



# BC856; BC857; BC858

65 V, 100 mA PNP general-purpose transistors

Rev. 7 — 16 April 2018

Product data sheet

## 1 Product profile

### 1.1 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	SOT23	TO-236AB	BC846
BC856A			BC846A
BC856B			BC846B
BC857			BC847
BC857A			BC847A
BC857B			BC847B
BC857C			BC847C
BC858B			BC848B

### 1.2 Features and benefits

- Low current (max. 100 mA)
- Low voltage (max. 65 V)
- AEC-Q101 qualified

### 1.3 Applications

- General-purpose switching and amplification

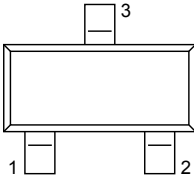
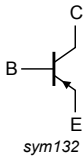
## 1.4 Quick reference data

**Table 2. Quick reference data** $T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base				
	BC856		-	-	-65	V
	BC857		-	-	-45	V
	BC858B		-	-	-30	V
$I_C$	collector current		-	-	-100	mA
$I_{CM}$	peak collector current		-	-	-200	mA
$h_{FE}$	DC current gain	$V_{CE} = -5\text{ V}; I_C = -2\text{ mA}$				
	BC856		125	-	475	-
	BC857		125	-	800	-
	BC856A; BC857A		125	-	250	-
	BC856; BC857B; BC858B		220	-	475	-
	BC857C		420	-	800	-

## 2 Pinning information

**Table 3. Pinning information**

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

### 3 Ordering information

Table 4. Ordering information

Type number	Package		Version
	Name	Description	
BC856	TO-236AB	Plastic surface-mounted package; 3 leads	SOT23
BC856A			
BC856B			
BC857			
BC857A			
BC857B			
BC857C			
BC858B			

### 4 Marking

Table 5. Marking codes

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

[1] % = placeholder for manufacturing site code

## 5 Limiting values

**Table 6. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit	
V <sub>CBO</sub>	collector-base voltage	open emitter				
	BC856		-	-80	V	
	BC857		-	-50	V	
	BC858B		-	-30	V	
V <sub>CEO</sub>	collector-emitter voltage	open base				
	BC856		-	-65	V	
	BC857		-	-45	V	
	BC858B		-	-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 copper; tin-plated and standard footprint.

## 6 Thermal characteristics

**Table 7. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	500	K/W

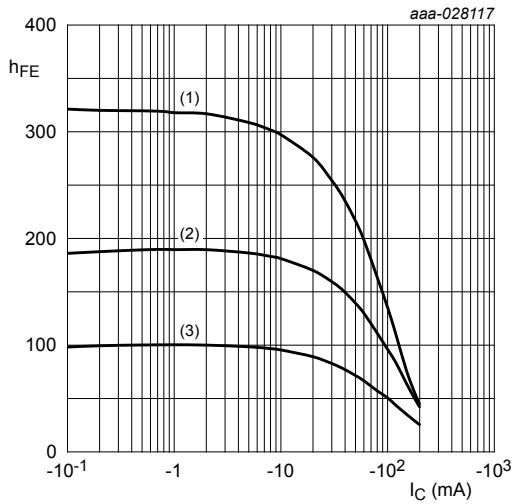
[1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.

## 7 Characteristics

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

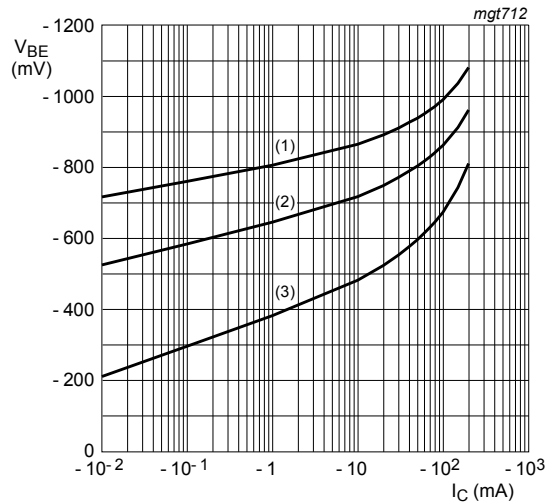
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -30\text{ V}; I_E = 0$	-	-1	-15	nA
		$V_{CB} = -30\text{ V}; I_E = 0; T_J = 150\text{ °C}$	-	-	-4	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0$	-	-	-100	nA
$h_{FE}$	DC current gain					
	BC856	$V_{CE} = -5\text{ V}; I_C = -2\text{ mA}$	125	-	475	
	BC857		125	-	800	
	BC856A; BC857A		125	-	250	
	BC856B; BC857B; BC858B		220	-	475	
BC857C	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	$I_C = -10\text{ mA}; I_B = -0.5\text{ mA}$	-	-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
$f_T$	transition frequency	$V_{CE} = -5\text{ V}; I_C = -10\text{ mA}; f = 100\text{ MHz}$	100	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$	-	4.5	-	pF
F	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;  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$



