



# BC817W series

45 V, 500 mA NPN general-purpose transistors

Rev. 8 — 1 July 2022

Product data sheet

## 1. General description

NPN general-purpose transistor in a very small SOT323 (SC70) 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

## 2. Features and benefits

- High current
- Three current gain selections

## 3. Applications

- General-purpose switching and amplification

## 4. Quick reference data

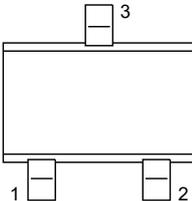
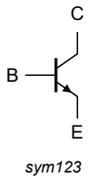
Table 2. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{CE0}$	collector-emitter voltage	open base; $T_{amb} = 25\text{ °C}$		-	-	45	V
$I_C$	collector current	$T_{amb} = 25\text{ °C}$		-	-	500	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1\text{ ms}$ ; $T_{amb} = 25\text{ °C}$		-	-	1	A
$h_{FE}$	DC current gain						
	BC817W	$V_{CE} = 1\text{ V}$ ; $I_C = 100\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	100	-	600	
	BC817-16W		[1]	100	-	250	
	BC817-25W		[1]	160	-	400	
	BC817-40W		[1]	250	-	600	

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

## 5. Pinning information

Table 3. Pinning

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

## 6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">BC817W</a>	SC-70	Plastic surface-mounted package; 3 leads	<a href="#">SOT323</a>
<a href="#">BC817-16W</a>			
<a href="#">BC817-25W</a>			
<a href="#">BC817-40W</a>			

## 7. Marking

Table 5. Marking

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

[1] % = placeholder for manufacturing site code

## 8. Limiting values

**Table 6. Limiting values**

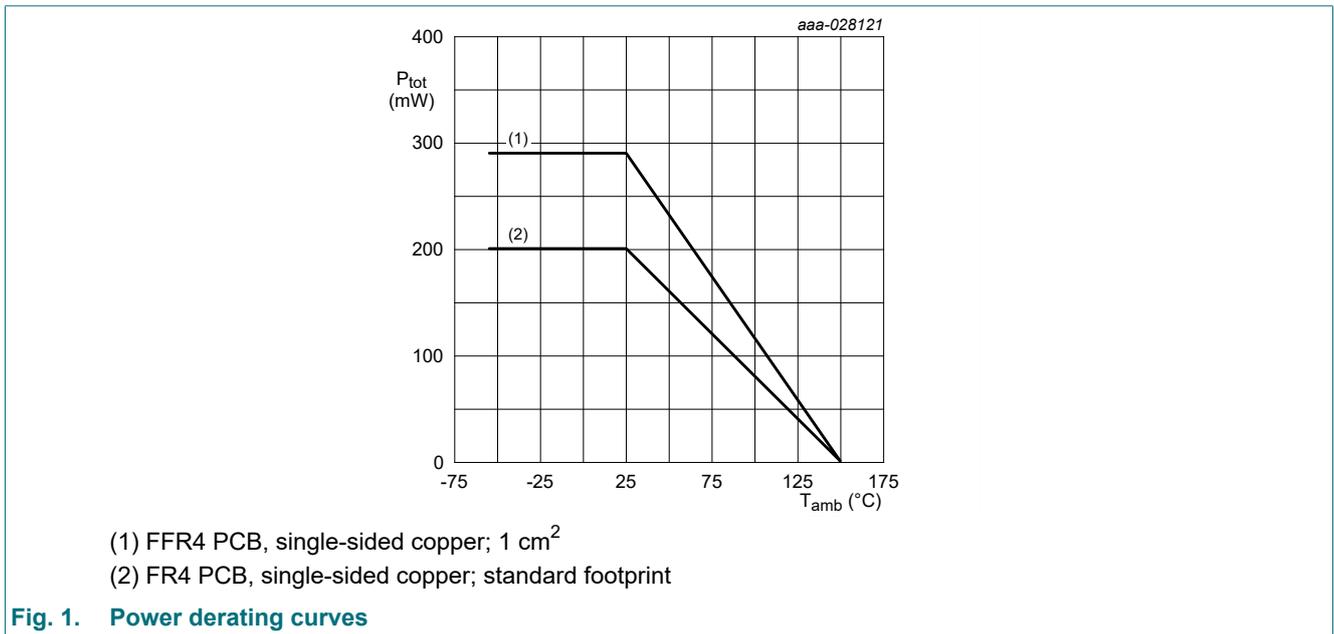
In accordance with the Absolute Maximum Rating System (IEC 60134).

