



# THE DATASHEET OF BC857B-QR





# BC856-Q; BC857-Q; BC858-Q

65 V, 100 mA PNP general-purpose transistors

Rev. 2 — 21 February 2022

Product data sheet

## 1. General description

PNP general-purpose transistors in a small SOT23 (TO-236AB), Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		NPN complement
	Nexperia	JEDEC	
BC856-Q	SOT23	TO-236AB	BC846-Q
BC856A-Q			BC846A-Q
BC856B-Q			BC846B-Q
BC857-Q			BC847-Q
BC857A-Q			BC847A-Q
BC857B-Q			BC847B-Q
BC857C-Q			BC847C-Q
BC858B-Q			BC848B-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

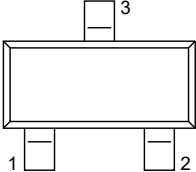
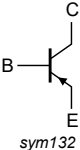
## 4. Quick reference data

**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				
	BC856-Q; BC856A-Q; BC856B-Q		-	-	-65	V
	BC857-Q; BC857A-Q; BC857B-Q; BC857C-Q		-	-	-45	V
	BC858B-Q		-	-	-30	V
$I_C$	collector current		-	-	-100	mA
$I_{CM}$	peak collector current		-	-	-200	mA
$h_{FE}$	DC current gain					
	BC856-Q	$V_{CE} = 5\text{ V}; I_C = 2\text{ mA}$	125	-	475	
	BC857-Q		125	-	800	
	BC856A-Q; BC857A-Q		125	-	250	
	BC856B-Q; BC857B-Q; BC858B-Q		220	-	475	
	BC857C-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	
BC856-Q	TO-236AB	plastic surface-mounted package; 3 leads	SOT23
BC856A-Q			
BC856B-Q			
BC857-Q			
BC857A-Q			
BC857B-Q			
BC857C-Q			
BC858B-Q			

## 7. Marking

Table 5. Marking codes

Type number		Marking code
BC856-Q	[1]	3D%
BC856A-Q	[1]	3A%
BC856B-Q	[1]	3B%
BC857-Q	[1]	3H%
BC857A-Q	[1]	3E%
BC857B-Q	[1]	3F%
BC857C-Q	[1]	3G%
BC858B-Q	[1]	3K%

[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 <sub>CB0</sub>	collector-base voltage	open emitter			
	BC856-Q; BC856A-Q; BC856B-Q		-	-80	V
	BC857-Q; BC857A-Q; BC857B-Q; BC857C-Q		-	-50	V
	BC858B-Q		-	-30	V
V <sub>CEO</sub>	collector-emitter voltage	open base			
	BC856-Q; BC856A-Q; BC856B-Q		-	-65	V
	BC857-Q; BC857A-Q; BC857B-Q; BC857C-Q		-	-45	V
	BC858B-Q		-	-30	V
V <sub>EBO</sub>	emitter-base voltage	open collector	-	-5	V
I <sub>C</sub>	collector current		-	-100	mA
I <sub>CM</sub>	peak collector current		-	-200	mA
I <sub>BM</sub>	peak base current		-	-200	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	250	mW
T <sub>j</sub>	junction temperature		-	150	°C
T <sub>amb</sub>	ambient temperature		-65	150	°C
T <sub>stg</sub>	storage temperature		-65	150	°C

