BC856BW,135 Datasheet

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DiGi Electronics Part Number	BC856BW,135-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	BC856BW,135
Description	TRANS PNP 65V 0.1A SOT323
Detailed Description	Bipolar (BJT) Transistor PNP 65 V 100 mA 100MHz 200 mW Surface Mount SOT-323

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Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
BC856BW,135	Nexperia USA Inc.
Series:	Product Status:
-	Active
Transistor Type:	Current - Collector (Ic) (Max):
PNP	100 mA
Voltage - Collector Emitter Breakdown (Max):	Vce Saturation (Max) @ Ib, Ic:
65 V	600mV @ 5mA, 100mA
Current - Collector Cutoff (Max):	DC Current Gain (hFE) (Min) @ Ic, Vce:
15nA (ICBO)	200 @ 2mA, 5V
Power - Max:	Frequency - Transition:
200 mW	100MHz
Operating Temperature:	Grade:
150°C (TJ)	Automotive
Qualification:	Mounting Type:
AEC-Q101	Surface Mount
Package / Case:	Supplier Device Package:
SC-70, SOT-323	SOT-323
Base Product Number:	
BC856	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.21.0075	

BC856W; BC857W; BC858W

65 V, 100 mA PNP general-purpose transistors

Rev. 4 — 10 July 2023 Product data sheet

1. General description

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

Table 1. Product overview

Type number	Package		NPN complement
	Nexperia	JEDEC	
BC856W	SOT323	SC-70	BC846W
BC856AW			BC846AW
BC856BW			BC846BW
BC857W			BC847W
BC857AW			BC847AW
BC857BW			BC847BW
BC857CW			BC847CW
BC858W			BC848W

2. Features and benefits

- Low current (max. 100 mA)
- Low voltage (max. 65 V)

3. Applications

- General-purpose switching and amplification

4. Quick reference data

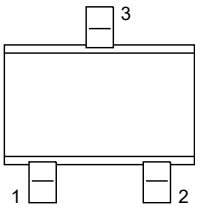
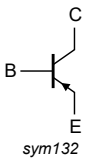
Table 2. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base				
	BC856W		-	-	-65	V
	BC857W		-	-	-45	V
	BC858W		-	-	-30	V
I_C	collector current		-	-	-100	mA
I_{CM}	peak collector current		-	-	-200	mA
h_{FE}	DC current gain					
	BC856W	V_{CE} = 5 V; I_C = 2 mA	125	-	475	
	BC857W; BC858W		125	-	800	
	BC856AW; BC857AW		125	-	250	
	BC856BW; BC857BW		220	-	475	
	BC857CW		420	-	800	

5. Pinning information

Table 3. Pinning information

Pin	Symbol	Descrition	Simlified 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
BC856W	SC-70	plastic surface-mounted package; 3 leads	SOT323
BC856AW			
BC856BW			
BC857W			
BC857AW			
BC857BW			
BC857CW			
BC858W			

7. Marking

Table 5. Marking codes

Type number		Marking code
BC856W	[1]	3D%
BC856AW	[1]	3A%
BC856BW	[1]	3B%
BC857W	[1]	3H%
BC857AW	[1]	3E%
BC857CW	[1]	3G%
BC858W	[1]	3M%

[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				
	BC856W			-	-80	V
	BC857W			-	-50	V
	BC858W			-	-30	V
V_{CEO}	collector-emitter voltage	open base				
	BC856W			-	-65	V
	BC857W			-	-45	V
	BC858W			-	-30	V
V_{EBO}	emitter-base voltage	open collector		-	-5	V
I_C	collector current			-	-100	mA
I_{CM}	peak collector current			-	-200	mA
I_{BM}	peak base current			-	-200	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