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



## 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
			[2]	-	-	431	K/W
			[3]	-	-	431	K/W

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

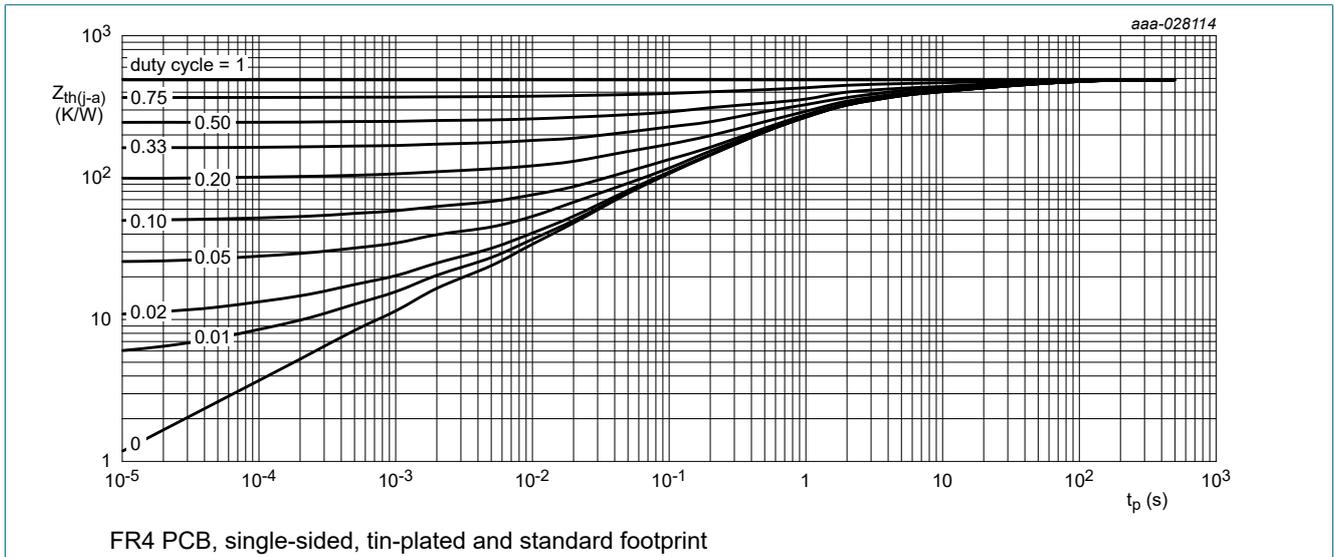


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