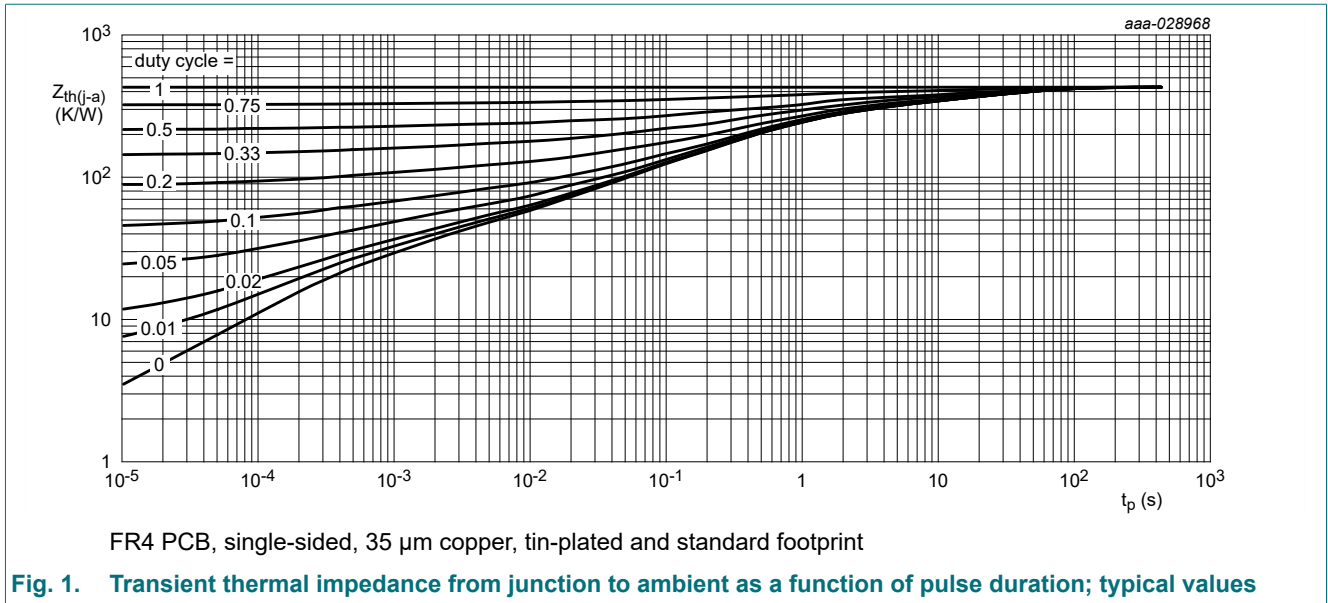
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided, 35 µm copper, tin-plated and standard footprint.

## 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]	-	500	K/W

[1] Device mounted on an FR4 PCB; single-sided, 35  $\mu$ m copper; tin-plated and standard footprint.

