



BC817-Q series

45 V, 500 mA NPN general-purpose transistors

Rev. 1 — 8 June 2021

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-Q	SOT23	TO-236AB	-	BC807-Q
BC817-16-Q				BC807-16-Q
BC817-25-Q				BC807-25-Q
BC817-40-Q				BC807-40-Q

2. Features and benefits

- High current
- Three current gain selections
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- General-purpose switching and amplification

4. Quick reference data

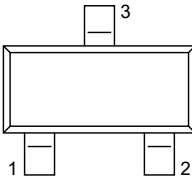
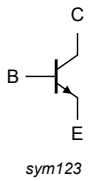
Table 2. Quick reference data

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-Q	$V_{CE} = 1\text{ V}$; $I_C = 100\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	100	-	600	
	BC817-16-Q		[1]	100	-	250	
	BC817-25-Q		[1]	160	-	400	
	BC817-40-Q		[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	
BC817-Q	TO-236AB	Plastic surface-mounted package; 3 leads	SOT23
BC817-16-Q			
BC817-25-Q			
BC817-40-Q			

7. Marking

Table 5. Marking

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

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 6. Limiting values

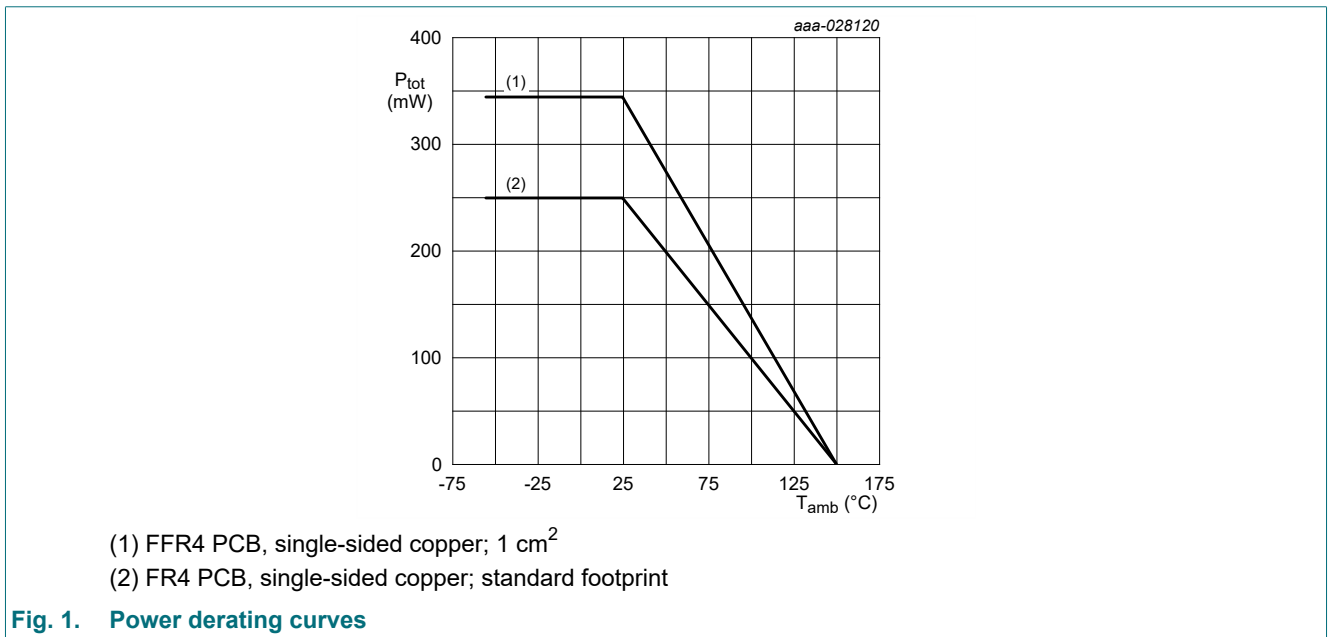
In accordance with the Absolute Maximum Rating System (IEC 60134).

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 cm².



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 cm².