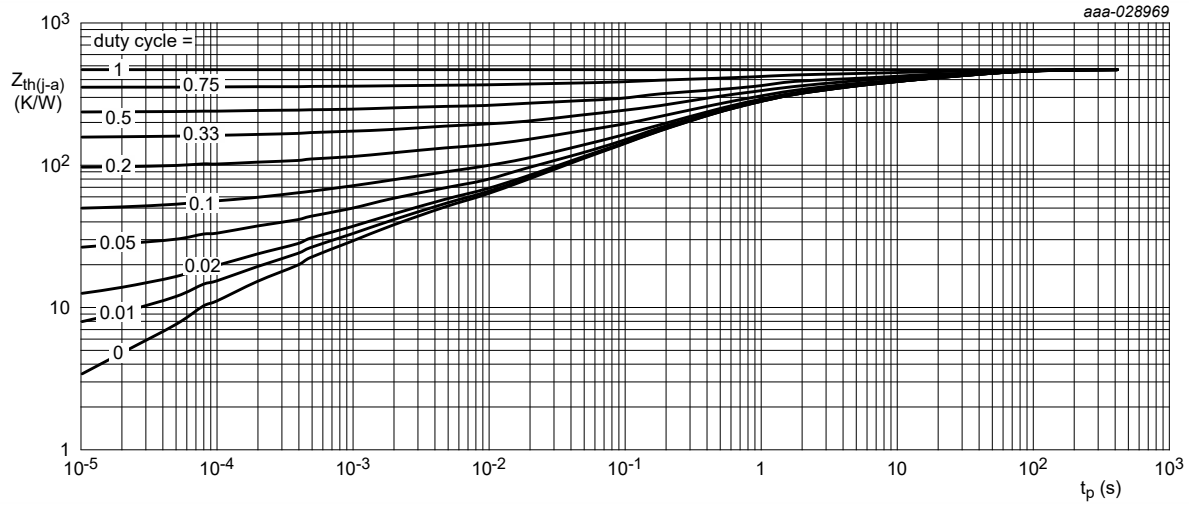
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 µm copper, tin-plated and standard footprint.

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; 35 µm copper; tin-plated and standard footprint.



FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint

Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

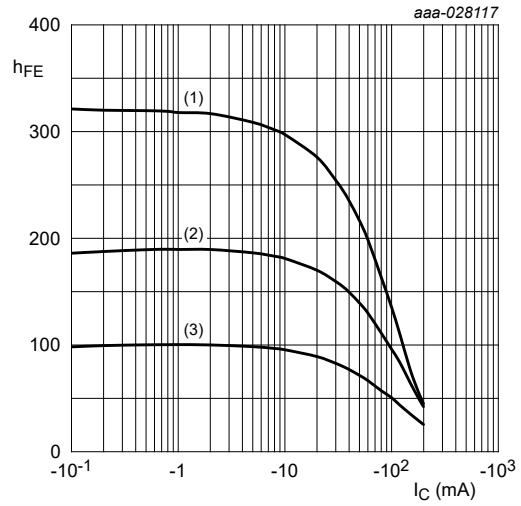
10. Characteristics

Table 8. Characteristics

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

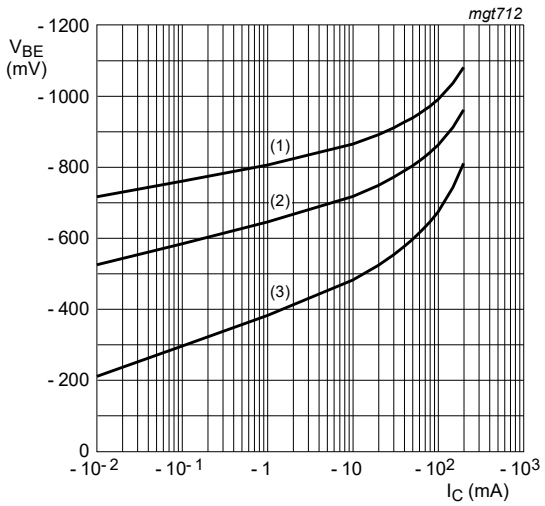
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage						
	BC856W	I_C = -100 µA; I_E = 0 A		-80	-	-	V
	BC857W			-50	-	-	V
	BC858W			-30	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage						
	BC856W	I_C = -2 mA; I_B = 0 A		-65	-	-	V
	BC857W			-45	-	-	V
	BC858W			-30	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 0 A; I_E = -100 µA		-5	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = -30 V; I_E = 0 A		-	-1	-15	nA
		V_{CB} = -30 V; I_E = 0 A; T_j = 150 °C		-	-	-4	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = -5 V; I_C = 0 A		-	-	-100	nA
h_{FE}	DC current gain						
	BC856W	V_{CE} = -5 V; I_C = -2 mA		125	-	475	
	BC857W; BC858W			125	-	800	
	BC856AW; BC857AW			125	-	250	
	BC857BW; BC858BW			220	-	475	
	BC857CW			420	-	800	
V_{CEsat}	collector-emitter saturation voltage	I_C = -10 mA; I_B = -0.5 mA		-	-75	-300	mV
		I_C = -100 mA; I_B = -5 mA	[1]	-	-250	-600	mV
V_{BEsat}	base-emitter saturation voltage	I_C = -10 mA; I_B = -0.5 mA	[1]	-	-700	-	mV
		I_C = -100 mA; I_B = -5 mA	[1]	-	-850	-	mV
V_{BE}	base-emitter voltage	V_{CE} = -5 V; I_C = -2 mA		-600	-650	-750	mV
		V_{CE} = -5 V; I_C = -10 mA		-	-	-820	mV
C_c	collector capacitance	V_{CB} = -10 V; I_E = i_e = 0 A; f = 1 MHz		-	3	-	pF
C_e	collector capacitance	V_{EB} = -5 V; I_C = i_c = 0 A; f = 1 MHz		-	12	-	pF
f_T	transition frequency	V_{CE} = -5 V; I_C = -10 mA; f = 100 MHz		100	-	-	MHz
NF	noise figure	I_C = -200 µA; V_{CE} = -5 V; R_S = 2 kΩ; f = 1 kHz; B = 200Hz		-	2	10	dB

[1] pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$



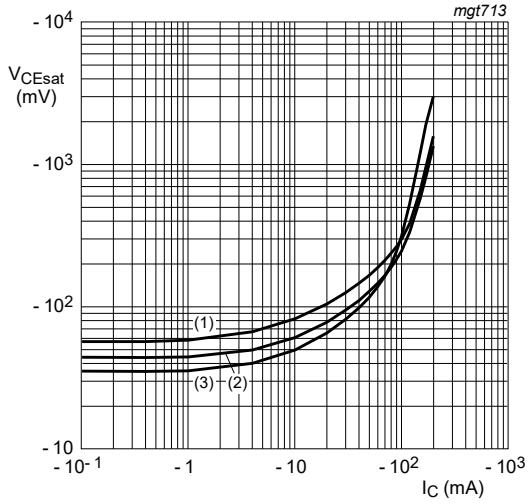
V_{CE} = -5 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 2. BC857AW: DC current gain as a function of collector current; typical values



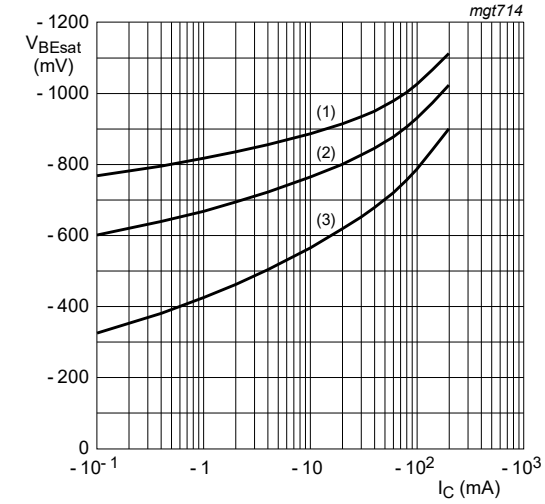
V_{CE} = -5 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 3. BC857AW: Base-emitter voltage as a function of collector current; typical values



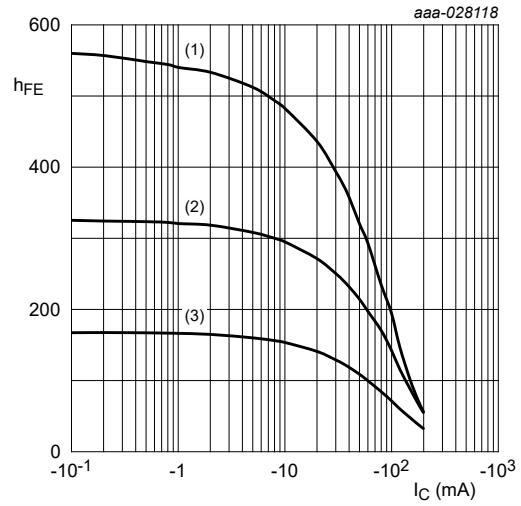
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 4. BC857AW: Collector-emitter saturation voltage as a function of collector current; typical values



