

BC857BW-QX Datasheet



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DiGi Electronics Part Number	BC857BW-QX-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	BC857BW-QX
Description	TRANS NPN 45V 0.1A SOT323
Detailed Description	Bipolar (BJT) Transistor NPN 45 V 100 mA 100MHz 200 mW Surface Mount SOT-323



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Purchase and inquiry

Manufacturer Product Number:

BC857BW-QX

Series:

BC847xW-Q

Transistor Type:

NPN

Voltage - Collector Emitter Breakdown (Max):

45 V

Current - Collector Cutoff (Max):

15nA (ICBO)

Power - Max:

200 mW

Operating Temperature:

150°C (TJ)

Qualification:

AEC-Q101

Package / Case:

SC-70, SOT-323

Base Product Number:

BC857

Manufacturer:

Nexperia USA Inc.

Product Status:

Active

Current - Collector (Ic) (Max):

100 mA

Vce Saturation (Max) @ Ib, Ic:

400mV @ 5mA, 100mA

DC Current Gain (hFE) (Min) @ Ic, Vce:

200 @ 2mA, 5V

Frequency - Transition:

100MHz

Grade:

Automotive

Mounting Type:

Surface Mount

Supplier Device Package:

SOT-323

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.21.0075

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



BC856W-Q; BC857W-Q; BC858W-Q

65 V, 100 mA PNP general-purpose transistors

Rev. 2 — 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-Q	SOT323	SC-70	BC846W-Q
BC856AW-Q			BC846AW-Q
BC856BW-Q			BC846BW-Q
BC857W-Q			BC847W-Q
BC857AW-Q			BC847AW-Q
BC857BW-Q			BC847BW-Q
BC857CW-Q			BC847CW-Q
BC858W-Q			BC848W-Q

2. Features and benefits

- Low current (max. 100 mA)
- Low voltage (max. 65 V)
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- General-purpose switching and amplification

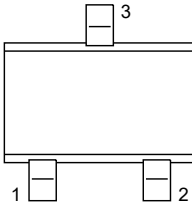
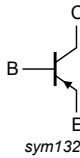
4. Quick reference data

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				
	BC856W-Q		-	-	-65	V
	BC857W-Q		-	-	-45	V
	BC858W-Q		-	-	-30	V
I_C	collector current		-	-	-100	mA
I_{CM}	peak collector current		-	-	-200	mA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}; I_C = 2\text{ mA}$				
	BC856W-Q		125	-	475	
	BC857W-Q; BC858W-Q		125	-	800	
	BC856AW-Q; BC857AW-Q		125	-	250	
	BC856BW-Q; BC857BW-Q		220	-	475	
	BC857CW-Q		420	-	800	

5. Pinning information

Table 3. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		 sym132
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		Version
	Name	Description	
BC856W-Q	SC-70	plastic surface-mounted package; 3 leads	SOT323
BC856AW-Q			
BC856BW-Q			
BC857W-Q			
BC857AW-Q			
BC857BW-Q			
BC857CW-Q			
BC858W-Q			

7. Marking

Table 5. Marking codes

Type number		Marking code
BC856W-Q	[1]	3D%
BC856AW-Q	[1]	3A%
BC856BW-Q	[1]	3B%
BC857W-Q	[1]	3H%
BC857AW-Q	[1]	3E%
BC857BW-Q	[1]	3F%
BC857CW-Q	[1]	3G%
BC858W-Q	[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-Q		-	-80	V
	BC857W-Q		-	-50	V
	BC858W-Q		-	-30	V
V _{CEO}	collector-emitter voltage	open base			
	BC856W-Q		-	-65	V
	BC857W-Q		-	-45	V
	BC858W-Q		-	-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} ≤ 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

