

# BC817-16,235 Datasheet



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DiGi Electronics Part Number	BC817-16,235-DG
Manufacturer	<a href="#">Nexperia USA Inc.</a>
Manufacturer Product Number	BC817-16,235
Description	TRANS NPN 45V 0.5A TO236AB
Detailed Description	Bipolar (BJT) Transistor NPN 45 V 500 mA 100MHz 2 50 mW Surface Mount TO-236AB



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## Purchase and inquiry

**Manufacturer Product Number:**

BC817-16,235

**Series:**

-

**Transistor Type:**

NPN

**Voltage - Collector Emitter Breakdown (Max):**

45 V

**Current - Collector Cutoff (Max):**

100nA (ICBO)

**Power - Max:**

250 mW

**Operating Temperature:**

150°C (TJ)

**Qualification:**

AEC-Q101

**Package / Case:**

TO-236-3, SC-59, SOT-23-3

**Base Product Number:**

BC817

**Manufacturer:**

Nexperia USA Inc.

**Product Status:**

Active

**Current - Collector (Ic) (Max):**

500 mA

**Vce Saturation (Max) @ Ib, Ic:**

700mV @ 50mA, 500mA

**DC Current Gain (hFE) (Min) @ Ic, Vce:**

100 @ 100mA, 1V

**Frequency - Transition:**

100MHz

**Grade:**

Automotive

**Mounting Type:**

Surface Mount

**Supplier Device Package:**

TO-236AB

## Environmental & Export classification

**RoHS Status:**

ROHS3 Compliant

**REACH Status:**

REACH Unaffected

**HTSUS:**

8541.21.0075

**Moisture Sensitivity Level (MSL):**

1 (Unlimited)

**ECCN:**

EAR99



# BC817 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 small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package			PNP complement
	Nexperia	JEDEC	JEITA	
BC817	SOT23	TO-236AB	-	BC807
BC817-16				BC807-16
BC817-25				BC807-25
BC817-40				BC807-40

## 2. Features and benefits

- High current
- Three current gain selections

## 3. Applications

- General-purpose switching and amplification

## 4. Quick reference data

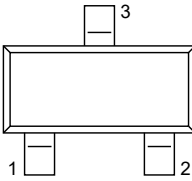
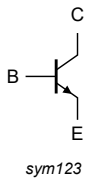
Table 2. Quick reference data

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						
	BC817	$V_{CE} = 1\text{ V}$ ; $I_C = 100\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	100	-	600	
	BC817-16		[1]	100	-	250	
	BC817-25		[1]	160	-	400	
	BC817-40		[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		 sym123
2	E	emitter		
3	C	collector		

## 6. Ordering information

Table 4. Ordering information

Type number	Package		Version
	Name	Description	
<a href="#">BC817</a>	TO-236AB	Plastic surface-mounted package; 3 leads	<a href="#">SOT23</a>
<a href="#">BC817-16</a>			
<a href="#">BC817-25</a>			
<a href="#">BC817-40</a>			

## 7. Marking

Table 5. Marking

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

[1] % = placeholder for manufacturing site code

## 8. Limiting values

**Table 6. Limiting values**

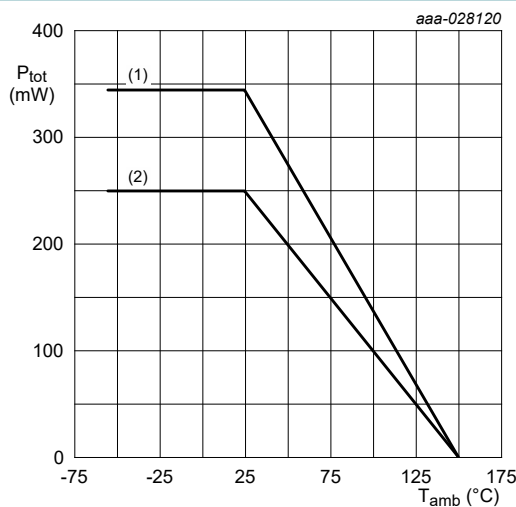
In accordance with the Absolute Maximum Rating System (IEC 60134).

