



# 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

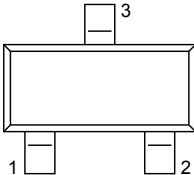
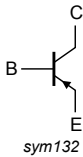
## 1.4 Quick reference data

**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

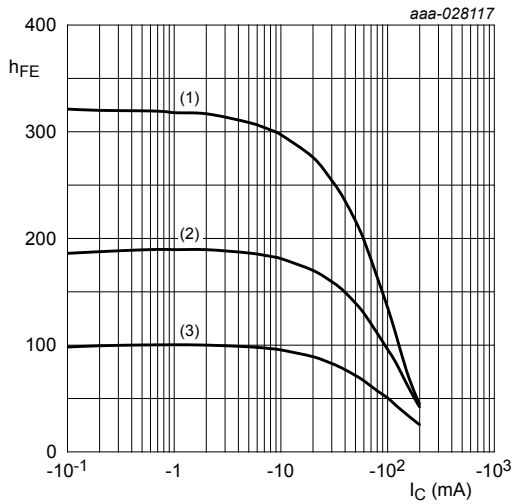
[1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.

## 7 Characteristics

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

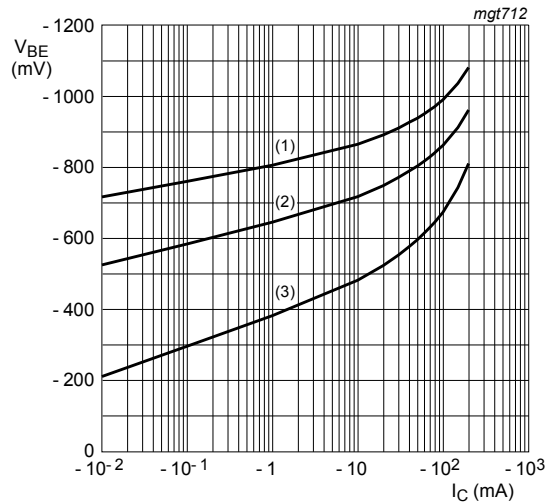
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -30\text{ V}; I_E = 0$	-	-1	-15	nA
		$V_{CB} = -30\text{ V}; I_E = 0; T_J = 150\text{ °C}$	-	-	-4	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0$	-	-	-100	nA
$h_{FE}$	DC 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;  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$



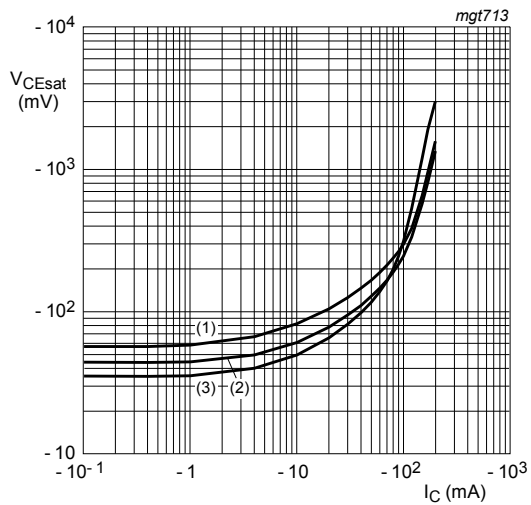
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



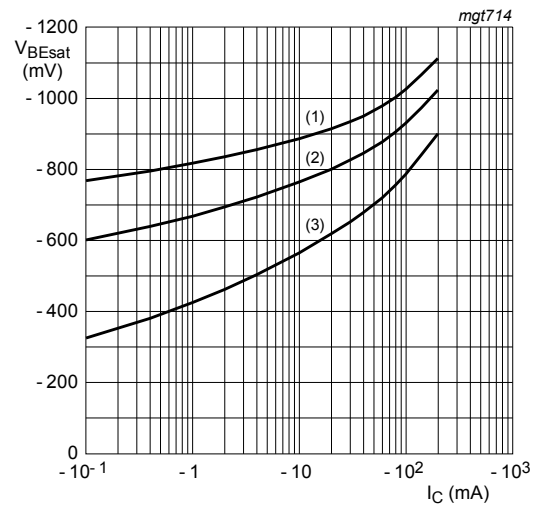
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**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**



