

# BC817W series

45 V, 500 mA NPN general-purpose transistors

Rev. 7 — 11 June 2018

Product data sheet

## 1 Product profile

### 1.1 General description

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

Table 1. Product overview

Type number	Package			PNP complement
	Nexperia	JEDEC	JEITA	
BC817W	SOT323	-	SC-70	BC807W
BC817-16W				BC807-16W
BC817-25W				BC807-25W
BC817-40W				BC807-40W

### 1.2 Features and benefits

- High current
- Three current gain selections
- AEC-Q101 qualified

### 1.3 Applications

- General-purpose switching and amplification

1.4 Quick reference data

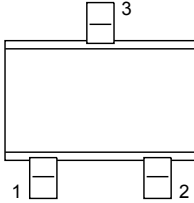
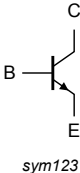
Table 2. Quick reference data  
*T<sub>amb</sub> = 25 °C unless otherwise specified.*

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base		-	-	45	V
I <sub>C</sub>	collector current			-	-	500	mA
I <sub>CM</sub>	peak collector current	single pulse; t <sub>p</sub> ≤ 1 ms		-	-	1	A
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = 1 V; I <sub>C</sub> = 100 mA					
	BC817W		[1]	100	-	600	
	BC817-16W		[1]	100	-	250	
	BC817-25W		[1]	160	-	400	
	BC817-40W		[1]	250	-	600	

[1] pulsed; t<sub>p</sub> ≤ 300 µs; δ ≤ 0.02

2 Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
<b>SOT323</b>				
1	B	base		
2	E	emitter		
3	C	collector		

3 Ordering information

Table 4. Ordering information

Type number	Package		Version
	Name	Description	
BC817W	SC-70	Plastic surface-mounted package; 3 leads	SOT323
BC817-16W			
BC817-25W			
BC817-40W			

## 4 Marking

Table 5. Marking

Type number	Marking code
BC817W	<sup>[1]</sup> 6D%
BC817-16W	<sup>[1]</sup> 6A%
BC817-25W	<sup>[1]</sup> 6B%
BC817-40W	<sup>[1]</sup> 6C%

[1] % = placeholder for manufacturing site code

## 5 Limiting values

Table 6. Limiting values

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

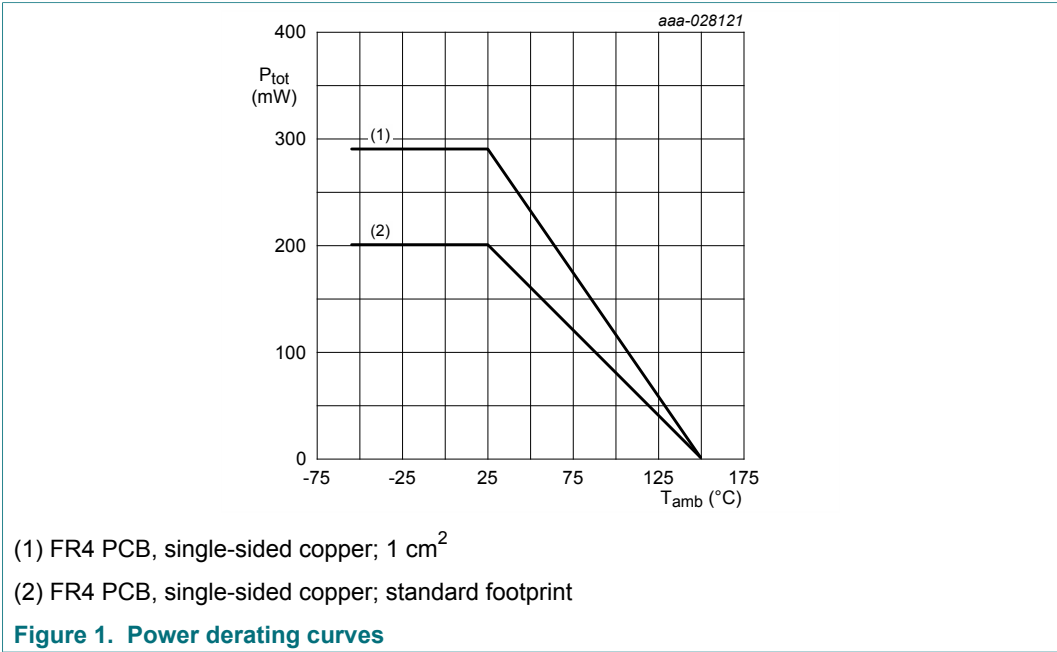
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter	-	50	V
$V_{CEO}$	collector-emitter voltage	open base	-	45	V
$V_{EBO}$	emitter-base voltage	open collector	-	5	V
$I_C$	collector current		-	500	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	1	A
$I_{BM}$	peak base current	single pulse; $t_p \leq 1\text{ ms}$	-	200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$ <sup>[1]</sup> <sup>[2]</sup>	-	200	mW
		<sup>[3]</sup> <sup>[2]</sup>	-	290	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 copper; tin-plated and standard footprint.

