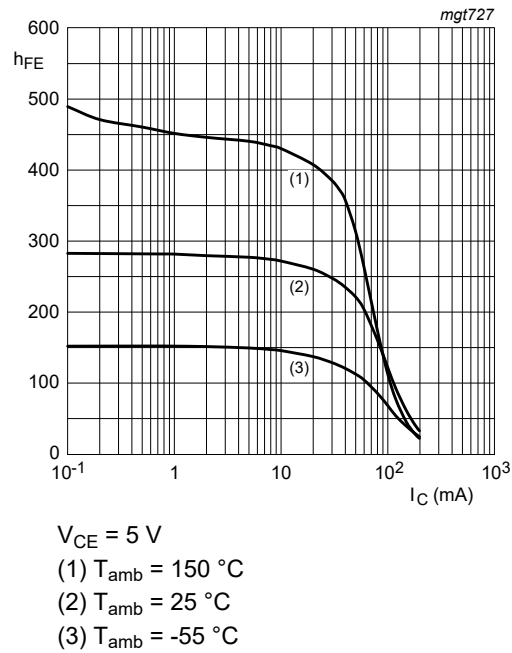


Fig. 6. Group B: DC current gain as a function of collector current; typical values

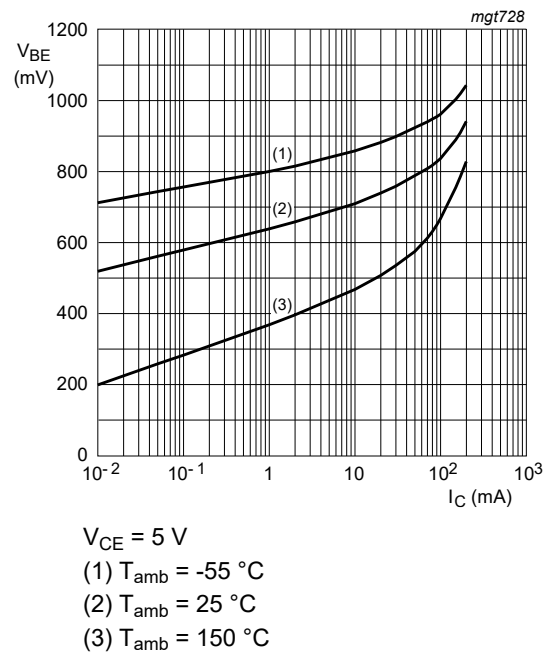


Fig. 7. Group B: Base-emitter voltage as a function of collector current; typical values

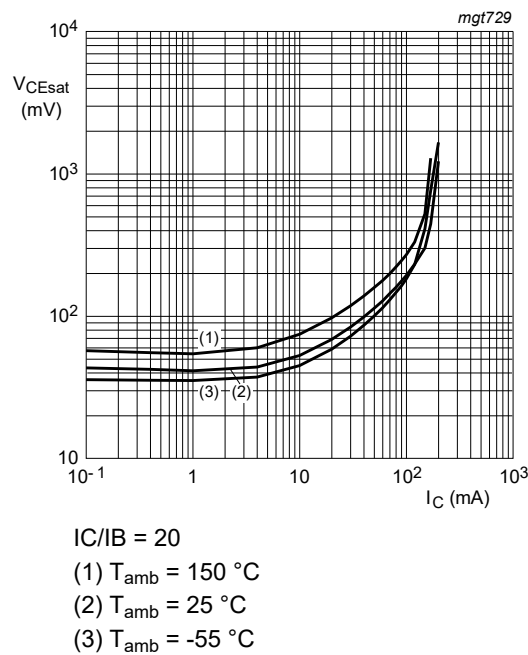


Fig. 8. Group B: Collector-emitter saturation voltage as a function of collector current; typical values