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]	250	mW	
			[2]	-	345	mW
			[3]	-	345	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 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>.



(1) FR4 PCB, single-sided copper; 1 cm<sup>2</sup>

(2) FR4 PCB, single-sided copper; standard footprint

**Fig. 1. Power derating curves**

## 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
			[2]	-	-	362	K/W
			[3]	-	-	362	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 PCB, single-sided copper, tin-plated; mounting pad for collector 1 cm<sup>2</sup>.

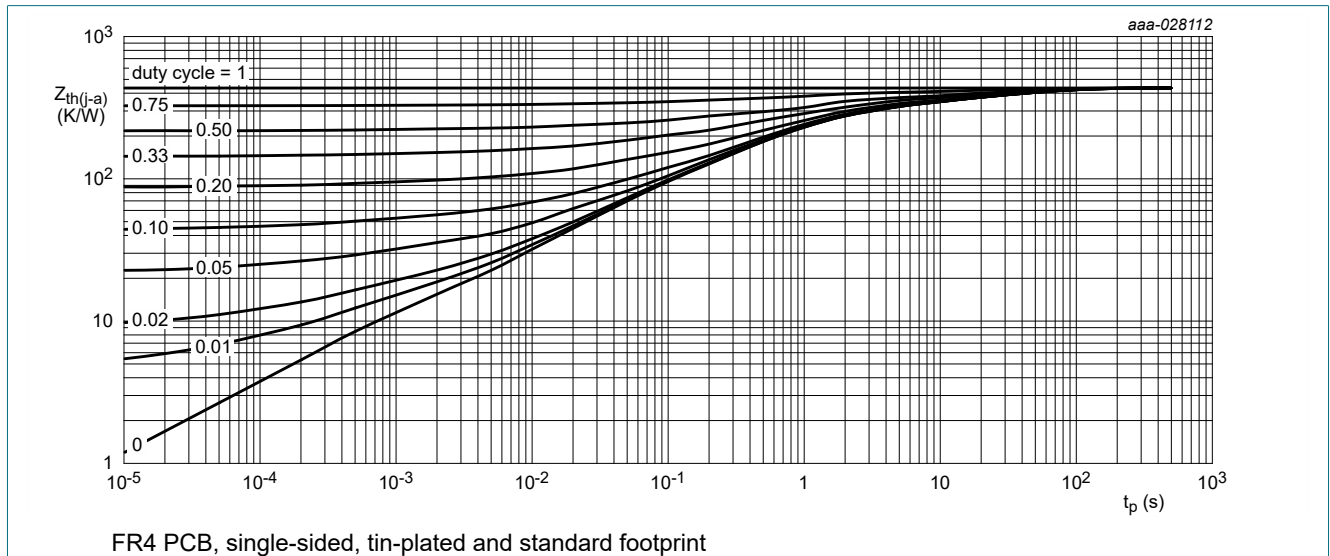


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