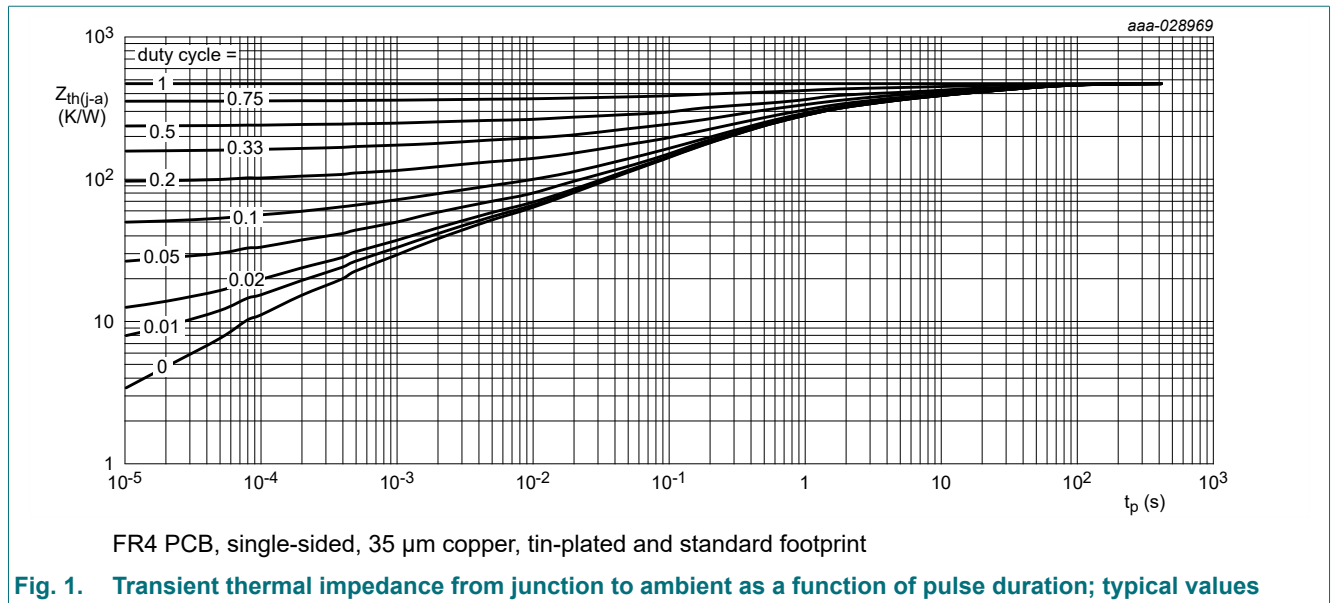
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 µm copper, tin-plated and standard footprint.

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 μ m copper; tin-plated and standard footprint.



10. Characteristics

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

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

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

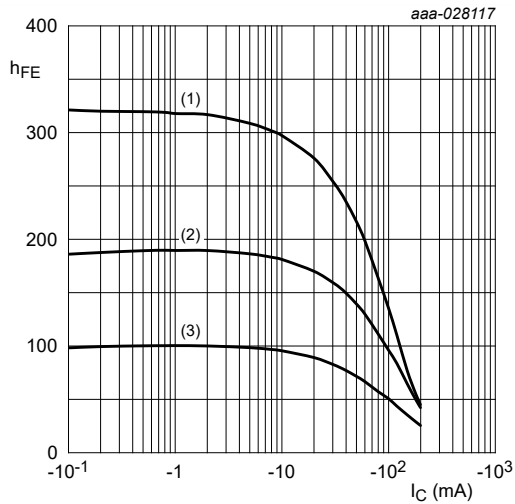

 $V_{CE} = -5 \text{ V}$
(1) $T_{amb} = 150 \text{ }^{\circ}\text{C}$ (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$ (3) $T_{amb} = -55 \text{ }^{\circ}\text{C}$

Fig. 2. BC856AW-Q; BC857AW-Q: DC current gain as a function of collector current; typical values

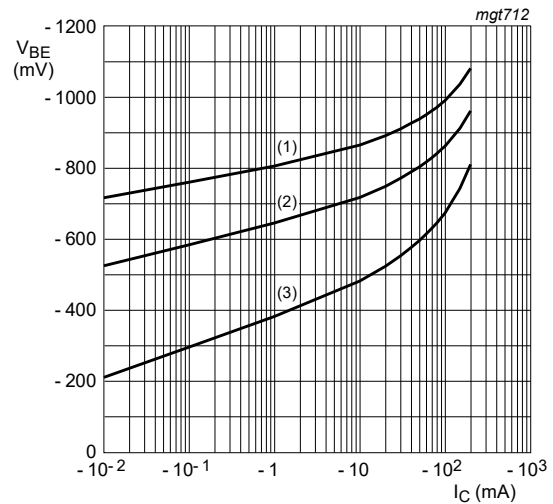

 $V_{CE} = -5 \text{ V}$
(1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$ (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$ (3) $T_{amb} = 150 \text{ }^{\circ}\text{C}$