[2] Valid for all available selection groups.

[3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector  $1\text{ cm}^2$ .



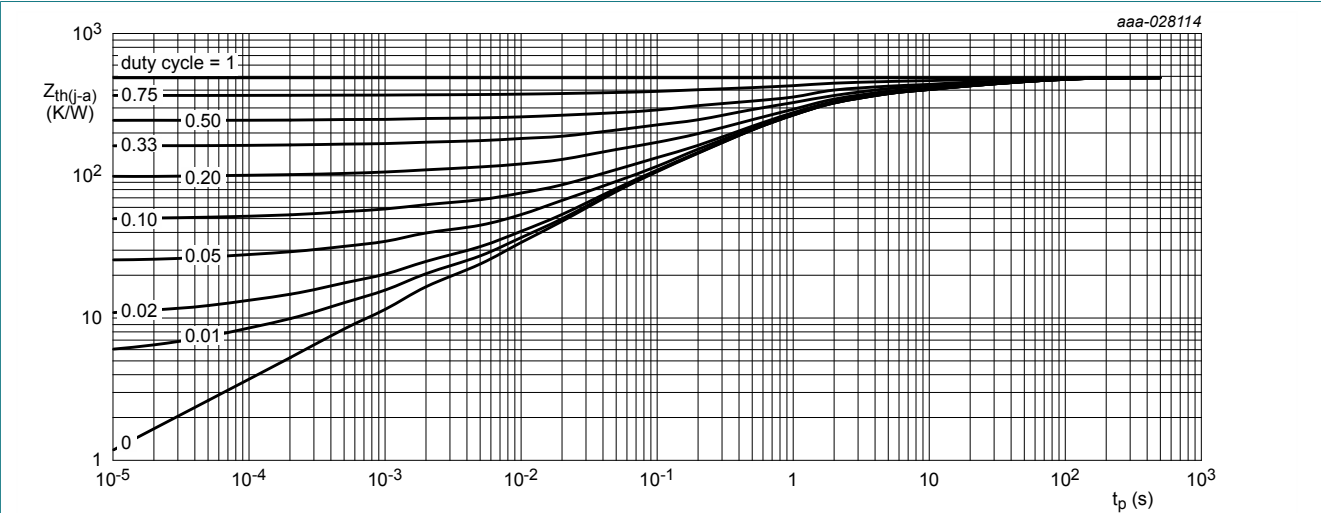
6 Thermal characteristics

Table 7. Thermal characteristics

T<sub>amb</sub> = 25 °C unless otherwise specified.

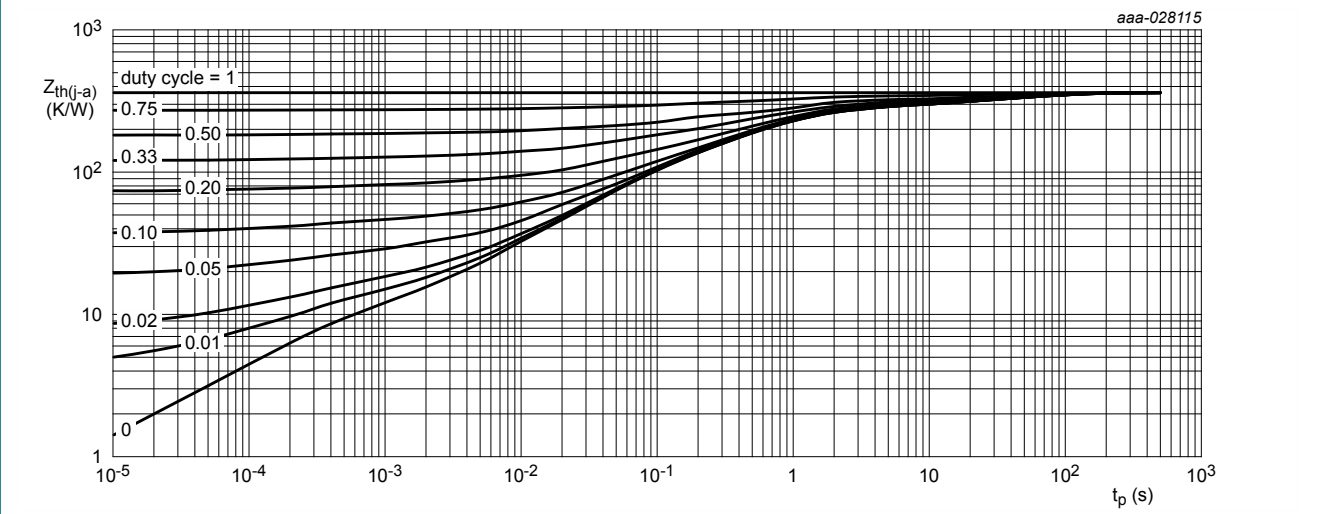
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	625	K/W
			[3] [2]	-	-	431	K/W