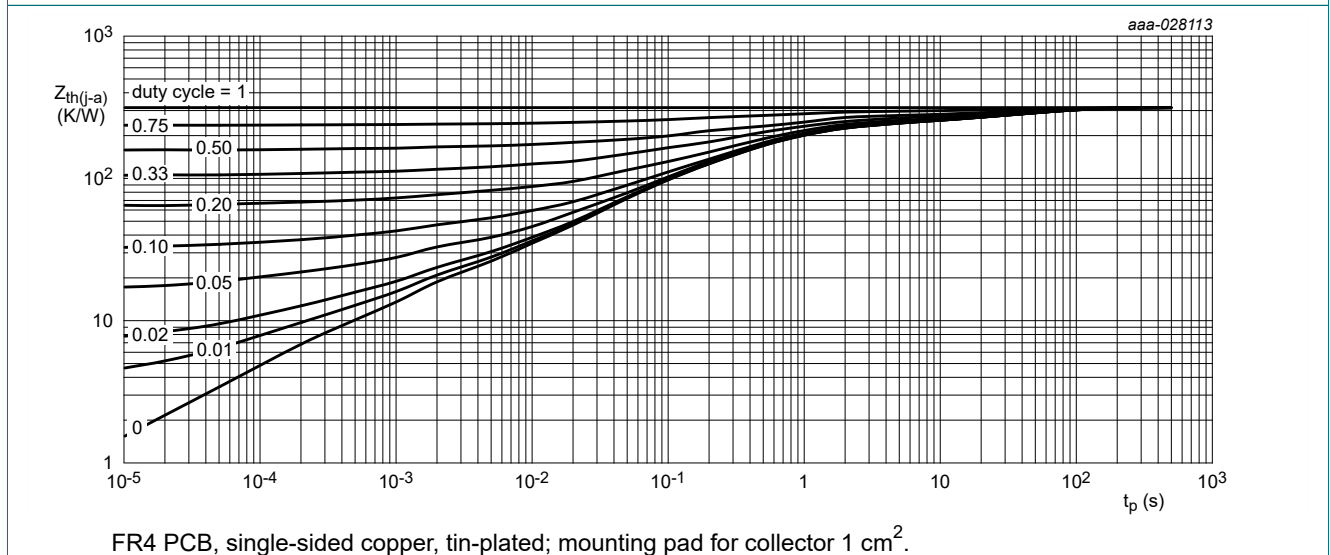


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

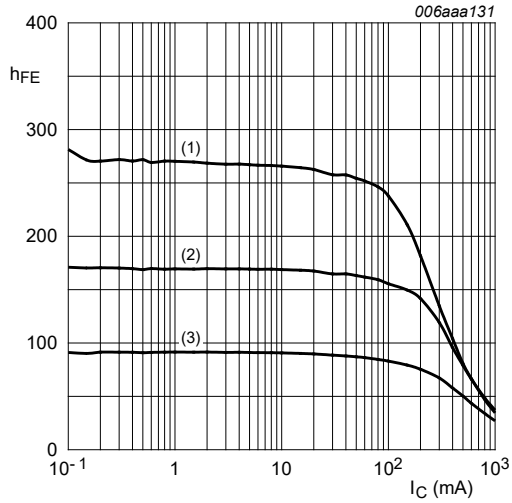
## 10. Characteristics

**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					
	BC817	$V_{CE} = 1 \text{ V}; I_C = 100 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	100	-	600
	BC817-16		[1]	100	-	250
	BC817-25		[1]	160	-	400
BC817-40	[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

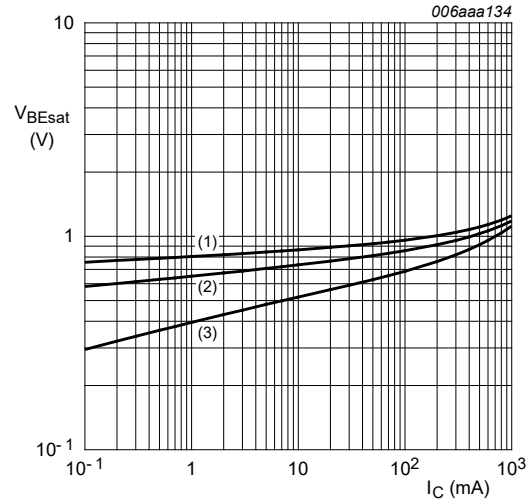
[1] pulsed;  $t_p \leq 300 \mu\text{s}$ ;  $\delta \leq 0.02$

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



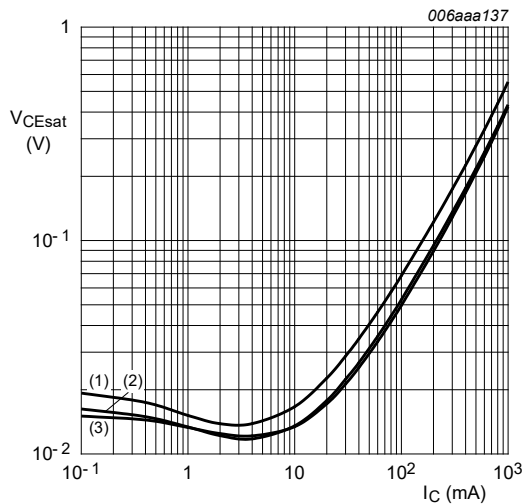
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