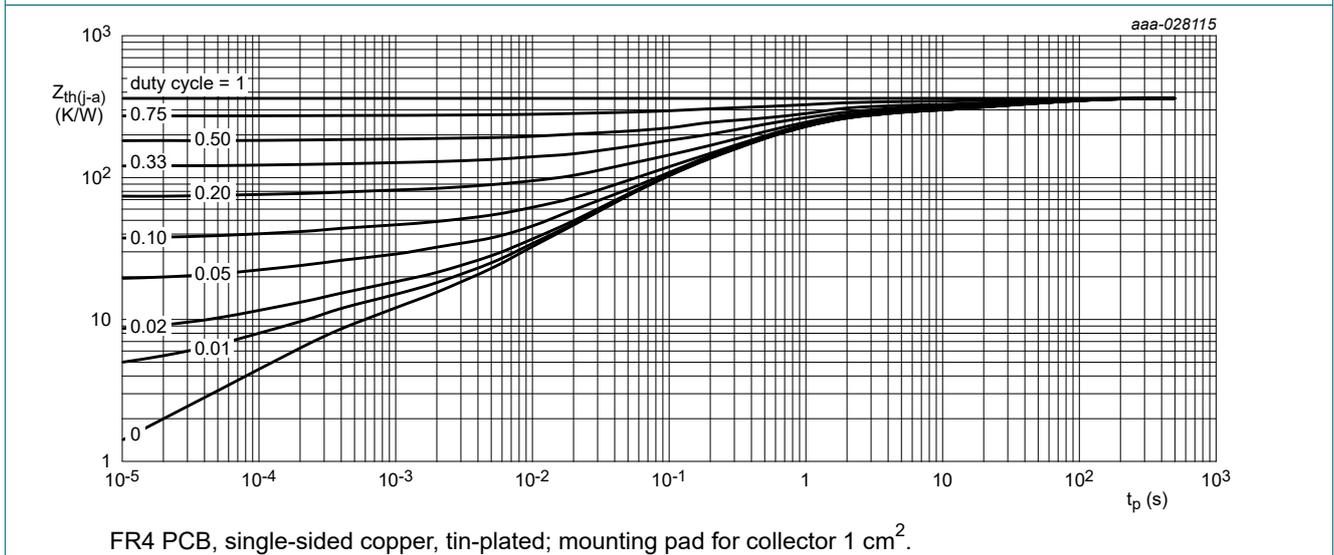


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

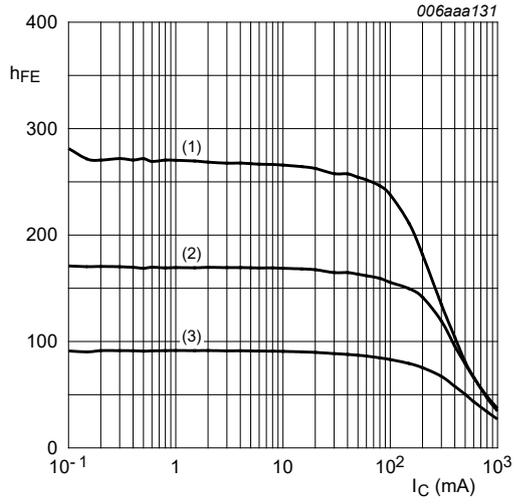
## 10. Characteristics

Table 8. Characteristics

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

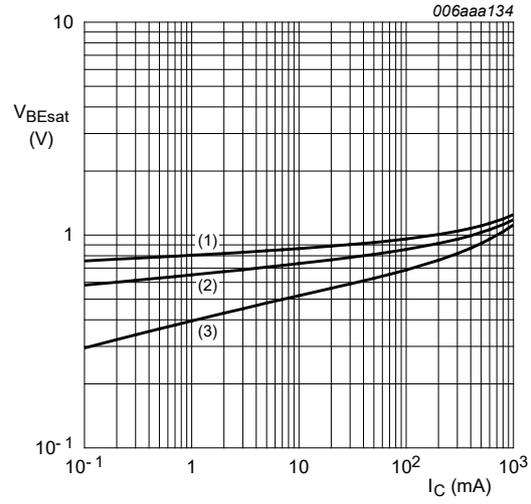
[1] pulsed;  $t_p \leq 300 \mu\text{s}$ ;  $\delta \leq 0.02$