- [1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.  
[2] Valid for all available selection groups.  
[3] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>.



FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>

Figure 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm<sup>2</sup>

Figure 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 7 Characteristics

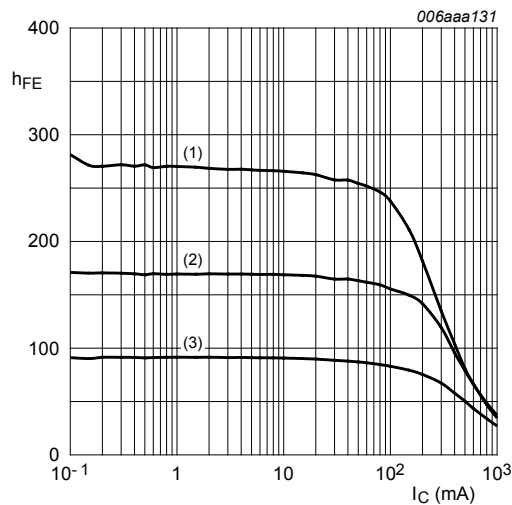
**Table 8. Characteristics**

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\text{ }\mu\text{A}$ ; $I_E = 0\text{ A}$		50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 10\text{ mA}$ ; $I_B = 0\text{ A}$		45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 100\text{ }\mu\text{A}$ ; $I_C = 0\text{ A}$		5	-	-	V
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 20\text{ V}$ ; $I_E = 0\text{ A}$		-	-	100	nA
		$V_{CB} = 20\text{ V}$ ; $I_E = 0\text{ A}$ ; $T_j = 150\text{ }^{\circ}\text{C}$		-	-	5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}$ ; $I_C = 0\text{ A}$		-	-	100	nA
$h_{FE}$	DC current gain						
	BC817W	$V_{CE} = 1\text{ V}$ ; $I_C = 100\text{ mA}$	[1]	100	-	600	
	BC817-16W	$V_{CE} = 1\text{ V}$ ; $I_C = 100\text{ mA}$	[1]	100	-	250	
	BC817-25W	$V_{CE} = 1\text{ V}$ ; $I_C = 100\text{ mA}$	[1]	160	-	400	
	BC817-40W	$V_{CE} = 1\text{ V}$ ; $I_C = 100\text{ mA}$	[1]	250	-	600	
$h_{FE}$	DC current gain	$V_{CE} = 1\text{ V}$ ; $I_C = 500\text{ mA}$	[1]	40	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 500\text{ mA}$ ; $I_B = 50\text{ mA}$	[1]	-	-	700	mV
$V_{BE}$	base-emitter voltage	$V_{CE} = 1\text{ V}$ ; $I_C = 500\text{ mA}$	[1] [2]	-	-	1.2	V
$f_T$	transition frequency	$V_{CE} = 5\text{ V}$ ; $I_C = 10\text{ mA}$ ; $f = 100\text{ MHz}$		100	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = 10\text{ V}$ ; $I_E = I_e = 0\text{ A}$ ; $f = 1\text{ MHz}$		-	3	-	pF

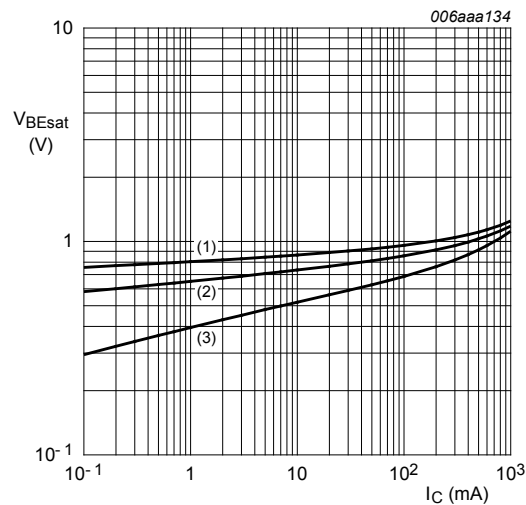
[1] pulsed;  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$

[2]  $V_{BE}$  decreases by approximately  $2\text{ mV/K}$  with increasing temperature.