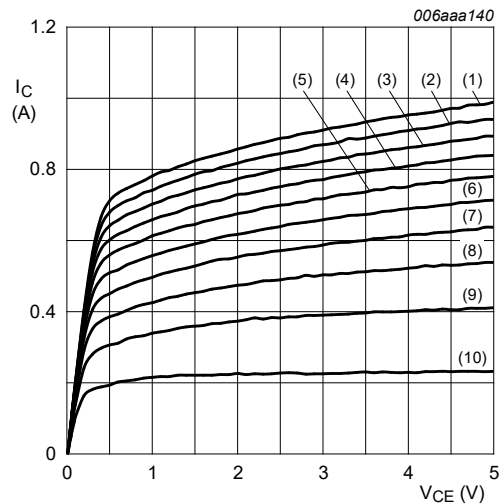
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

**Fig. 5. BC817-16: 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)  $T_{amb} = -55\text{ °C}$

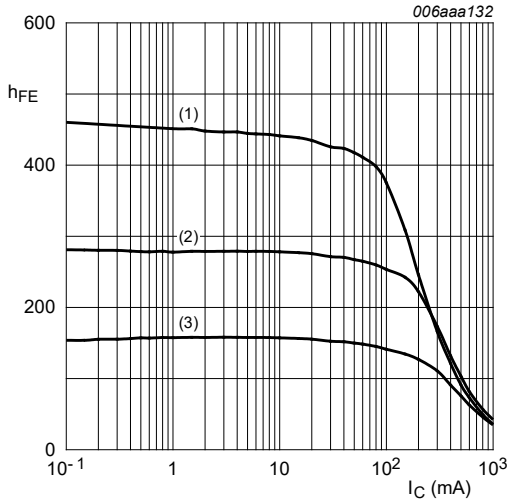
**Fig. 6. BC817-16: Collector-emitter saturation voltage as a function of collector current; typical values**



$T_{amb} = 25\text{ °C}$   
 (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)  $I_B = 1.6\text{ mA}$

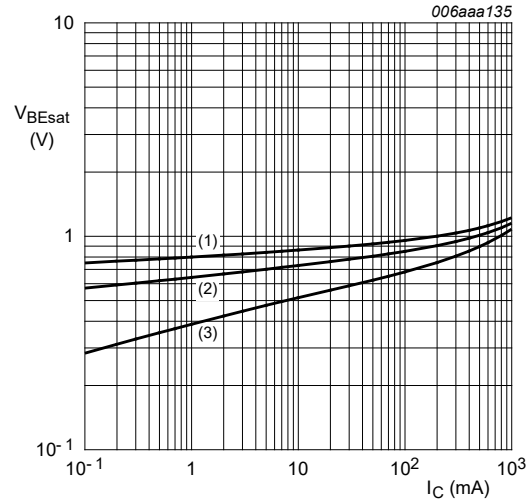
**Fig. 7. BC817-16: Collector current as a function of collector-emitter voltage; typical values**





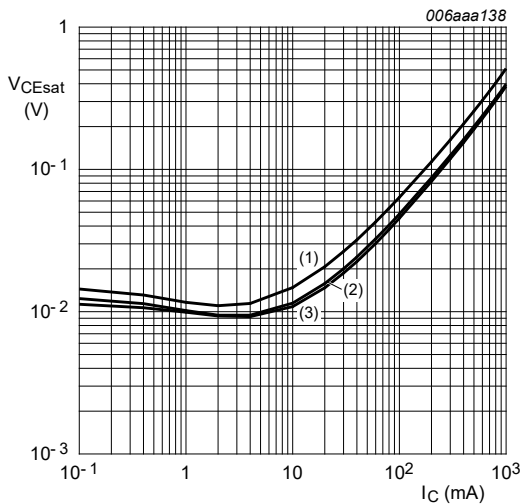
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