Fig. 3. BC856AW-Q; BC857AW-Q: Base-emitter voltage as a function of collector current; typical values

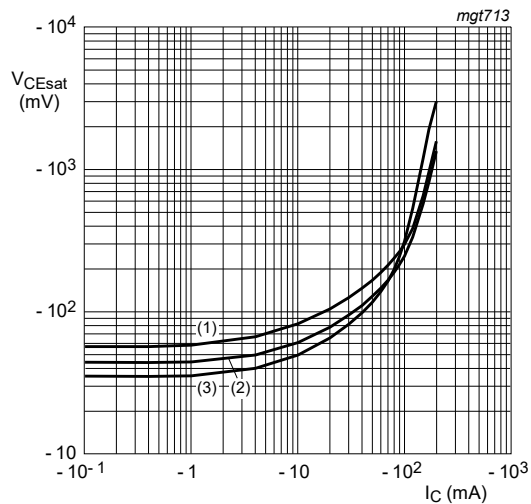

 $I_C/I_B = 20$
(1) $T_{amb} = 150 \text{ }^{\circ}\text{C}$ (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$ (3) $T_{amb} = -55 \text{ }^{\circ}\text{C}$

Fig. 4. BC856AW-Q; BC857AW-Q: Collector-emitter saturation voltage as a function of collector current; typical values

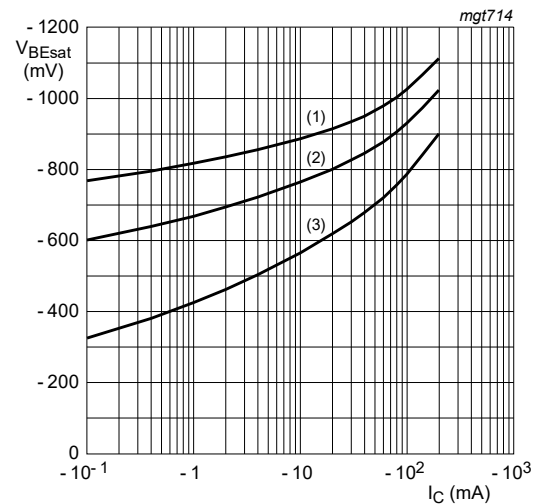
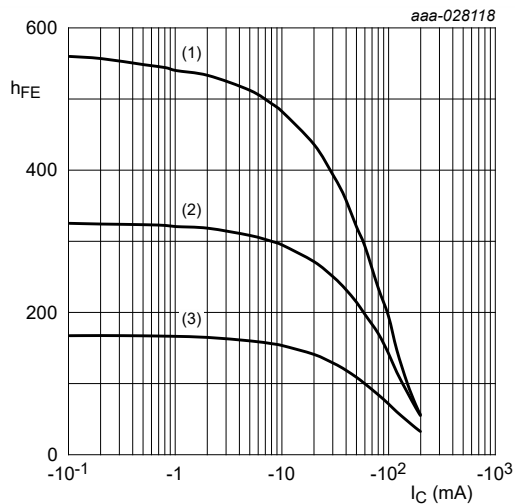

 $I_C/I_B = 20$
(1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$ (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$ (3) $T_{amb} = 150 \text{ }^{\circ}\text{C}$

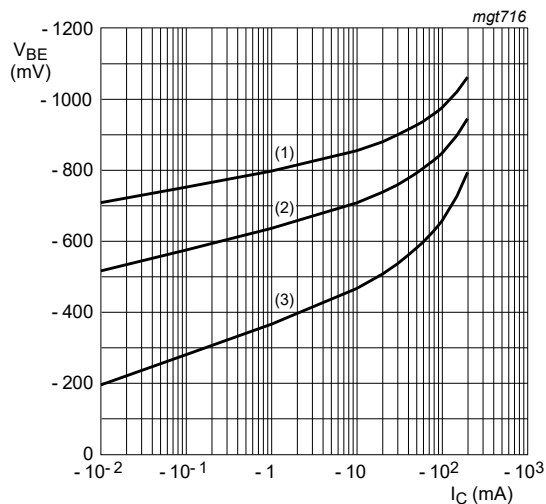
Fig. 5. BC856AW-Q; BC857AW-Q: Base-emitter saturation voltage as a function of collector current; typical values