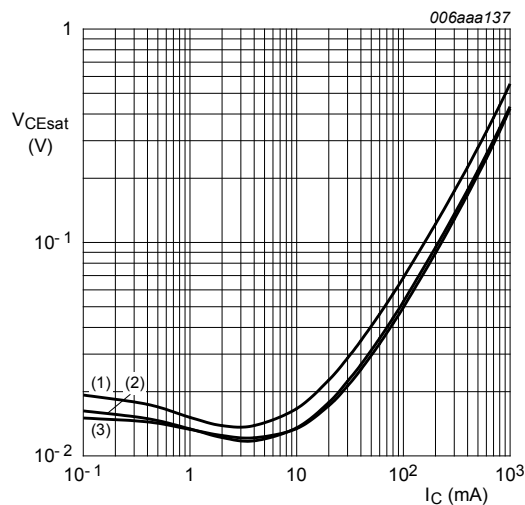
$V_{CE} = 1\text{ V}$   
(1)  $T_{amb} = 150\text{ °C}$   
(2)  $T_{amb} = 25\text{ °C}$   
(3)  $T_{amb} = -55\text{ °C}$

Figure 4. BC817-16W: DC current gain as a function of collector current; typical values



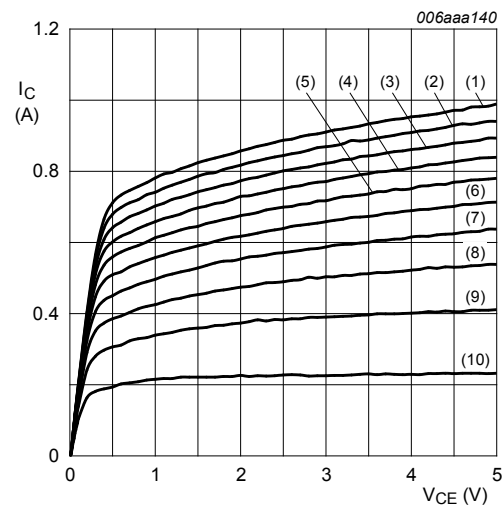
$I_C/I_B = 10$   
(1)  $T_{amb} = -55\text{ °C}$   
(2)  $T_{amb} = 25\text{ °C}$   
(3)  $T_{amb} = 150\text{ °C}$

Figure 5. BC817-16W: Base-emitter saturation voltage as a function of collector current; typical values



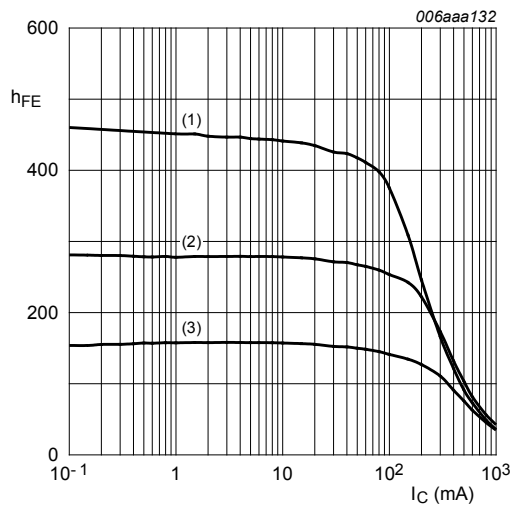
$I_C/I_B = 10$   
(1)  $T_{amb} = 150\text{ °C}$   
(2)  $T_{amb} = 25\text{ °C}$   
(3)  $T_{amb} = -55\text{ °C}$

Figure 6. BC817-16W: Collector-emitter saturation voltage as a function of collector current; typical values



$T_{amb} = 25\text{ °C}$   
(1)  $I_B = 16.0\text{ mA}$   
(2)  $I_B = 14.4\text{ mA}$   
(3)  $I_B = 12.8\text{ mA}$   
(4)  $I_B = 11.2\text{ mA}$   
(5)  $I_B = 9.6\text{ mA}$   
(6)  $I_B = 8.0\text{ mA}$   
(7)  $I_B = 6.4\text{ mA}$   
(8)  $I_B = 4.8\text{ mA}$   
(9)  $I_B = 3.2\text{ mA}$   
(10)  $I_B = 1.6\text{ mA}$

Figure 7. BC817-16W: Collector current as a function of collector-emitter voltage; typical values