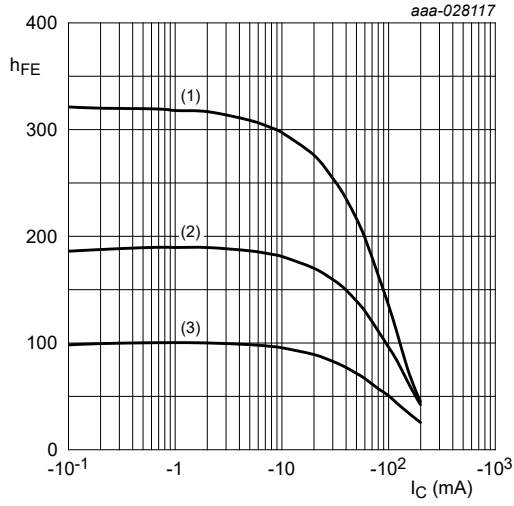


## 10. Characteristics

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

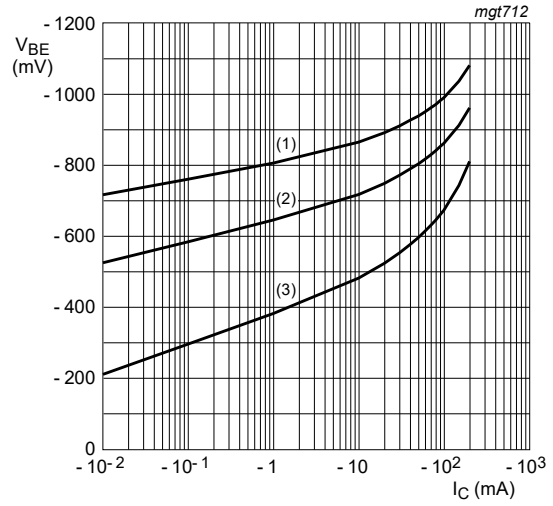
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{(BR)CBO}$	collector-base breakdown voltage						
	BC856-Q; BC856A-Q; BC856B-Q	$I_C = -100\ \mu\text{A}; I_E = 0\ \text{A}$	-80	-	-	V	
	BC857-Q; BC857A-Q; BC857B-Q; BC857C-Q		-50	-	-	V	
	BC858B-Q		-30	-	-	V	
$V_{(BR)CEO}$	collector-emitter breakdown voltage						
	BC856-Q; BC856A-Q; BC856B-Q	$I_C = -2\ \text{mA}; I_B = 0\ \text{A}$	-65	-	-	V	
	BC857-Q; BC857A-Q; BC857B-Q; BC857C-Q		-45	-	-	V	
	BC858B-Q		-30	-	-	V	
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_C = 0\ \text{A}; I_E = -100\ \mu\text{A}$	-5	-	-	V	
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -30\ \text{V}; I_E = 0\ \text{A}$	-	-1	-15	nA	
		$V_{CB} = -30\ \text{V}; I_E = 0\ \text{A}; T_j = 150\text{ °C}$	-	-	-4	$\mu\text{A}$	
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\ \text{V}; I_C = 0\ \text{A}$	-	-	-100	nA	
$h_{FE}$	DC current gain						
	BC856-Q	$V_{CE} = -5\ \text{V}; I_C = -2\ \text{mA}$	125	-	475		
	BC857-Q		125	-	800		
	BC856A-Q; BC857A-Q		125	-	250		
	BC856B-Q; BC857B-Q; BC858B-Q		220	-	475		
	BC857C-Q		420	-	800		
$V_{CEsat}$	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	-650	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	$V_{CB} = -10\ \text{V}; I_E = i_e = 0\ \text{A}; f = 1\ \text{MHz}$	-	4.5	-	pF	
$f_T$	transition frequency	$V_{CE} = -5\ \text{V}; I_C = -10\ \text{mA}; f = 100\ \text{MHz}$	100	-	-	MHz	
NF	noise figure	$I_C = -200\ \mu\text{A}; V_{CE} = -5\ \text{V}; R_S = 2\ \text{k}\Omega;$ $f = 1\ \text{kHz}; B = 200\text{Hz}$	-	2	10	dB	

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



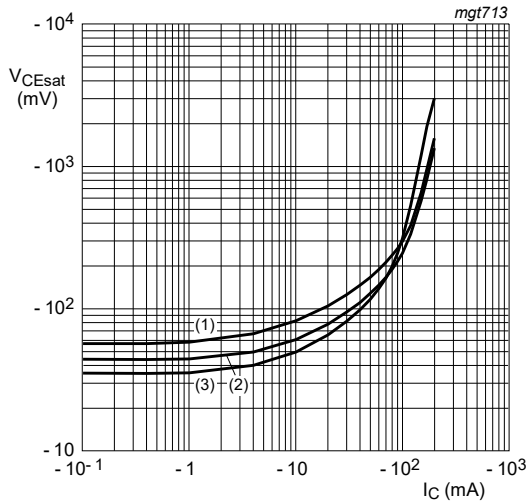
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

Fig. 2. BC856A-Q; BC857A-Q: DC current gain as a function of collector current; typical values



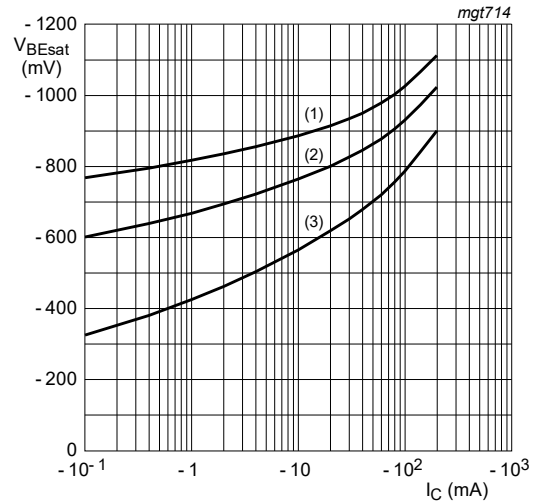
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

Fig. 3. BC856A-Q; BC857A-Q: Base-emitter voltage as a function of collector current; typical values



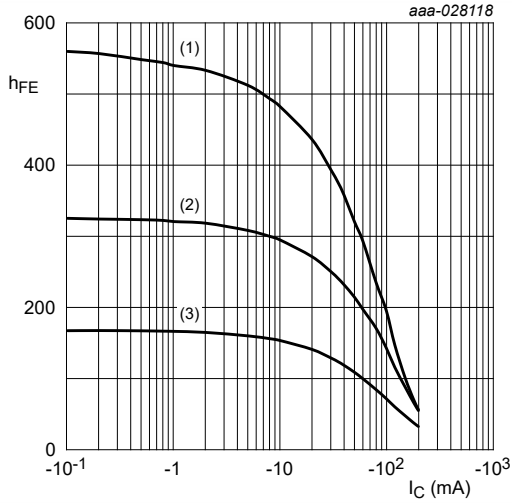
$I_C/I_B = 20$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