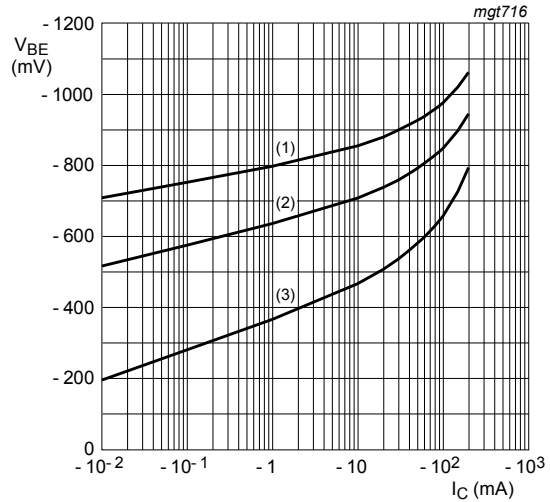
$I_C/I_B = 20$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**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**



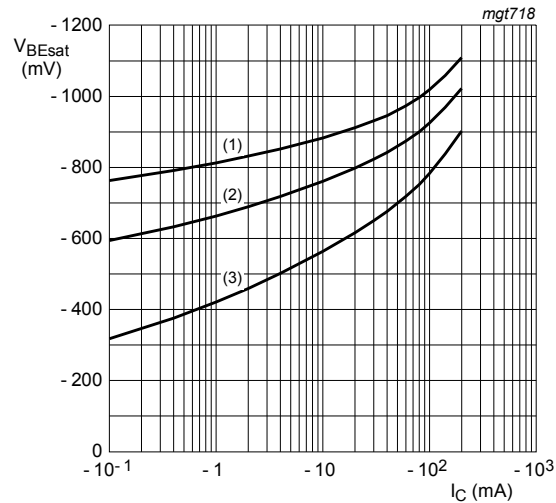
$V_{CE} = -5\text{ V}$   
 (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$

**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**



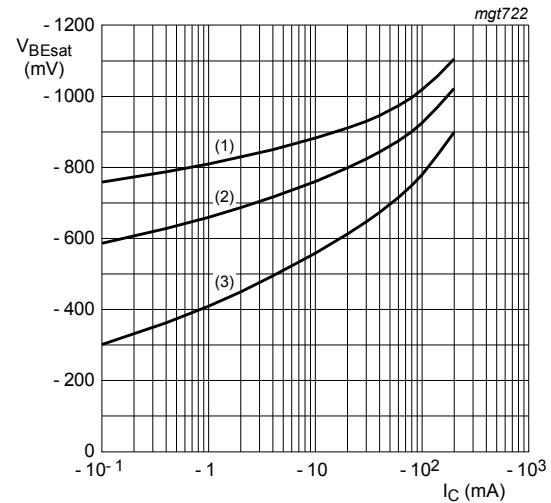
$V_{CE} = -5 \text{ V}$   
 (1)  $T_{amb} = -55 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 150 \text{ }^\circ\text{C}$