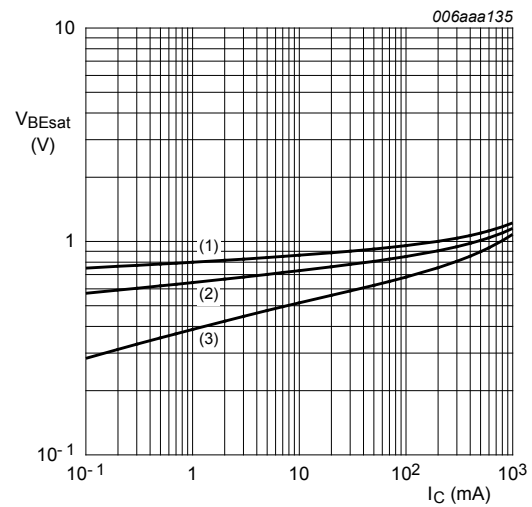
$V_{CE} = 1 \text{ V}$

(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 8. BC817-25W: DC current gain as a function of collector current; typical values**



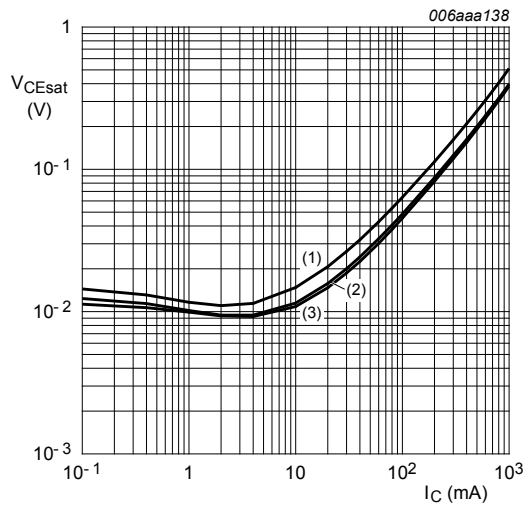
$I_C/I_B = 10$

(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 9. BC817-25W: Base-emitter saturation voltage as a function of collector current; typical values**



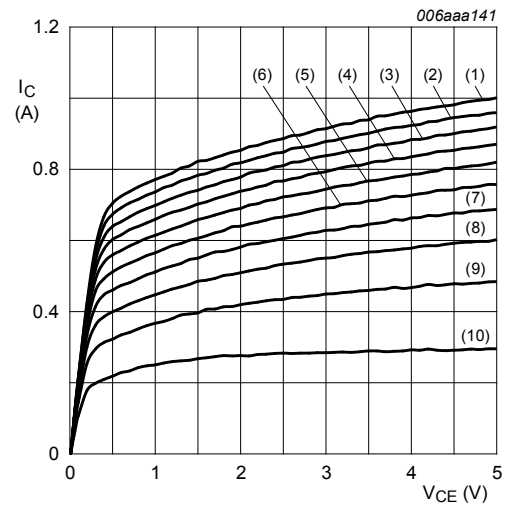
$I_C/I_B = 10$

(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 10. BC817-25W: Collector-emitter saturation voltage as a function of collector current; typical values**