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



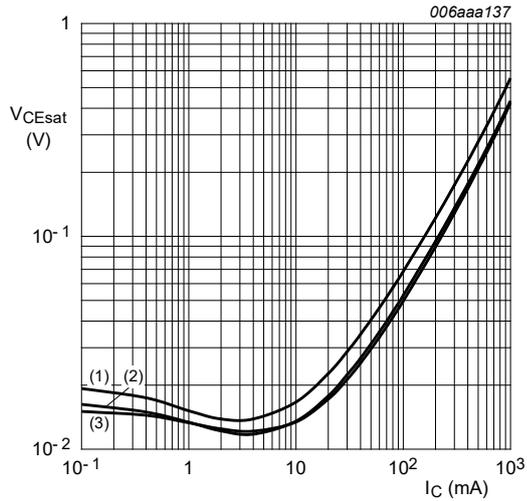
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



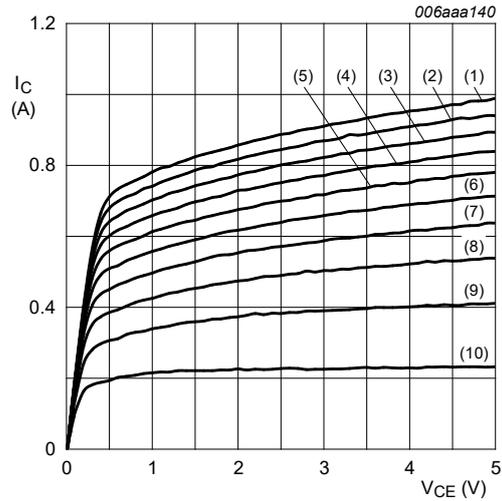
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

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



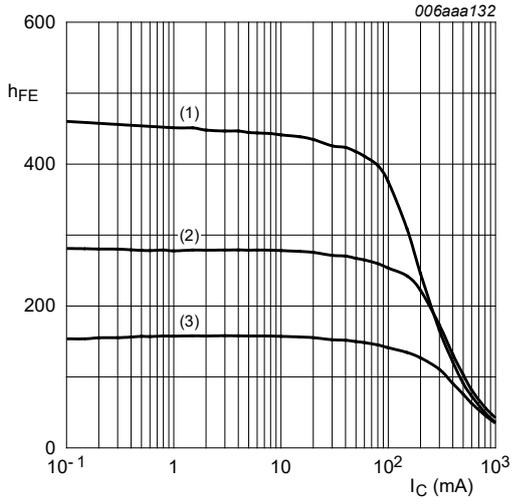
$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



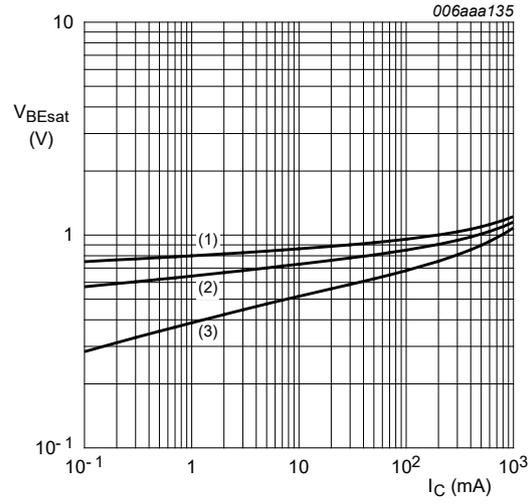
$T_{amb} = 25\text{ °C}$   
 (1)  $I_B = 16.0\text{ mA}$   
 (2)  $I_B = 14.4\text{ mA}$   
 (3)  $I_B = 12.8\text{ mA}$   
 (4)  $I_B = 11.2\text{ mA}$   
 (5)  $I_B = 9.6\text{ mA}$   
 (6)  $I_B = 8.0\text{ mA}$   
 (7)  $I_B = 6.4\text{ mA}$   
 (8)  $I_B = 4.8\text{ mA}$   
 (9)  $I_B = 3.2\text{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