Fig. 4. BC856A-Q; BC857A-Q: Collector-emitter saturation voltage as a function of collector current; typical values



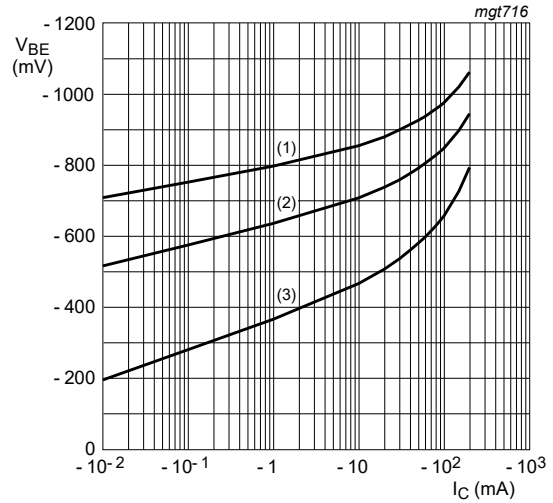
$I_C/I_B = 20$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

Fig. 5. BC856A-Q; BC857A-Q: Base-emitter saturation voltage as a function of collector current; typical values



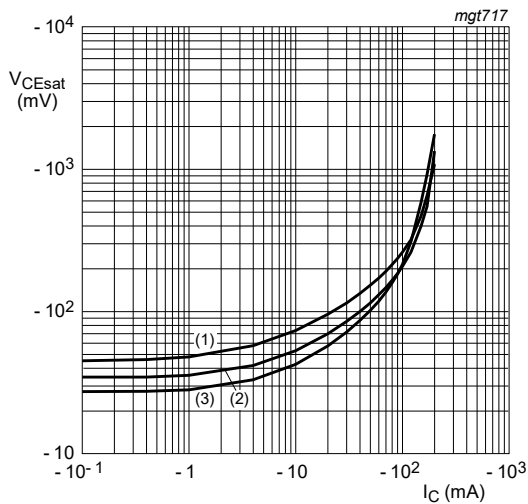
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

Fig. 6. BC856B-Q; BC857B-Q; BC858B-Q: DC current gain as a function of collector current; typical values



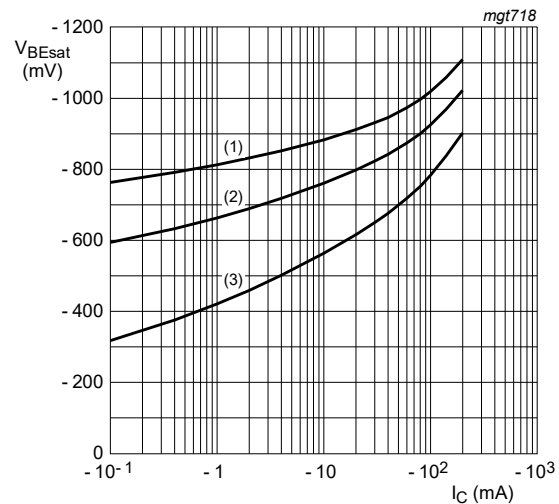
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

Fig. 7. BC856B-Q; BC857B-Q; BC858B-Q: Base-emitter voltage as a function of collector current; typical values



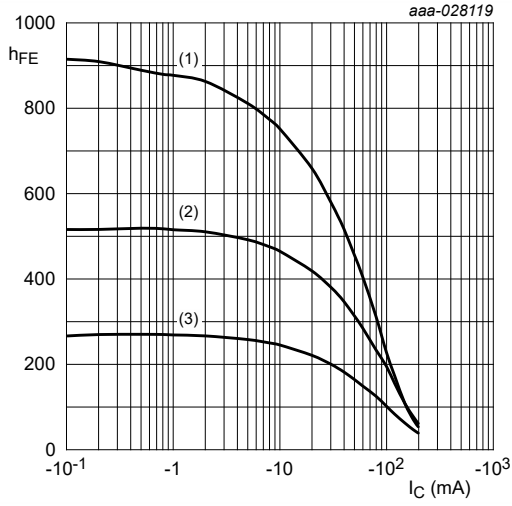
$I_C/I_B = 20$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