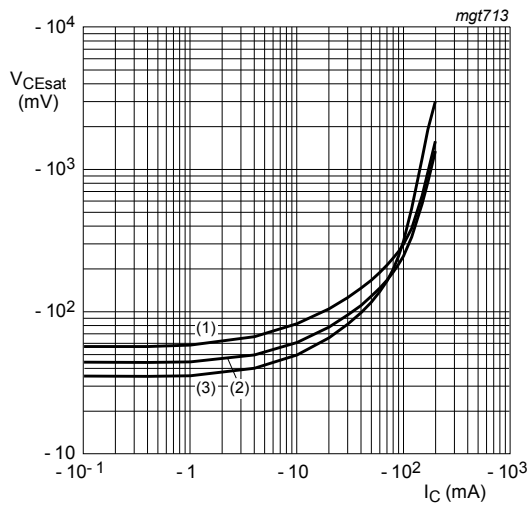
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

**Figure 1. BC856A; BC857A: DC current gain as a function of collector current; typical values**



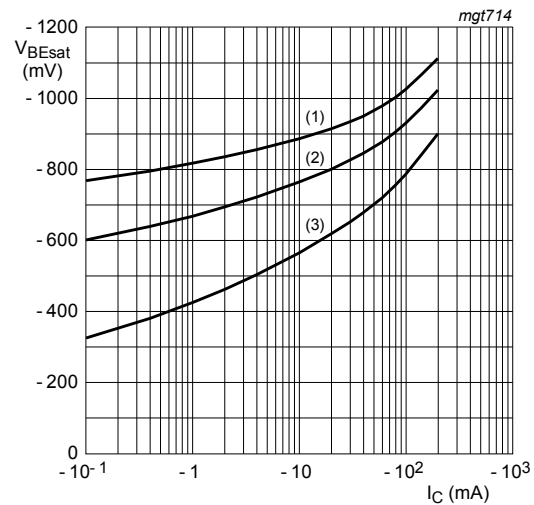
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**Figure 2. BC856A; BC857A: Base-emitter voltage as a function of collector current; typical values**



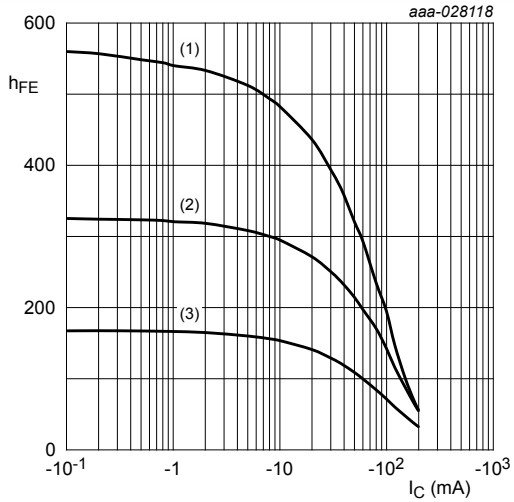
$I_C/I_B = 20$   
 (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