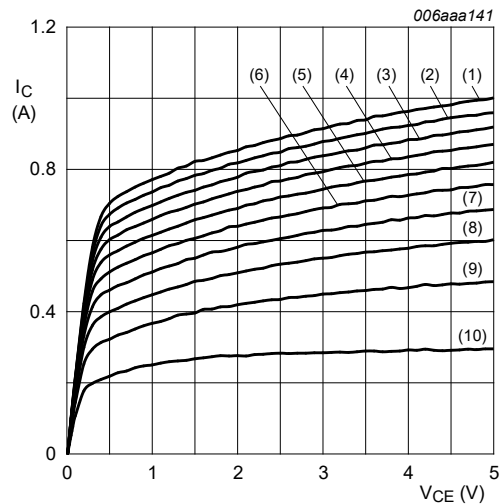
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

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



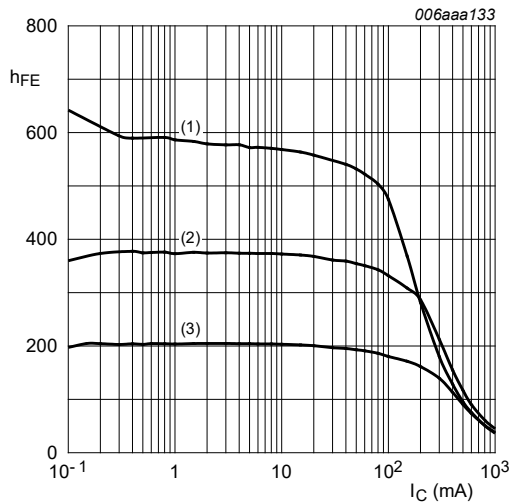
$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



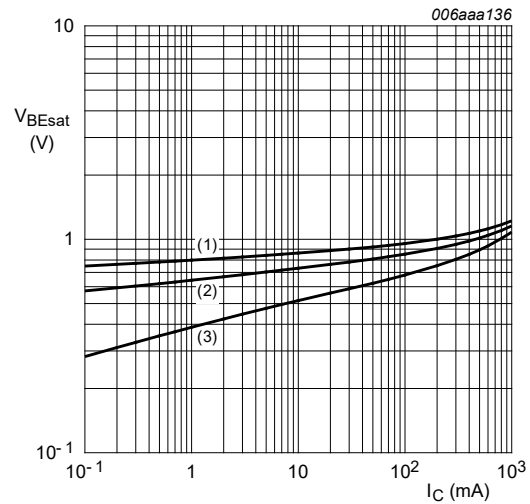
$T_{amb} = 25\text{ °C}$   
 (1)  $I_B = 13.0\text{ mA}$   
 (2)  $I_B = 11.7\text{ mA}$   
 (3)  $I_B = 10.4\text{ mA}$   
 (4)  $I_B = 9.1\text{ mA}$   
 (5)  $I_B = 7.8\text{ mA}$   
 (6)  $I_B = 6.5\text{ mA}$   
 (7)  $I_B = 5.2\text{ mA}$   
 (8)  $I_B = 3.9\text{ mA}$   
 (9)  $I_B = 2.6\text{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

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



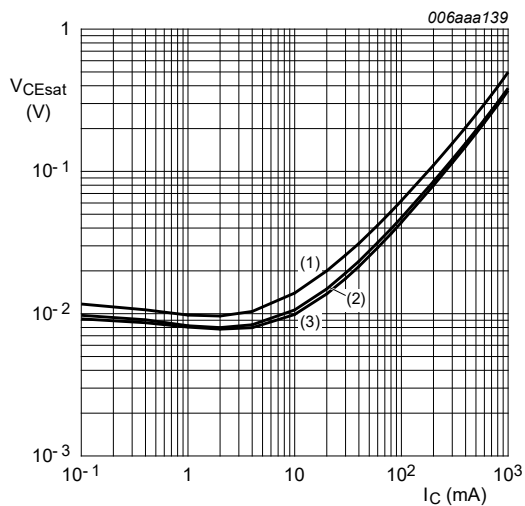
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