$V_{CE} = -5 \text{ V}$

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

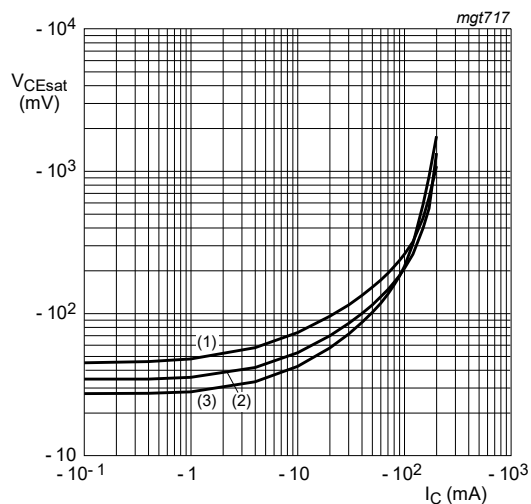
Fig. 6. BC856BW-Q; BC857BW-Q; BC858BW-Q: DC current gain as a function of collector current; typical values



$V_{CE} = -5 \text{ V}$

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

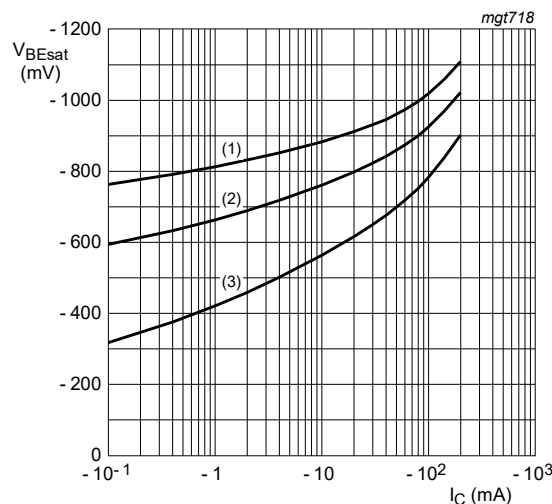
Fig. 7. BC856BW-Q; BC857BW-Q; BC858BW-Q: Base-emitter voltage as a function of collector current; typical values



$I_C/I_B = 20$

- (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. 8. BC856BW-Q; BC857BW-Q; BC858BW-Q: Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$

- (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. 9. BC856BW-Q; BC857BW-Q; BC858BW-Q: Base-emitter saturation voltage as a function of collector current; typical values

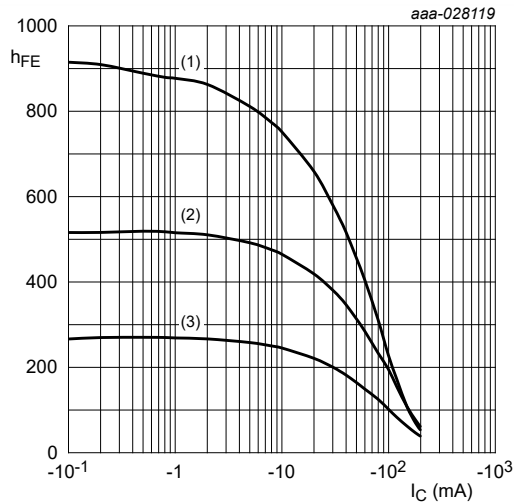

 $V_{CE} = -5 \text{ V}$
(1) $T_{amb} = 150 \text{ }^\circ\text{C}$ (2) $T_{amb} = 25 \text{ }^\circ\text{C}$ (3) $T_{amb} = -55 \text{ }^\circ\text{C}$

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

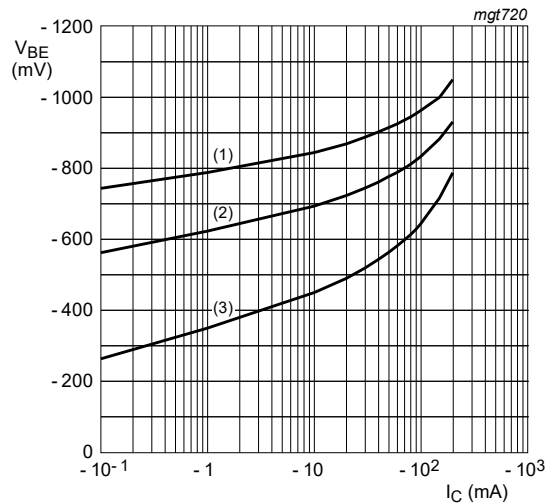

 $V_{CE} = -5 \text{ V}$
(1) $T_{amb} = -55 \text{ }^\circ\text{C}$ (2) $T_{amb} = 25 \text{ }^\circ\text{C}$ (3) $T_{amb} = 150 \text{ }^\circ\text{C}$