**Figure 3. BC856A; BC857A: Collector-emitter saturation voltage as a function of collector current; typical values**



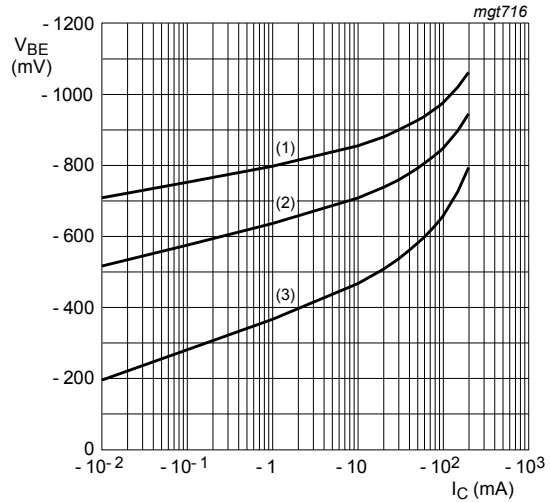
$I_C/I_B = 20$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**Figure 4. BC856A; BC857A: Base-emitter saturation voltage as a function of collector current; typical values**



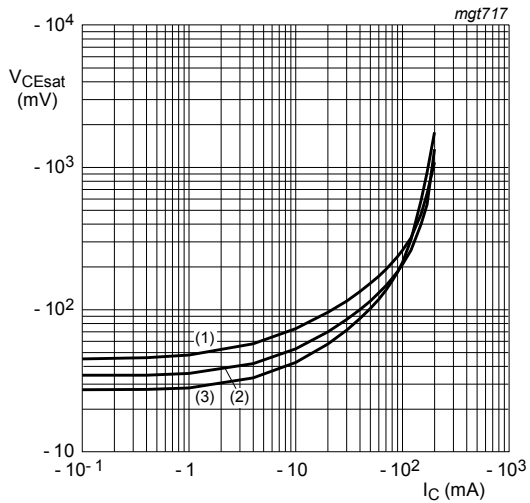
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

**Figure 5. BC856B; BC857B; BC858B: DC current gain as a function of collector current; typical values**



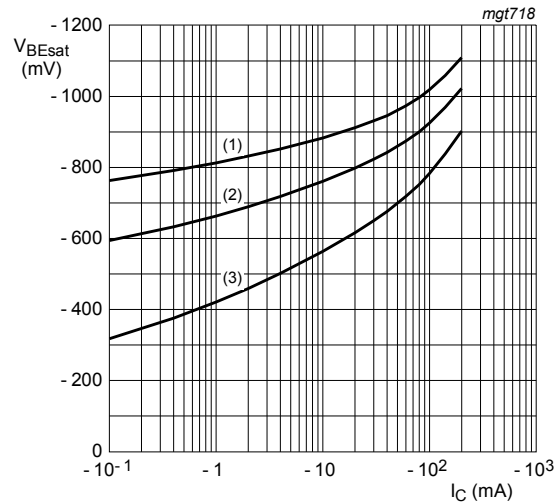
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**Figure 6. BC856B; BC857B; BC858B: Base-emitter voltage as a function of collector current; typical values**



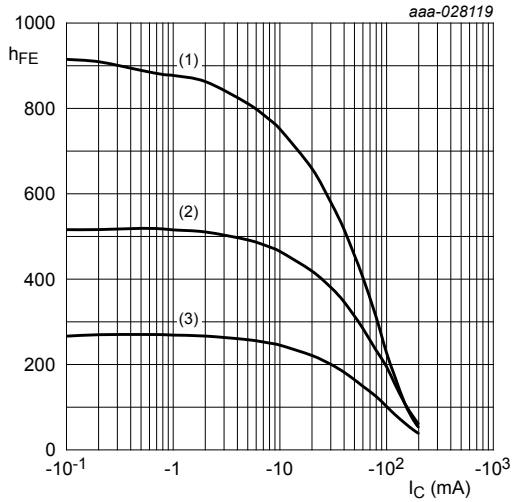
$I_C/I_B = 20$   
 (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

**Figure 7. BC856B; BC857B; BC858B: Collector-emitter saturation voltage as a function of collector current; typical values**