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



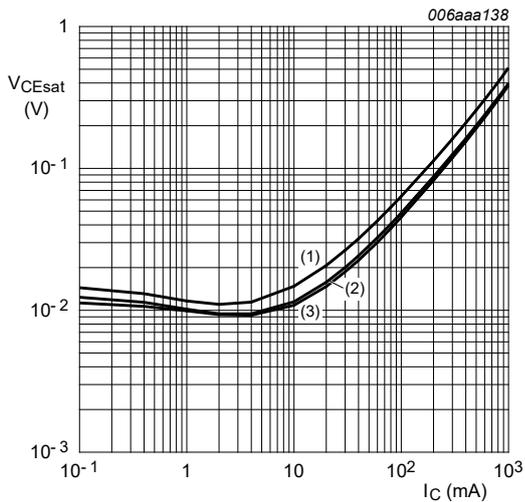
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



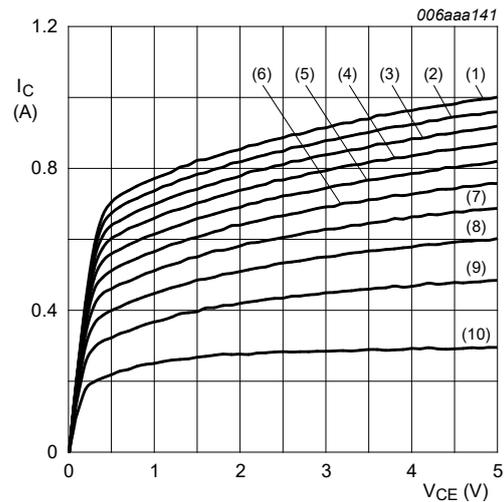
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

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



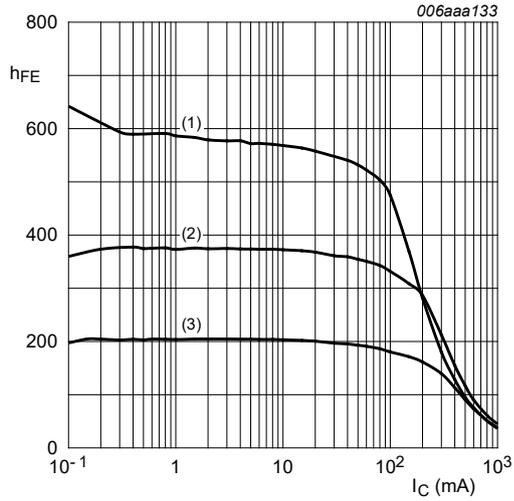
$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



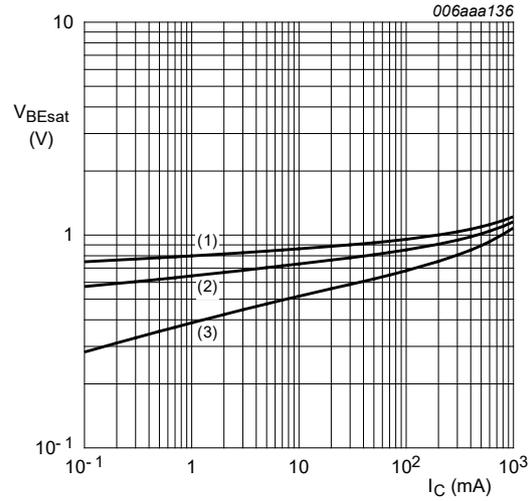
$T_{amb} = 25\text{ °C}$   
 (1)  $I_B = 13.0\text{ mA}$   
 (2)  $I_B = 11.7\text{ mA}$   
 (3)  $I_B = 10.4\text{ mA}$   
 (4)  $I_B = 9.1\text{ mA}$   
 (5)  $I_B = 7.8\text{ mA}$   
 (6)  $I_B = 6.5\text{ mA}$   
 (7)  $I_B = 5.2\text{ mA}$   
 (8)  $I_B = 3.9\text{ mA}$   
 (9)  $I_B = 2.6\text{ mA}$   
 (10)  $I_B = 1.3\text{ mA}$