Fig. 11. BC857CW-Q: Base-emitter voltage as a function of collector current; typical values

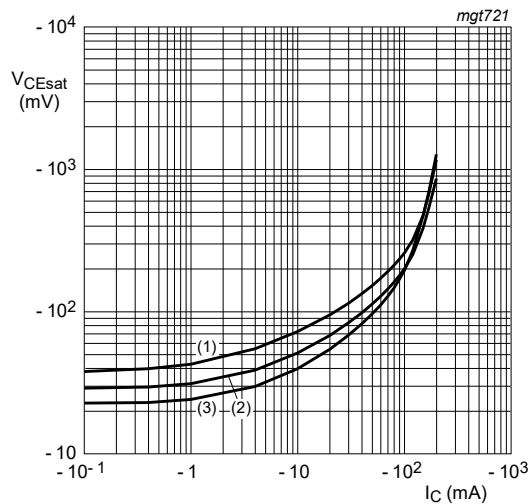

 $I_C/I_B = 20$
(1) $T_{amb} = 150 \text{ }^\circ\text{C}$ (2) $T_{amb} = 25 \text{ }^\circ\text{C}$ (3) $T_{amb} = -55 \text{ }^\circ\text{C}$

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

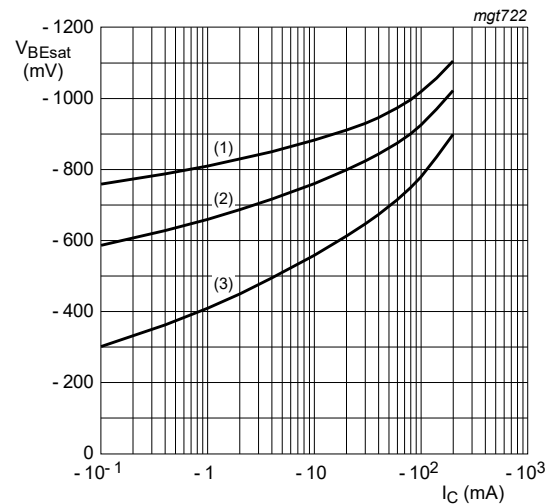

 $I_C/I_B = 20$
(1) $T_{amb} = -55 \text{ }^\circ\text{C}$ (2) $T_{amb} = 25 \text{ }^\circ\text{C}$ (3) $T_{amb} = 150 \text{ }^\circ\text{C}$

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

11. Test information

11.1. Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

12. Package outline

Table 9. Package outline

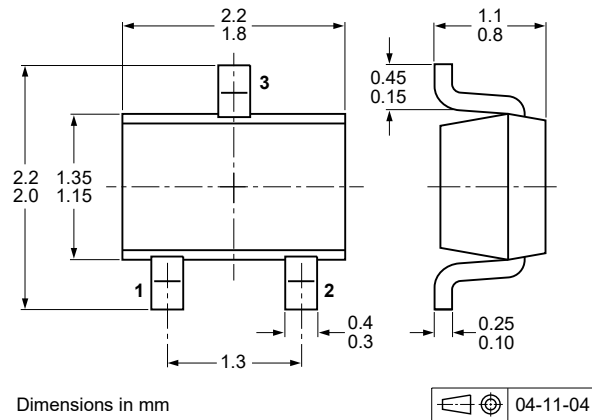


Fig. 14. Package outline SOT323 (SC-70)