**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

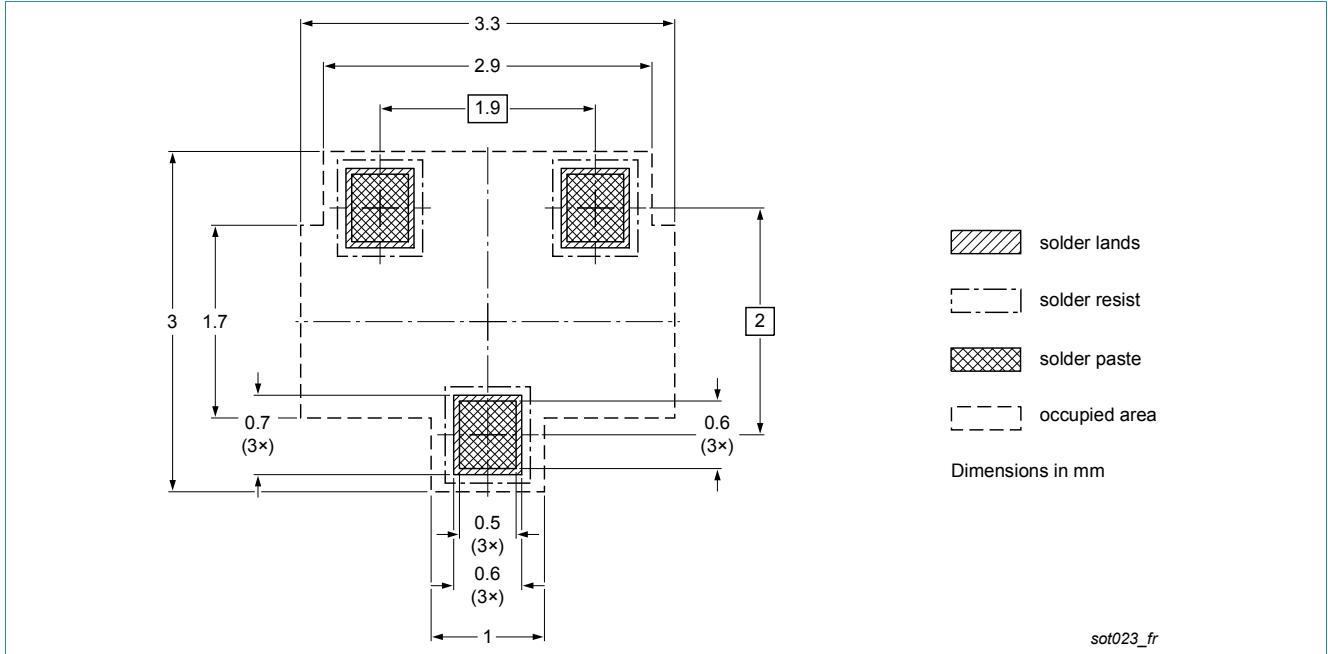


Figure 14. Reflow soldering footprint for SOT23 (TO-236AB)

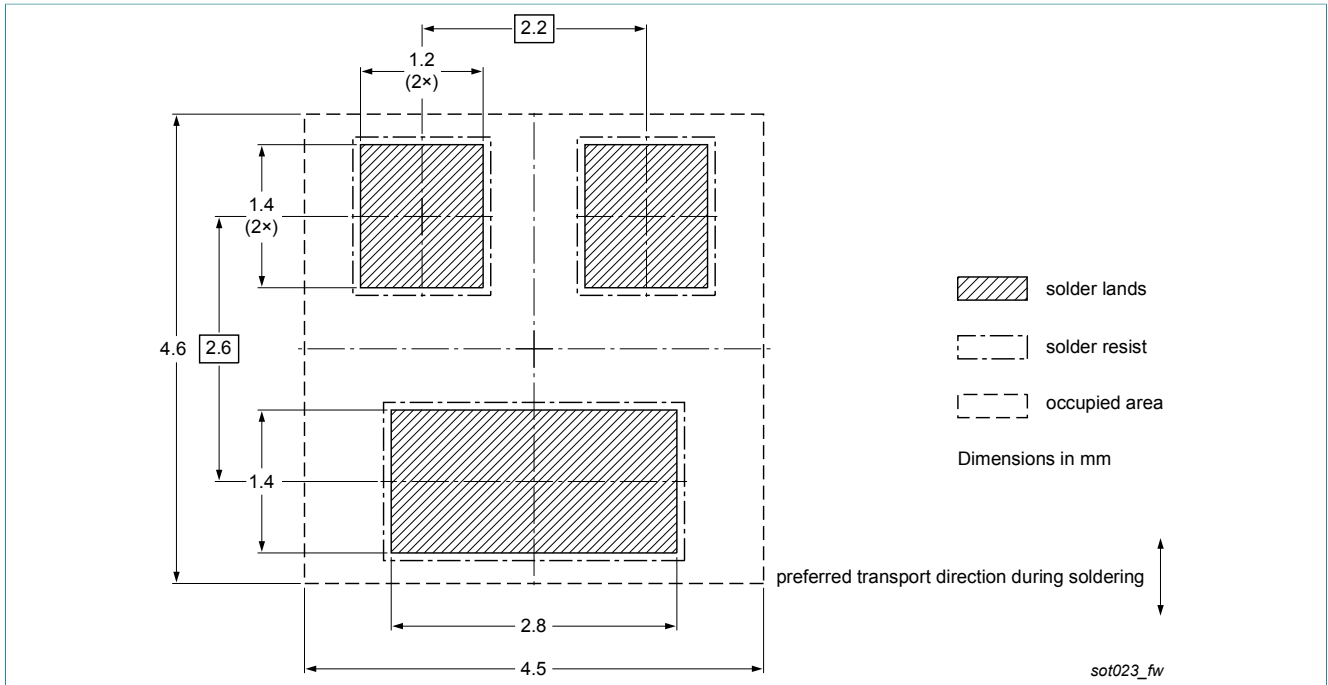


Figure 15. Wave soldering footprint for SOT23 (TO-236AB)

## 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".

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