Fig. 8. BC856B-Q; BC857B-Q; BC858B-Q: Collector-emitter saturation voltage as a function of collector current; typical values



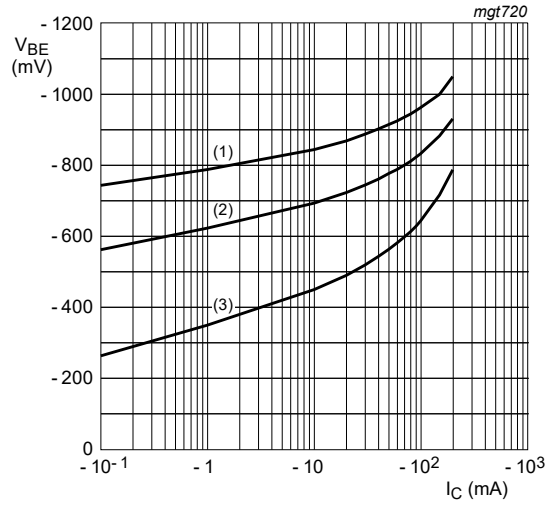
$I_C/I_B = 20$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

Fig. 9. BC856B-Q; BC857B-Q; BC858B-Q: Base-emitter saturation voltage as a function of collector current; typical values



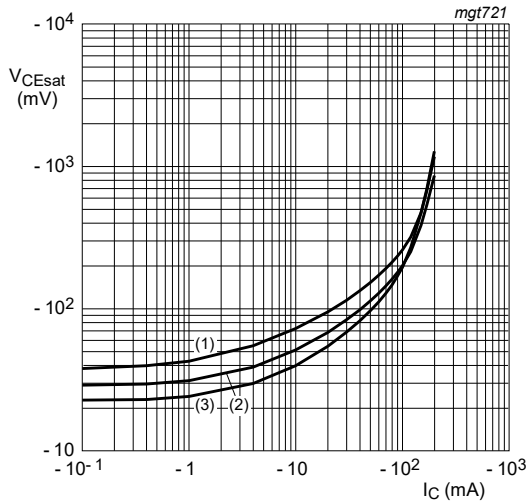
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

Fig. 10. BC857C-Q: DC current gain as a function of collector current; typical values



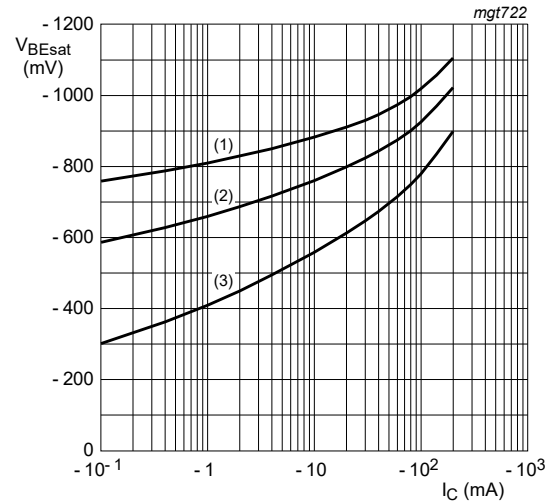
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

Fig. 11. BC857C-Q: 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. BC857C-Q: Collector-emitter saturation voltage as a function of collector current; typical values