13. Soldering

Table 10. Soldering

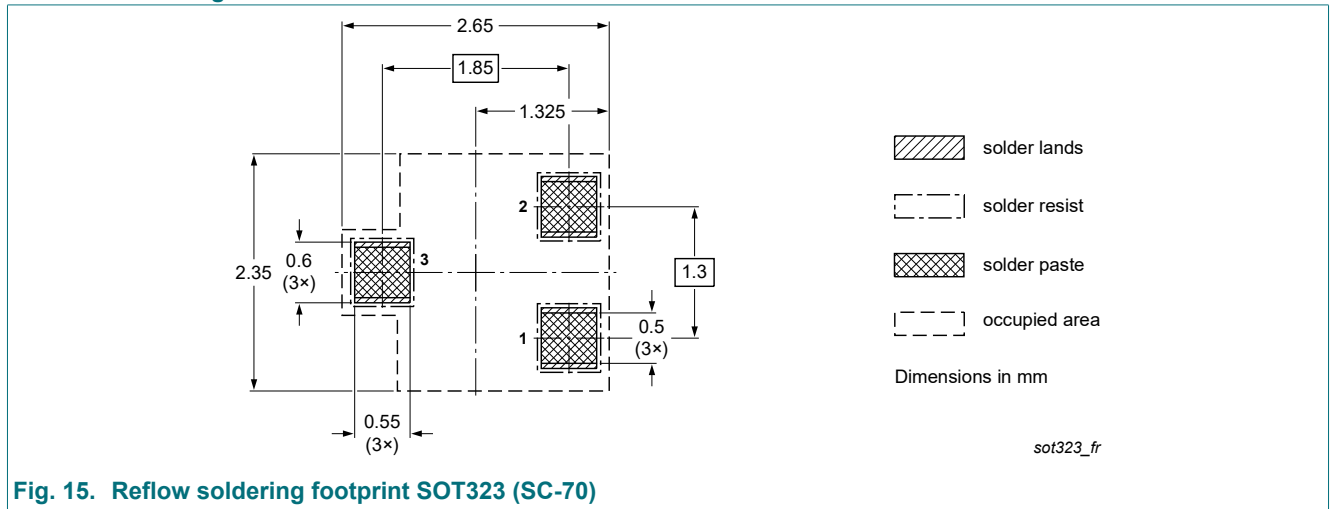


Fig. 15. Reflow soldering footprint SOT323 (SC-70)

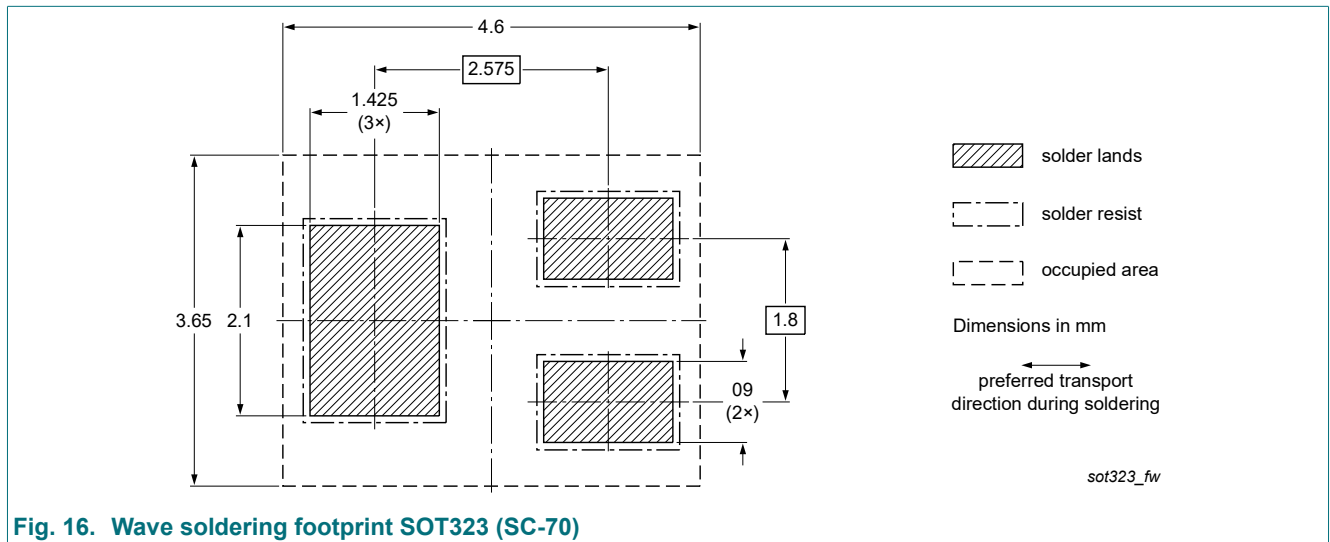


Fig. 16. Wave soldering footprint SOT323 (SC-70)

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC856W-Q_BC857W-Q_BC858W-Q v.2	20230710	Product data sheet	-	-
Modifications:	<ul style="list-style-type: none"> Quick reference data: typos corrected 			
BC856W-Q_BC857W-Q_BC858W-Q v.1	20211203	Product data sheet	-	-

15. 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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Date of release: 10 July 2023

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