$T_{amb} = 25 \text{ }^{\circ}\text{C}$

(1)  $I_B = 13.0 \text{ mA}$

(2)  $I_B = 11.7 \text{ mA}$

(3)  $I_B = 10.4 \text{ mA}$

(4)  $I_B = 9.1 \text{ mA}$

(5)  $I_B = 7.8 \text{ mA}$

(6)  $I_B = 6.5 \text{ mA}$

(7)  $I_B = 5.2 \text{ mA}$

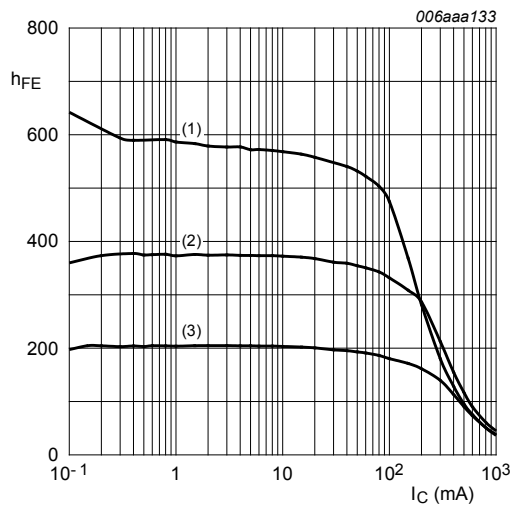
(8)  $I_B = 3.9 \text{ mA}$

(9)  $I_B = 2.6 \text{ mA}$

(10)  $I_B = 1.3 \text{ mA}$

**Figure 11. BC817-25W: Collector current as a function of collector-emitter voltage; typical values**

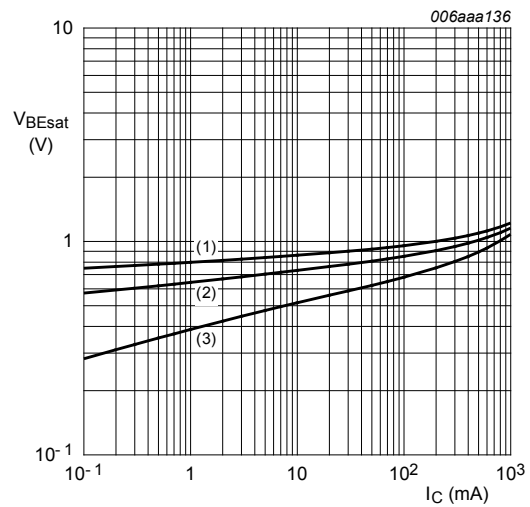




$V_{CE} = 1 \text{ V}$

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

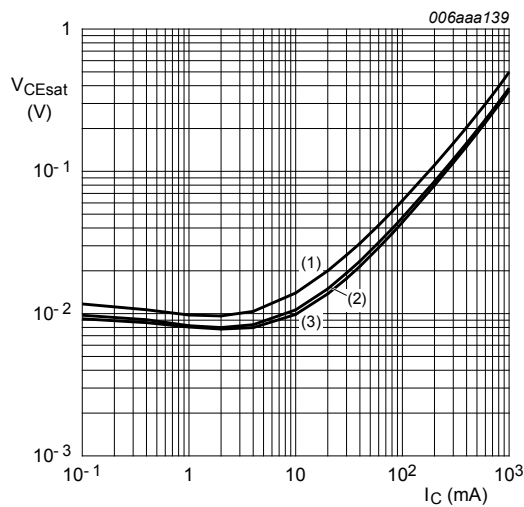
**Figure 12. BC817-40W: DC current gain as a function of collector current; typical values**



$I_C/I_B = 10$

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

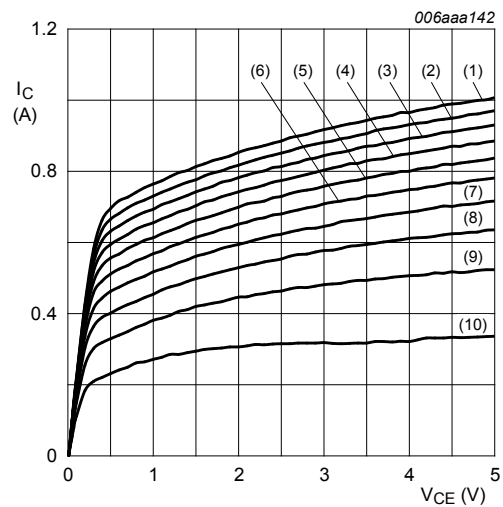
**Figure 13. BC817-40W: Base-emitter saturation voltage as a function of collector current; typical values**



$I_C/I_B = 10$

- (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 14. BC817-40W: Collector-emitter saturation voltage as a function of collector current; typical values**



$T_{amb} = 25 \text{ }^{\circ}\text{C}$

- (1)  $I_B = 12.0 \text{ mA}$
- (2)  $I_B = 10.8 \text{ mA}$
- (3)  $I_B = 9.6 \text{ mA}$
- (4)  $I_B = 8.4 \text{ mA}$
- (5)  $I_B = 7.2 \text{ mA}$
- (6)  $I_B = 6.0 \text{ mA}$
- (7)  $I_B = 4.8 \text{ mA}$
- (8)  $I_B = 3.6 \text{ mA}$
- (9)  $I_B = 2.4 \text{ mA}$
- (10)  $I_B = 1.2 \text{ mA}$