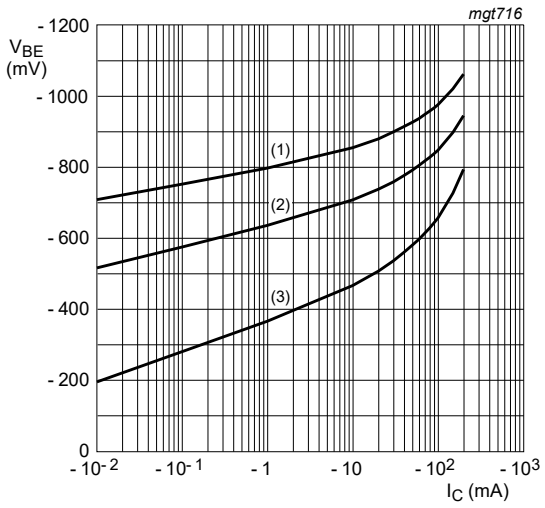
I_C/I_B = 20
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 5. BC857AW: Base-emitter saturation voltage as a function of collector current; typical values



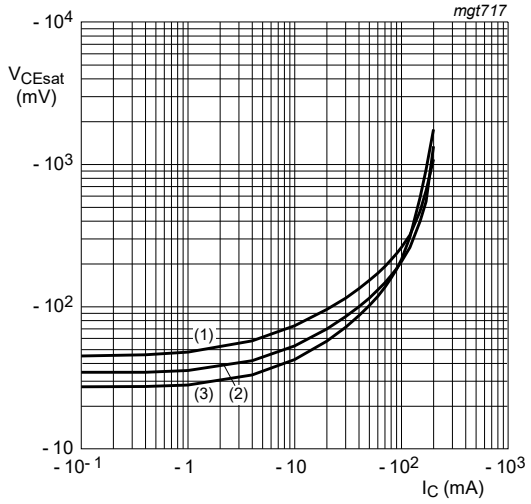
V_{CE} = -5 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 6. BC857BW: DC current gain as a function of collector current; typical values



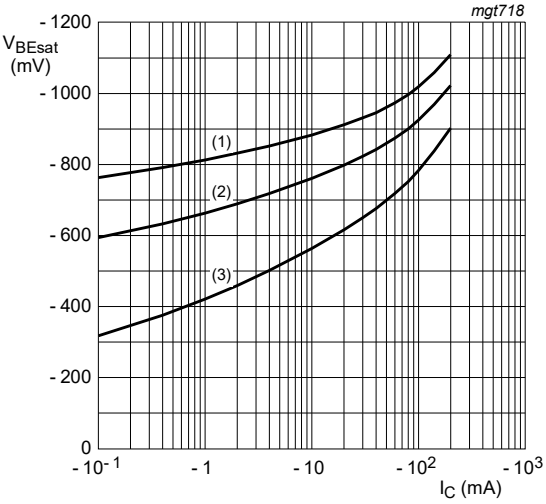
V_{CE} = -5 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 7. BC857BW: Base-emitter voltage as a function of collector current; typical values



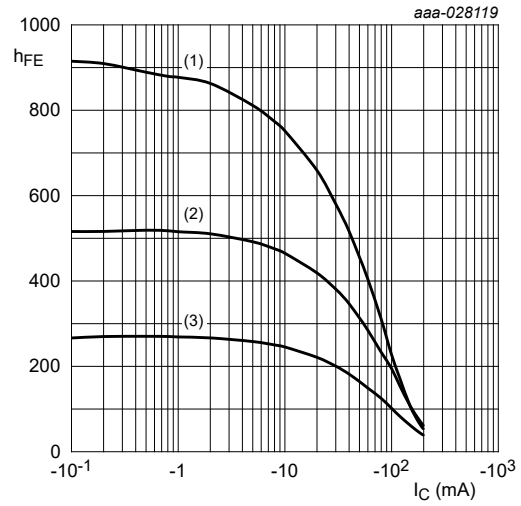
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 8. BC857BW: Collector-emitter saturation voltage as a function of collector current; typical values