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



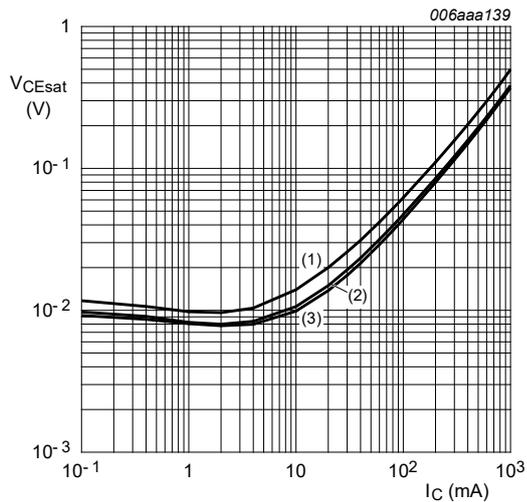
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



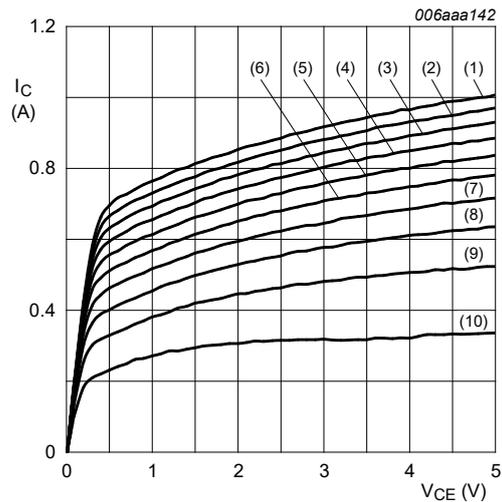
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

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



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

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



$T_{amb} = 25\text{ °C}$   
 (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)  $I_B = 1.2\text{ mA}$