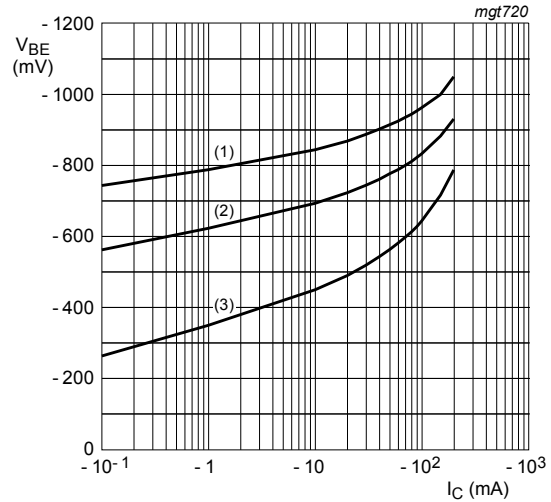
$I_C/I_B = 20$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**Figure 8. BC856B; BC857B; BC858B: Base-emitter saturation voltage as a function of collector current; typical values**



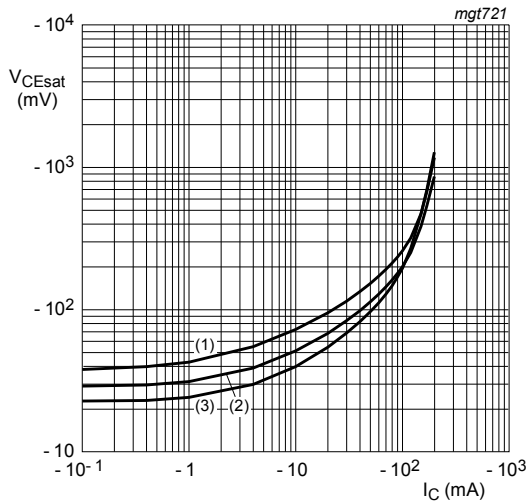
$V_{CE} = -5 \text{ V}$   
 (1)  $T_{amb} = 150 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -55 \text{ }^\circ\text{C}$

**Figure 9. BC857C: DC current gain as a function of collector current; typical values**



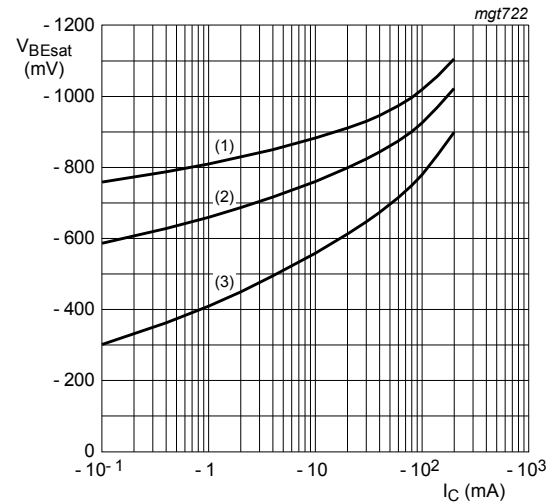
$V_{CE} = -5 \text{ V}$   
 (1)  $T_{amb} = -55 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 150 \text{ }^\circ\text{C}$