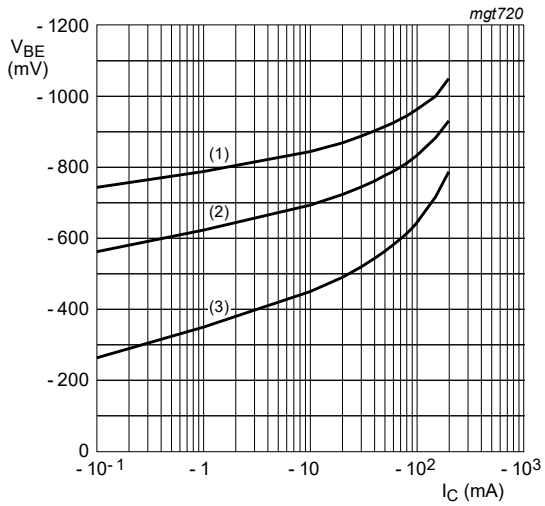
I_C/I_B = 20
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 9. BC857BW: Base-emitter saturation voltage as a function of collector current; typical values



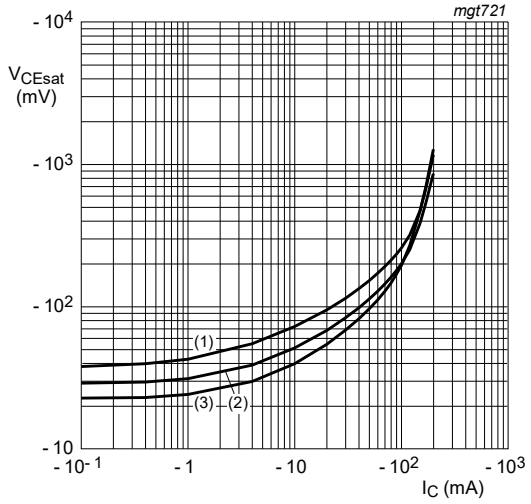
V_{CE} = -5 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 10. BC857CW: DC current gain as a function of collector current; typical values



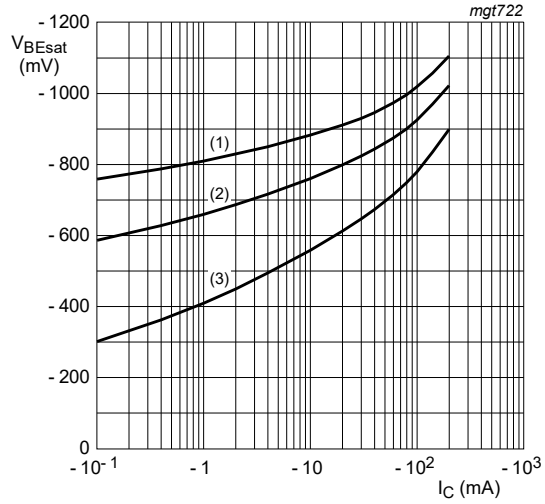
V_{CE} = -5 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 11. BC857CW: 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. 12. BC857CW: Collector-emitter saturation voltage as a function of collector current; typical values



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

Fig. 13. BC857CW: Base-emitter saturation voltage as a function of collector current; typical values

11. Package outline

Table 9. Package outline

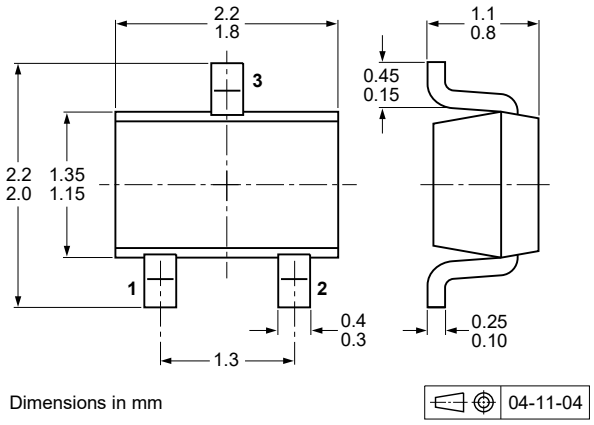


Fig. 14. Package outline SOT323 (SC-70)