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

11. Package outline

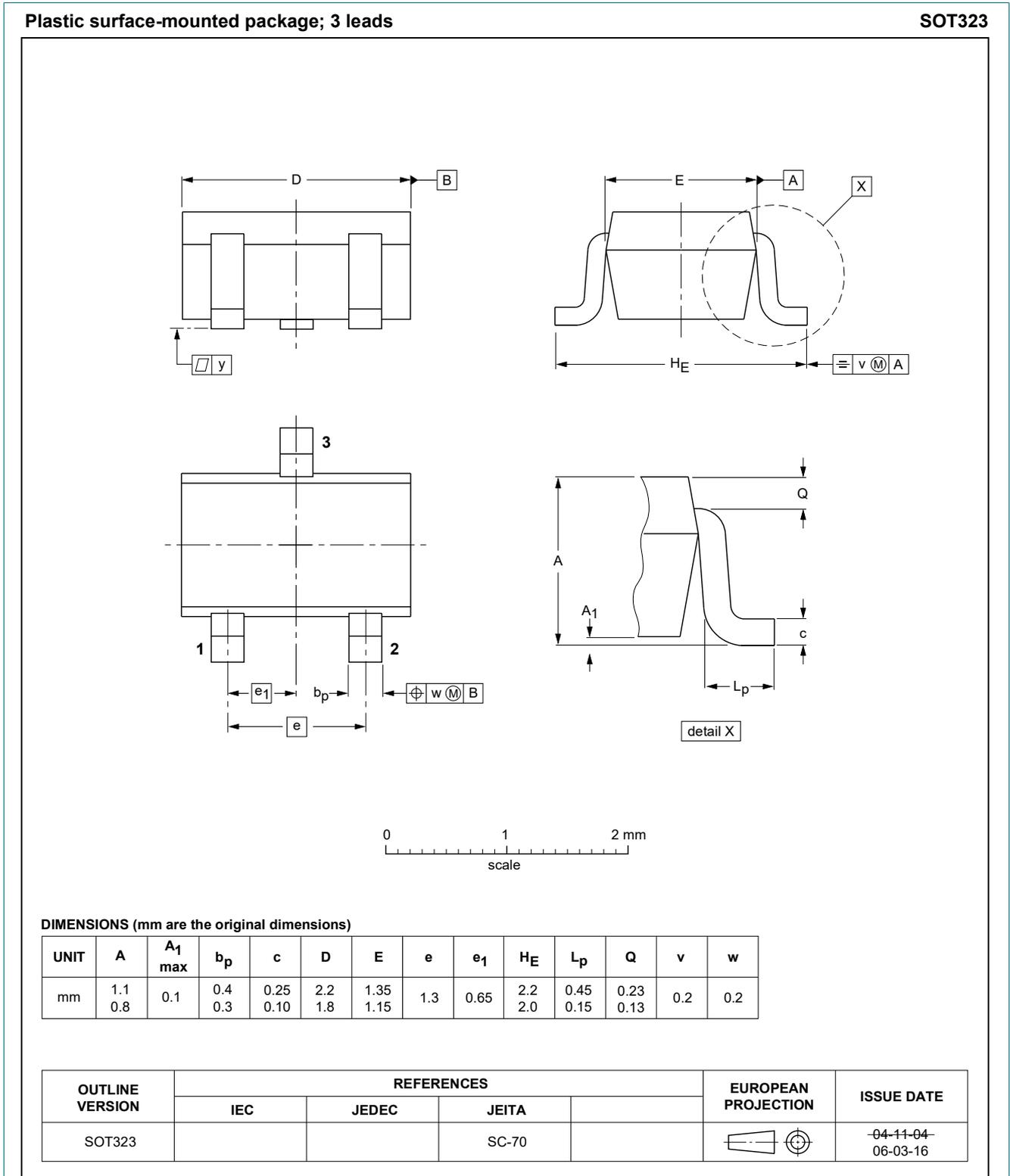


Fig. 16. Package outline SOT323 (SC70)

## 12. Soldering

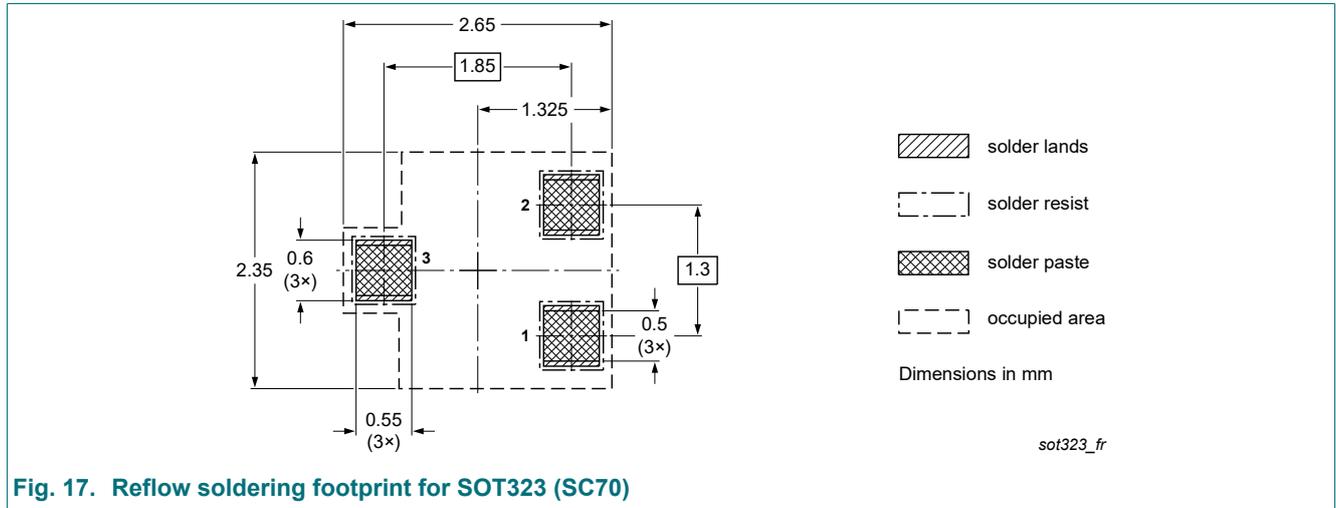


Fig. 17. Reflow soldering footprint for SOT323 (SC70)