**Figure 10. BC857C: 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)  $T_{amb} = -55 \text{ }^\circ\text{C}$

**Figure 11. BC857C: 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)  $T_{amb} = 150 \text{ }^\circ\text{C}$

**Figure 12. BC857C: Base-emitter saturation voltage as a function of collector current; typical values**

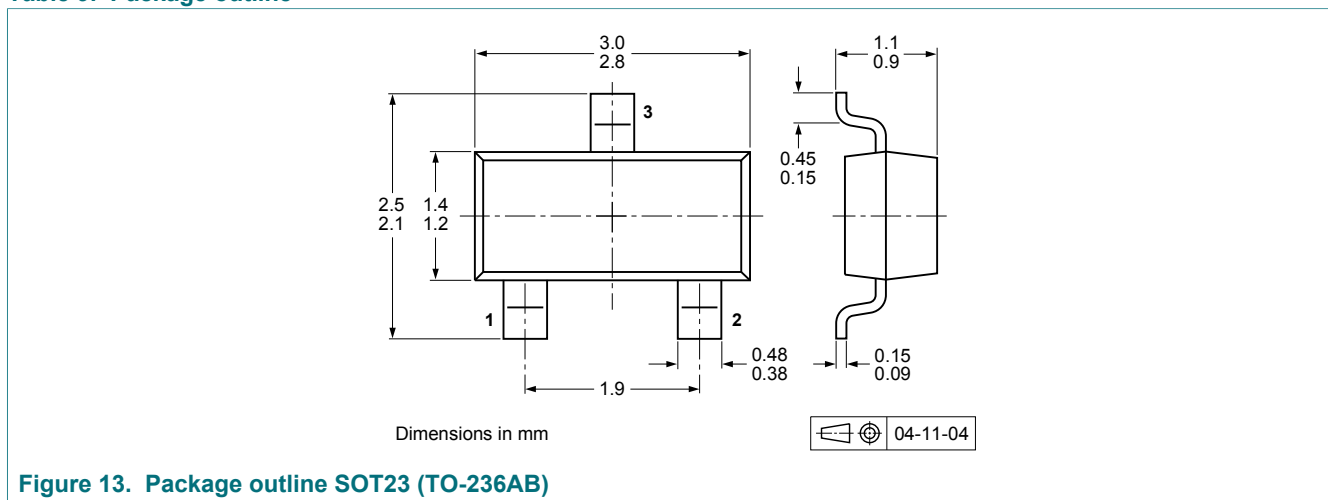


## 8 Test information

### 8.1 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.

## 9 Package outline

**Table 9. Package outline****Figure 13. Package outline SOT23 (TO-236AB)**

**10 Soldering**

Table 10. Soldering

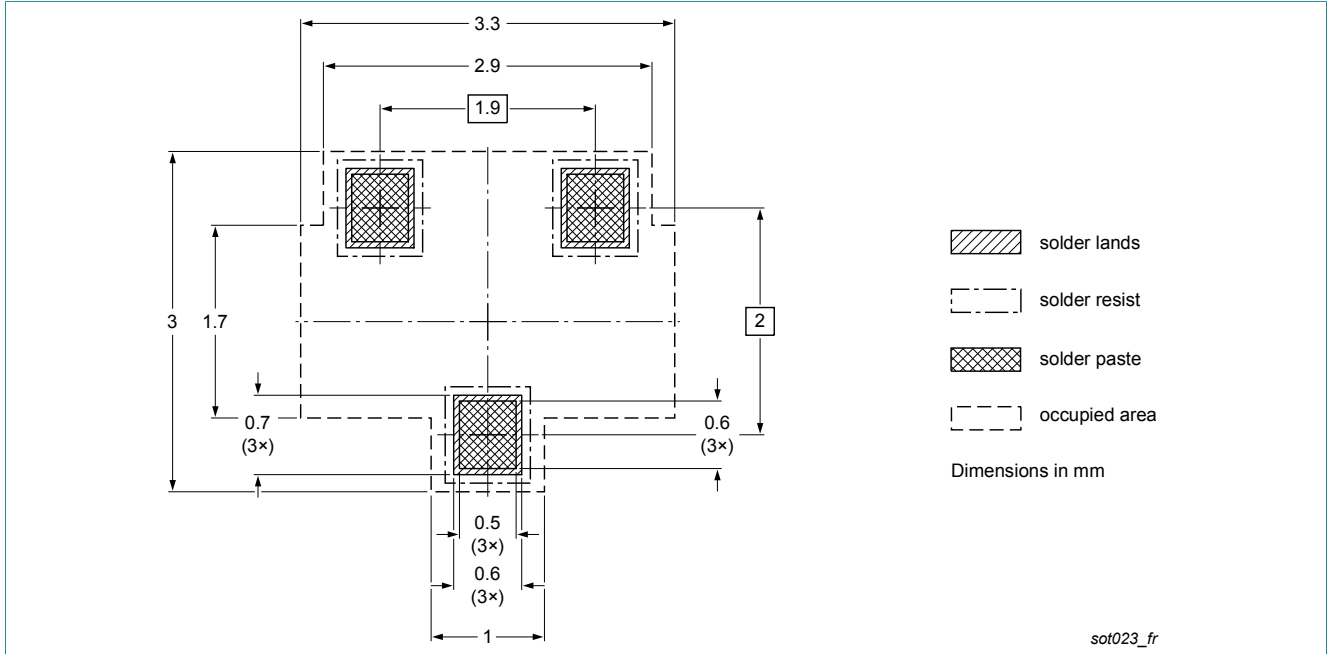


Figure 14. Reflow soldering footprint for SOT23 (TO-236AB)