**Figure 15. BC817-40W: Collector current as a function of collector-emitter voltage; typical values**

## 8 Test information

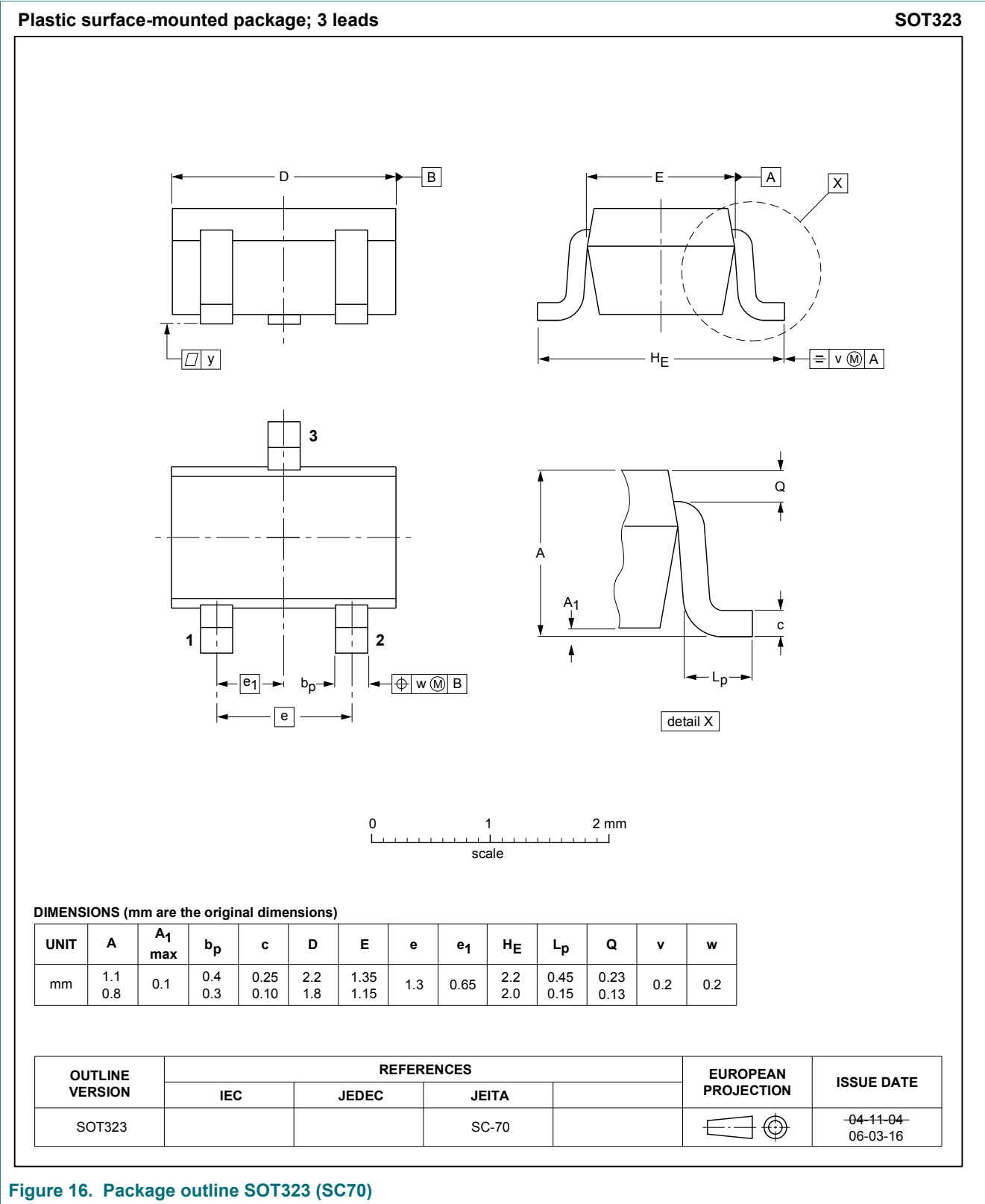
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### 8.1 Quality information