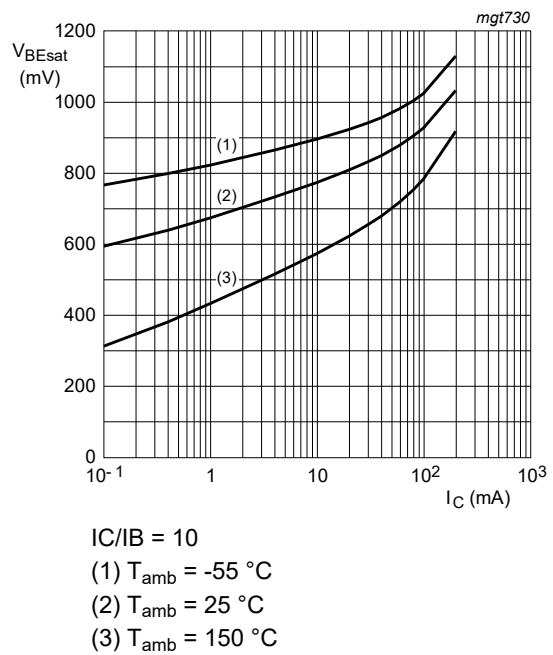


Fig. 9. Group B: Base-emitter saturation voltage as a function of collector current; typical values

11. Package outline

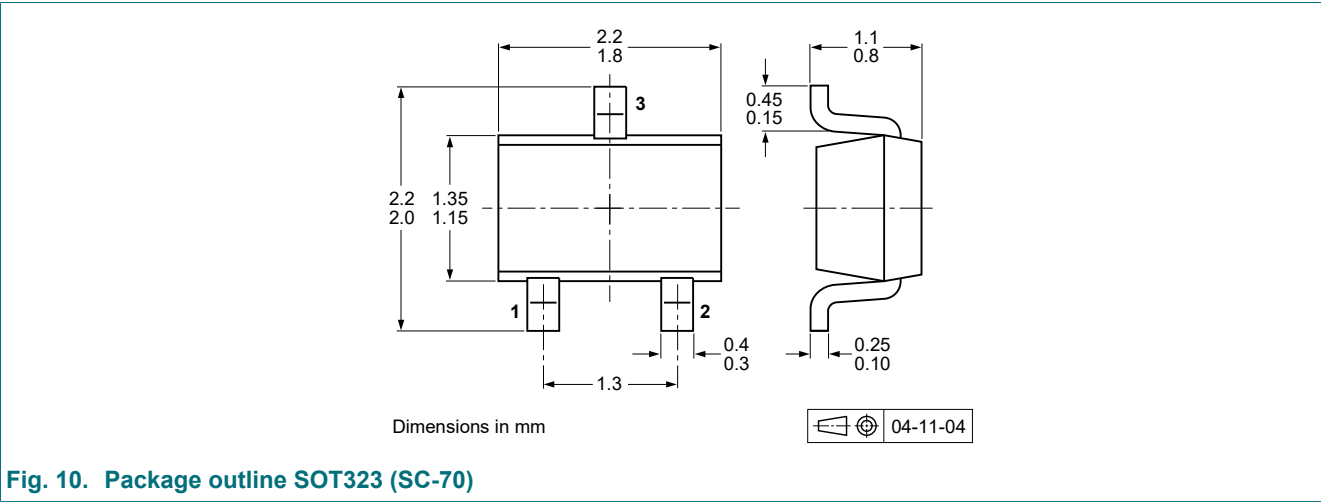
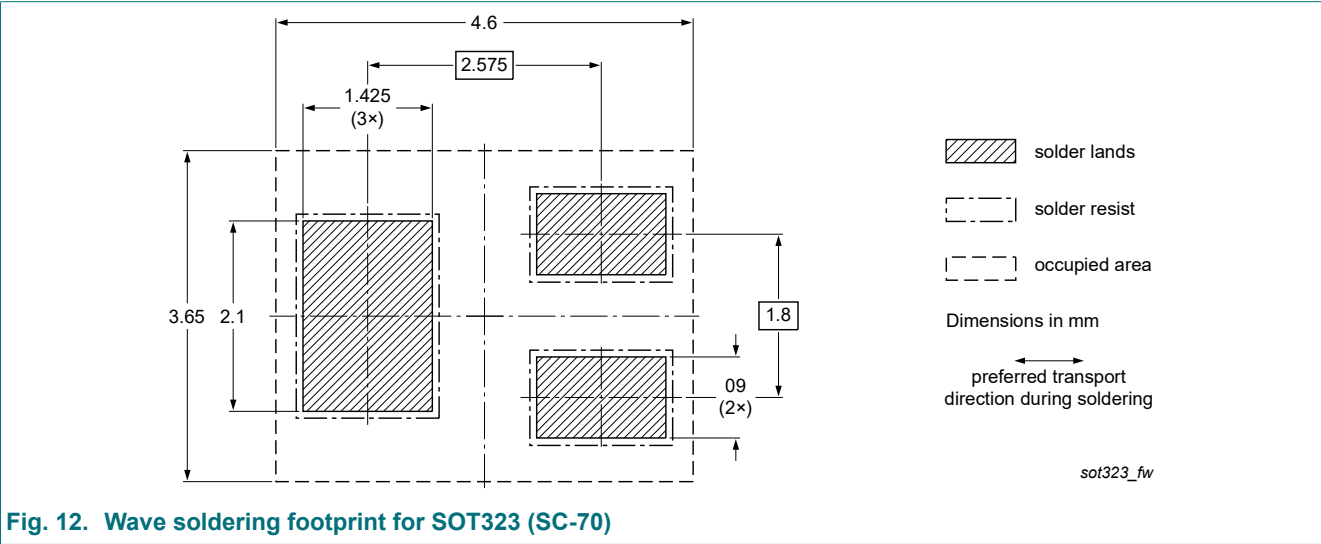
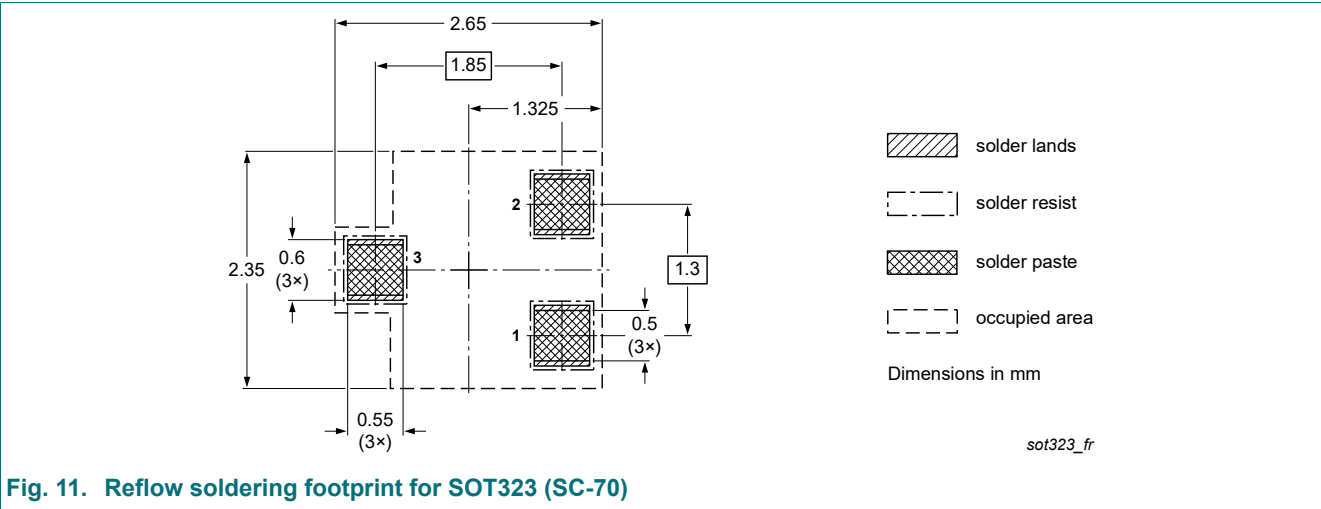


Fig. 10. Package outline SOT323 (SC-70)

12. Soldering



13. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC846XW_SER v.12	20230329	Product data sheet	-	BC846_SER v.11
Modifications:	• Subtitle of the data sheet corrected to 100 mA			
BC846XW_SER v.11	20220701	Product data sheet	-	BC846_SER v.10
BC846_SER v.9	20120925	Product data sheet	-	BC846_SER v.8
BC846_SER v.8	20120424	Product data sheet	-	BC846_BC546_SER v.7
BC846_BC546_SER v.7	20091117	Product data sheet	-	BC846_BC546_SER v.6
BC846_BC546_SER v.6	20060207	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".
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Contents

1. General description..... 1

2. Features and benefits..... 1

3. Applications..... 1

4. Quick reference data..... 1

5. Pinning information.....2

6. Ordering information.....2

7. Marking.....2

8. Limiting values..... 3

9. Thermal characteristics..... 3

10. Characteristics..... 4

11. Package outline..... 7

12. Soldering..... 8

13. Revision history.....9

14. Legal information.....10

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Date of release: 29 March 2023

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