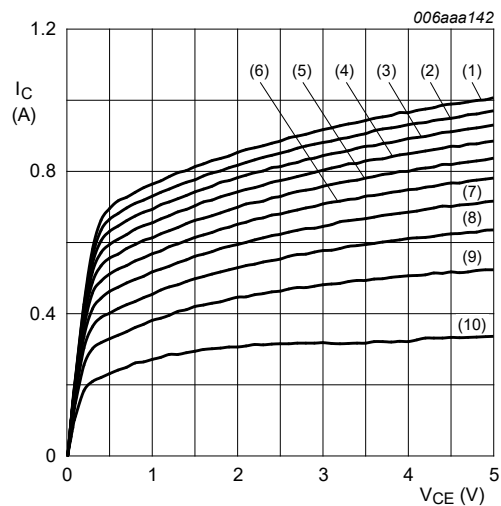
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

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

## 11. Package outline

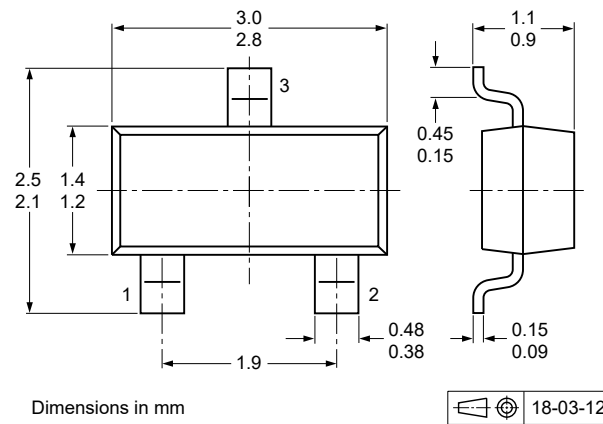


Fig. 16. Package outline SOT23 (TO-236AB)

## 12. Soldering

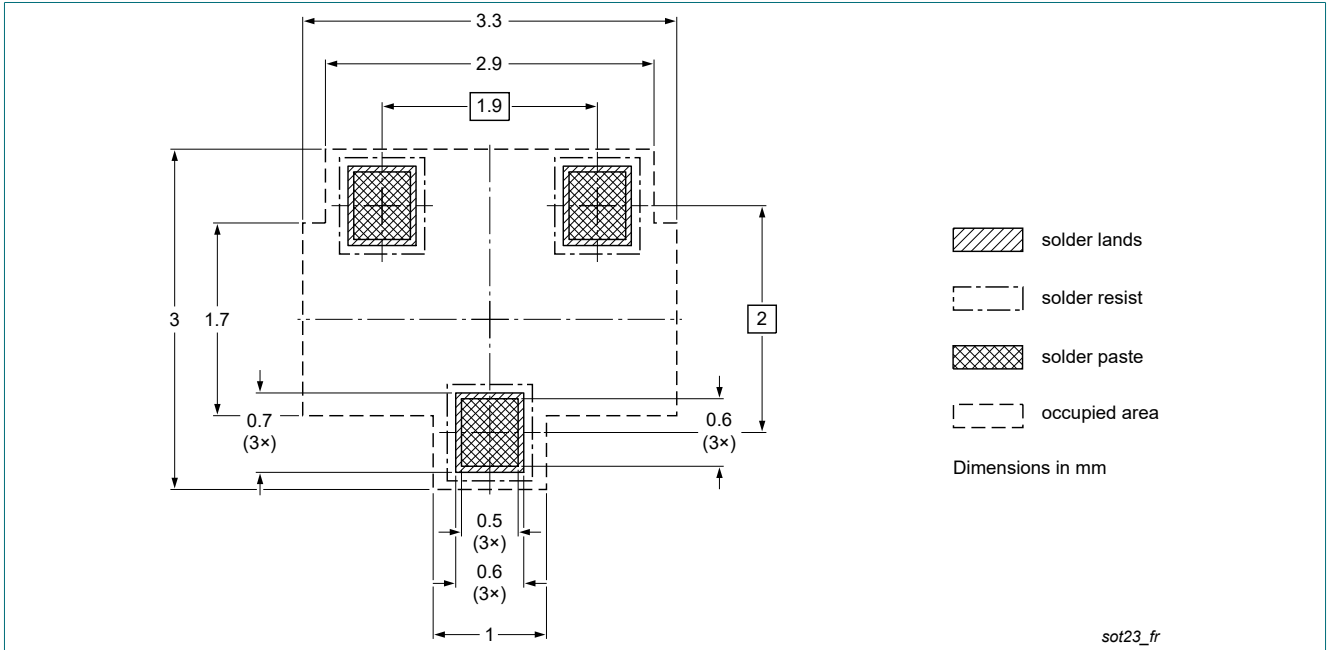


Fig. 17. Reflow soldering footprint for SOT23 (TO-236AB)