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

Fig. 13. BC857C-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

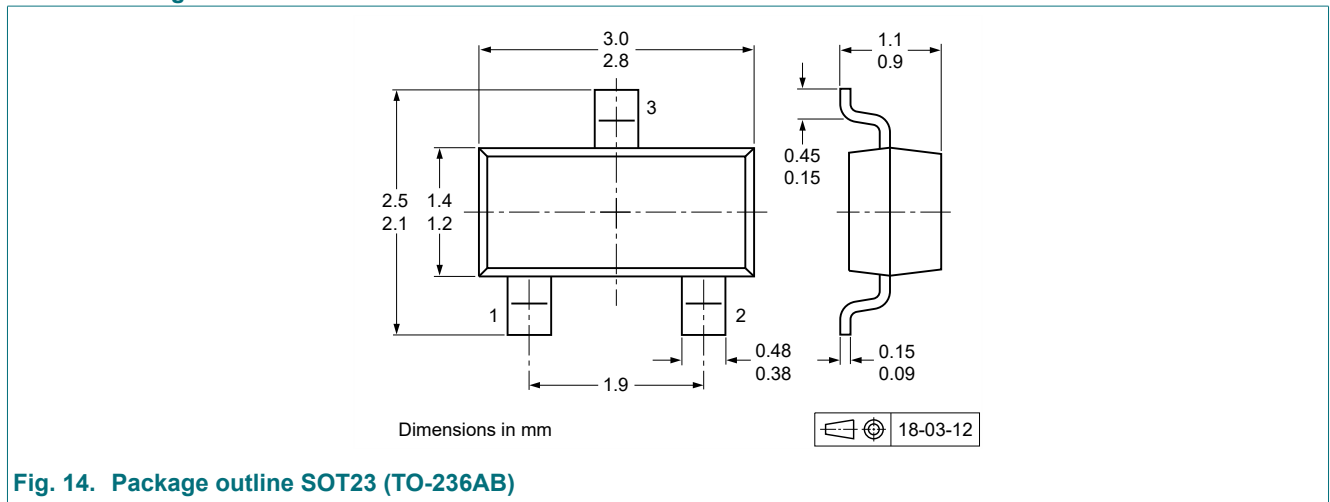


Fig. 14. Package outline SOT23 (TO-236AB)

### 13. Soldering

Table 10. Soldering

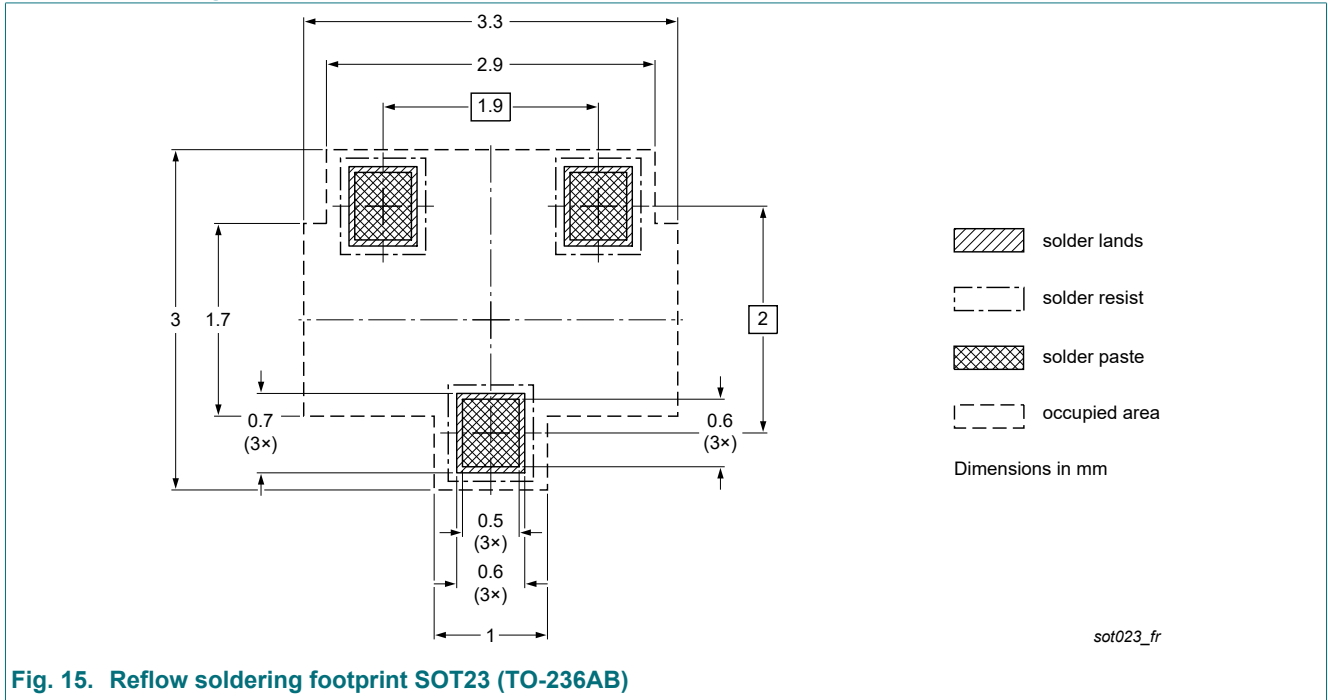


Fig. 15. Reflow soldering footprint SOT23 (TO-236AB)