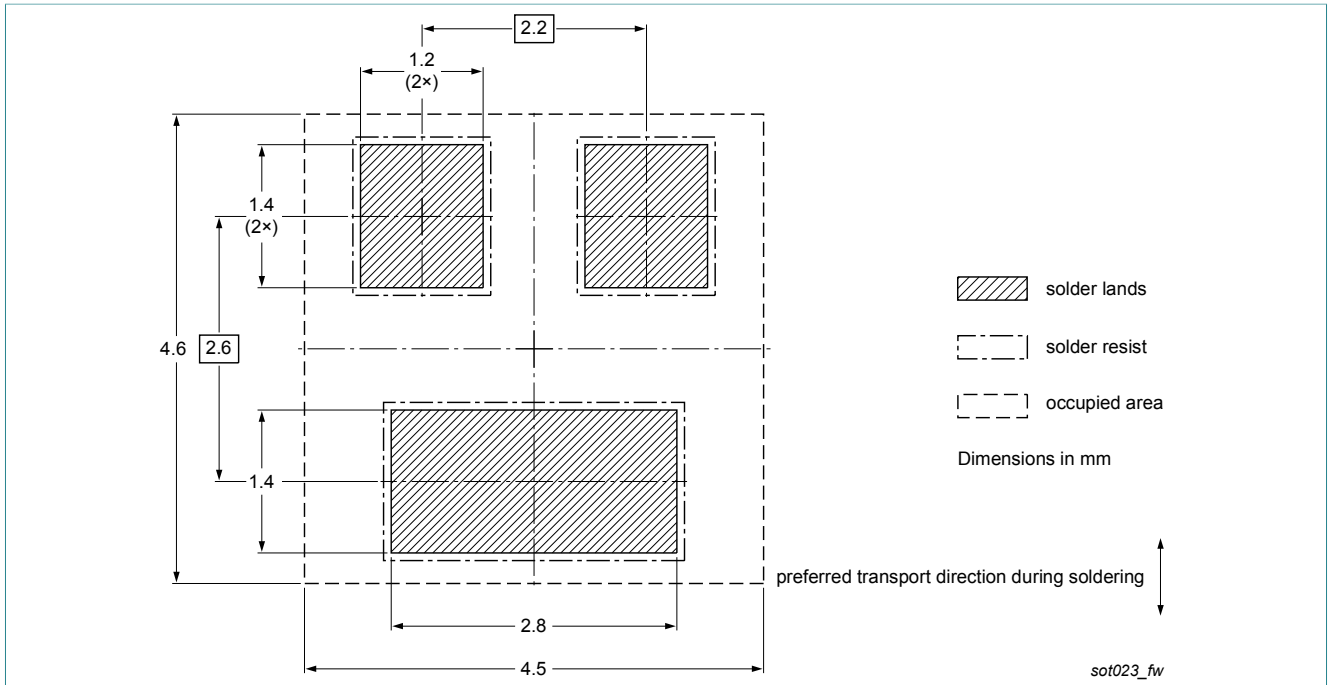


Figure 15. Wave soldering footprint for SOT23 (TO-236AB)

## 11 Revision history

**Table 11. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC856_BC857_BC858 v.7	20180416	Product data sheet	-	BC856_BC857_BC858 v.6
Modifications:	<ul style="list-style-type: none"><li>• The products are AEC-Q101 qualified.</li><li>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• General description, pinning information, ordering information, marking and characteristics are corrected.</li><li>• Quick reference data added.</li></ul>			
BC856_BC857_BC858 v.6	20040106	Product data sheet	-	BC856_BC857_BC858 v.5

## 12 Legal information

### 12.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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 URL <http://www.nexperia.com>.

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Date of release: 16 April 2018

Document identifier: BC856\_BC857\_BC858



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