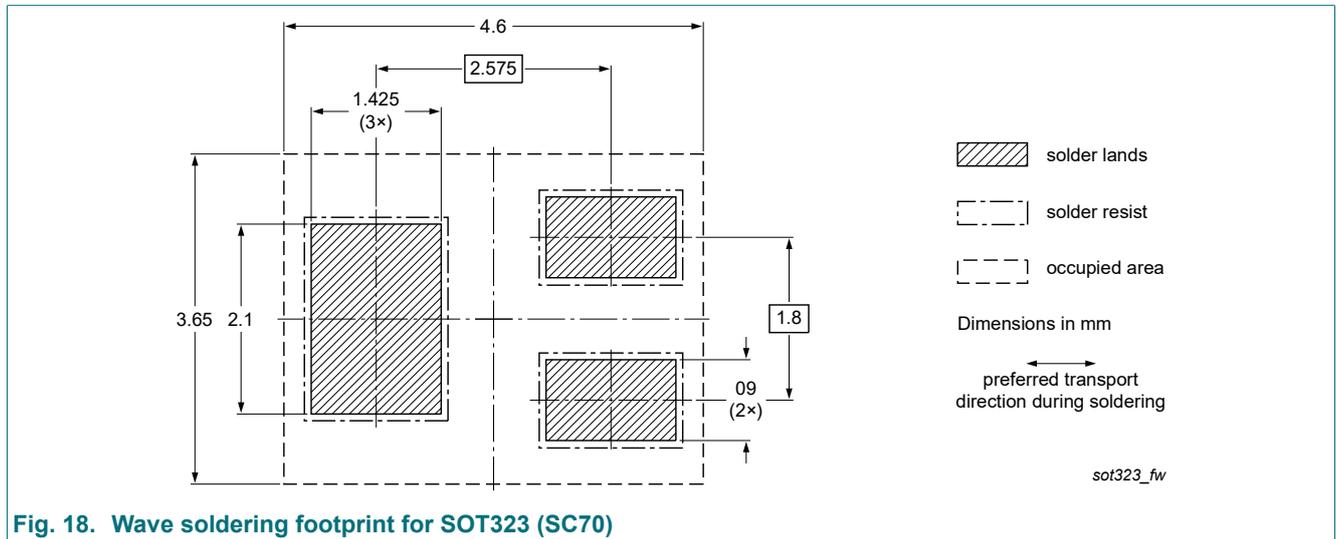


Fig. 18. Wave soldering footprint for SOT323 (SC70)

## 13. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC817W_SER v.8	20220701	Product data sheet	-	BC817W_SER v.7
Modifications:	<ul style="list-style-type: none"> <li>Product changed to non-automotive qualification. Please refer to <a href="http://nexperia.com">nexperia.com</a> for automotive (-Q) product alternative(s).</li> </ul>			
BC817W_SER v.7	20180615	Product data sheet	-	BC817_BC817W_BC327 v.6
BC817_BC817W_BC337 v.6	20091117	Product data sheet	-	BC817_BC817W_BC337 v.5
BC817_BC817W_BC337 v.5	20050221	Product data sheet	-	BC817 v.4 BC817W v.4 BC337 v.3
BC817 v.4	20040116	Product Specification	-	BC817 v.3
BC817W_SER v.4	19990518	Product Specification	-	BC817W_SER v.3
BC337 v.3	19990415	Product Specification	-	BC337_338_CNV v.2

## 14. 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: 1 July 2022

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