12. Soldering

Table 10. Soldering

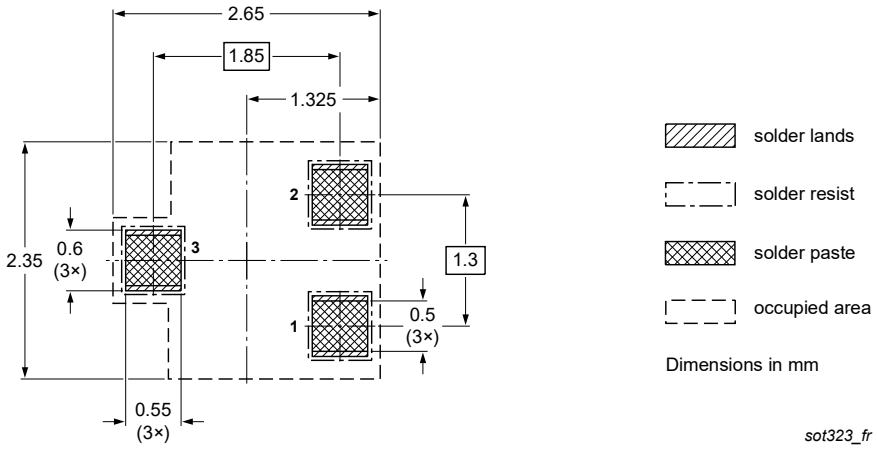


Fig. 15. Reflow soldering footprint SOT323 (SC-70)

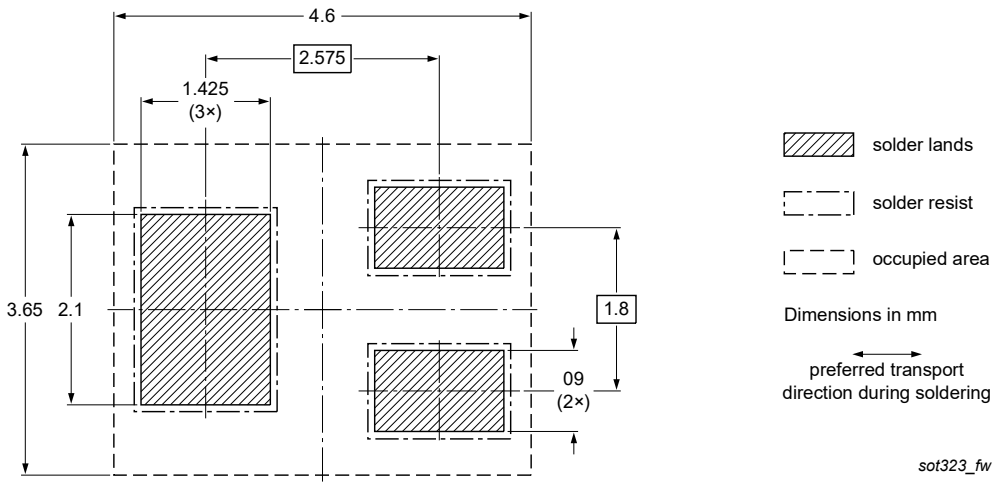


Fig. 16. Wave soldering footprint SOT323 (SC-70)

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC856W_BC857W_BC858W v.4	20230710	Product data sheet	-	BC856W_BC857W_BC858W v.3
Modifications:	• Quick reference data: typos corrected			
BC856W_BC857W_BC858W v.3	20230701	Product data sheet	-	BC856W_BC857W_BC858W v.2
BC856W_BC857W_BC858W v.2	20020204	Product data sheet	-	BC856W_BC857W_BC858W v.1
BC856W_BC857W_BC858W v.1	19990412	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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Contents

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Date of release: 10 July 2023

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