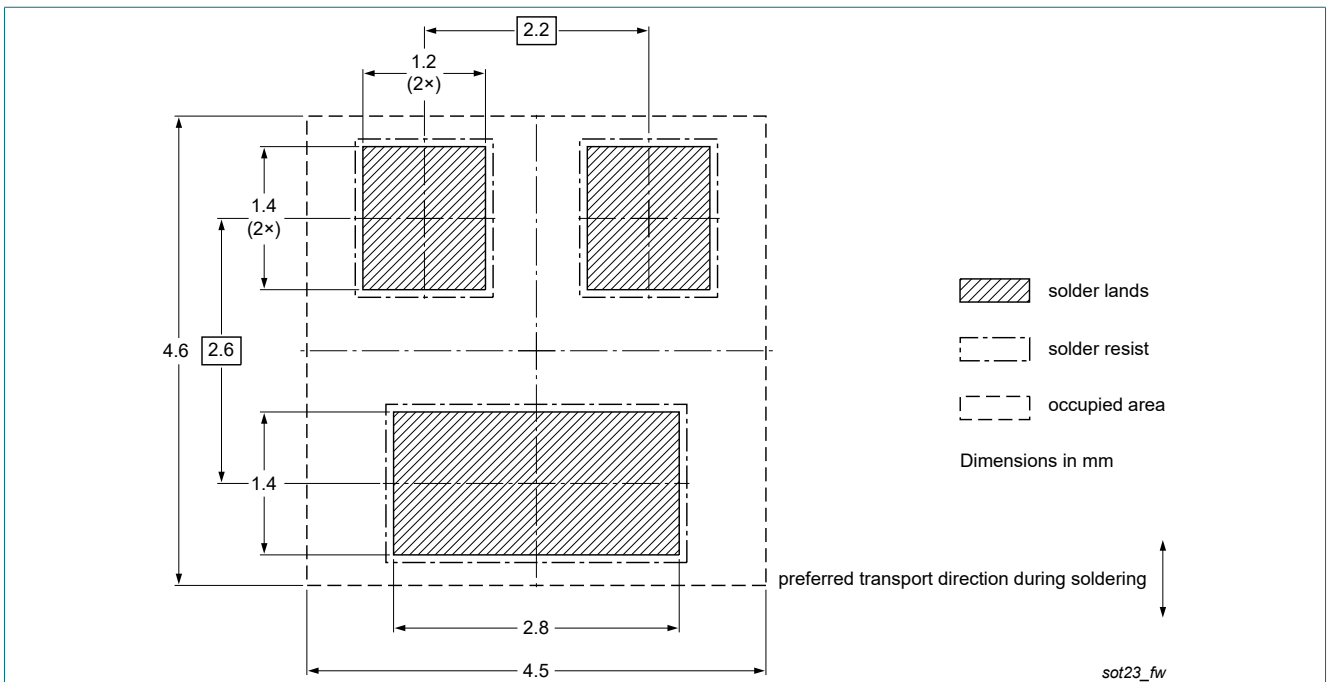


Fig. 18. Wave soldering footprint for SOT23 (TO-236AB)

## 13. Revision history

**Table 9. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC817_SER v.8	20220701	Product data sheet	-	BC817_SER v.7
Modifications:	<ul style="list-style-type: none"> <li>Product(s) changed to non-automotive qualification. Please refer to <a href="http://nexperia.com">nexperia.com</a> for automotive (-Q) product alternative(s).</li> </ul>			
BC817_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	CPCN200302007F CPCN200405006F	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".
- [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 <https://www.nexperia.com>.

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