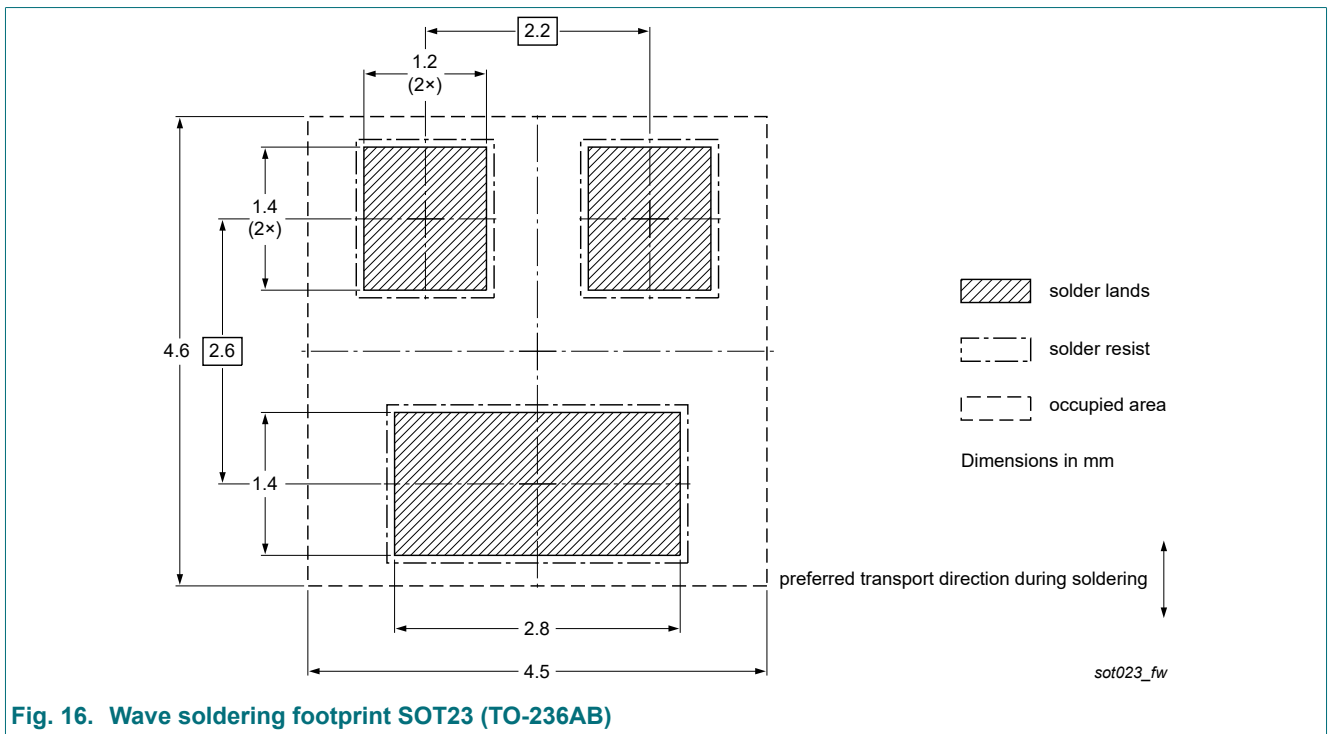


Fig. 16. Wave soldering footprint SOT23 (TO-236AB)

## 14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC856-Q_BC857-Q_BC858-Q v.2	20220221	Product data sheet	-	BC856-Q_BC857-Q_BC858-Q v.1
Modifications:	<ul style="list-style-type: none"><li>• Quick reference data: BC856-Q corrected to BC856B-Q at <math>h_{FE}</math></li><li>• Limiting values and Characteristics: Product names changed to detailed descriptions</li></ul>			
BC856-Q_BC857-Q_BC858-Q v.1	20210624	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: 21 February 2022

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