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



10 Soldering

Table 10. Soldering

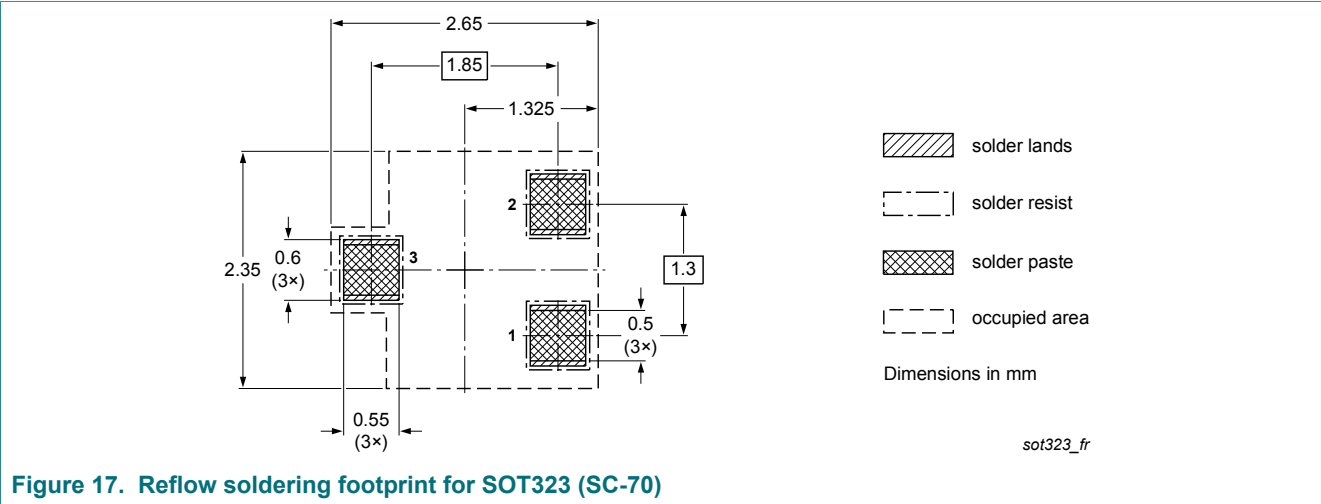


Figure 17. Reflow soldering footprint for SOT323 (SC-70)

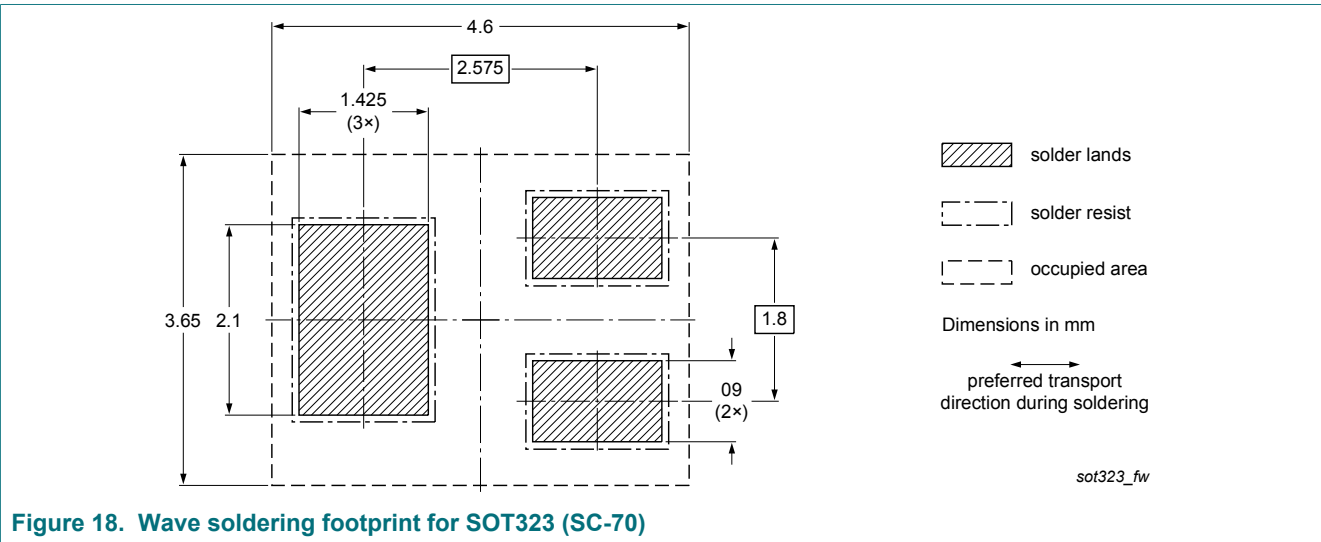


Figure 18. Wave soldering footprint for SOT323 (SC-70)

## 11 Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC817W_SER v.7	20180611	Product data sheet	-	BC817_BC817W_BC337 v.6
Modifications:	<ul style="list-style-type: none"> <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>• Removed basic types: BC327 and BC807W (separate data sheet).</li> <li>• Added Fig 1. Power derating curves in section "Limiting values" and the thermal graphs as Fig 2. and Fig 3. in section "Thermal characteristics".</li> <li>• Graphs in section "Characteristics" are sorted in new order.</li> <li>• Added sections 8 "Test information" and 9 "Soldering".</li> <li>• Removed Section "Packing information"</li> <li>• AEC-Q101 qualified</li> </ul>			
BC817_BC817W_BC337 v.6	20091117	Product data sheet	-	BC817_BC817W_BC337 v.5
BC817_BC817W_BC337 v.5	20050221	Product data sheet	CPCN200302007F CPCN200405006F	BC817 v.4; BC817W_SER v.4; BC337 v.3
BC817 v.4	20040116	Product Specification	-	BC817 v.3
BC817W_SER v.4	20040225	Product Specification	-	BC817W_SER v.3
BC337 v.3	19990415	Product Specification	-	BC337_338_CNV v.2

## 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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## 12.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

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Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.