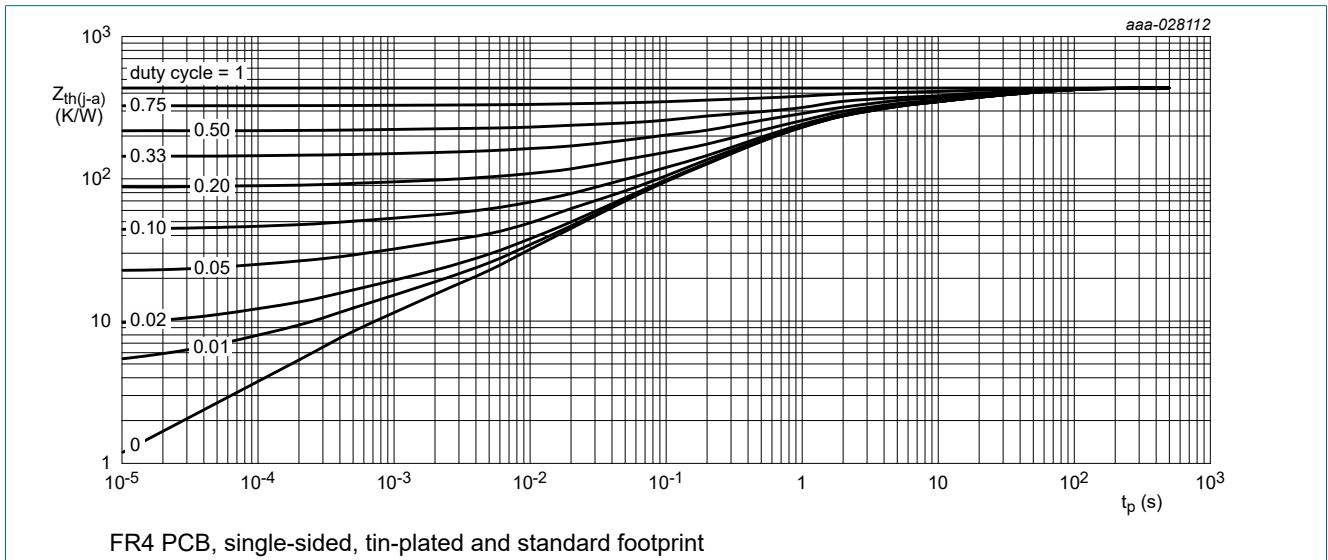


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

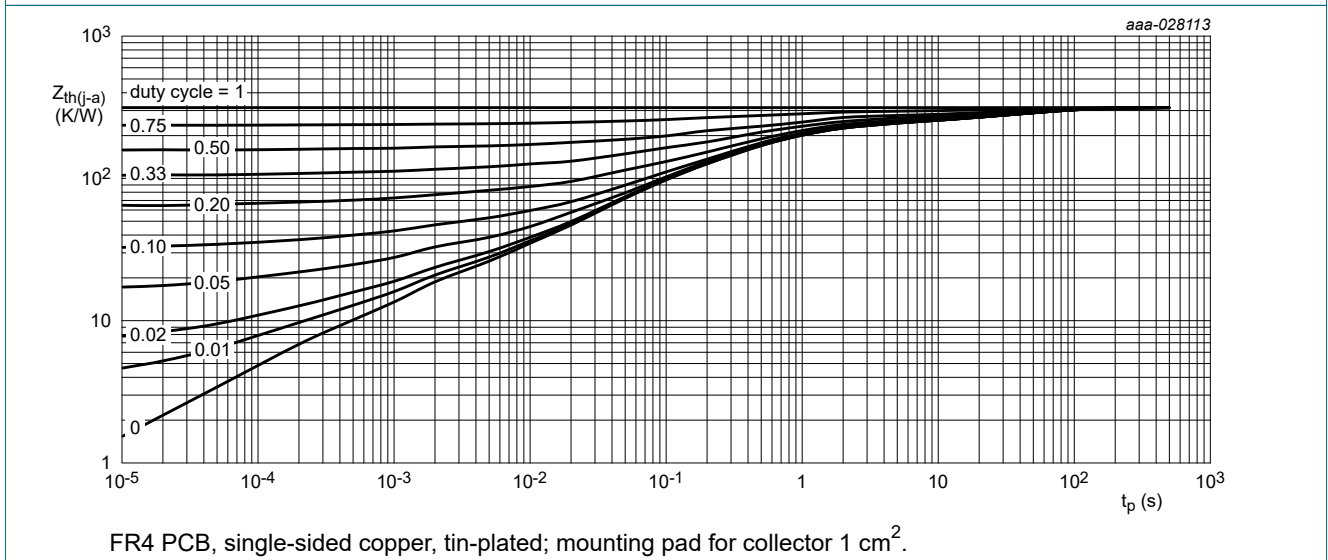


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

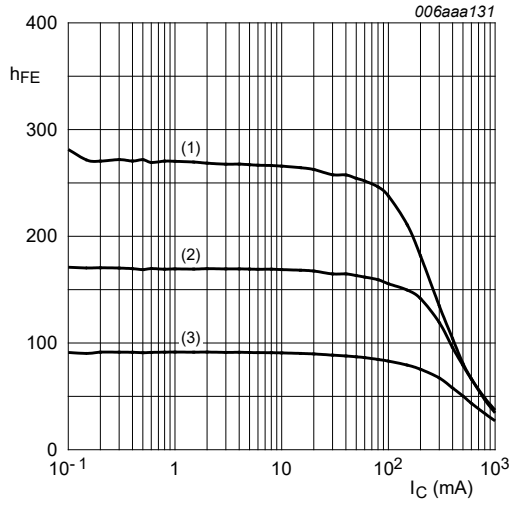
10. Characteristics

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

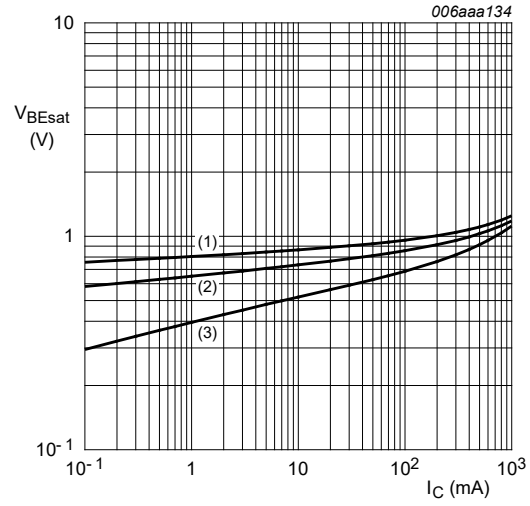
[1] pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$

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



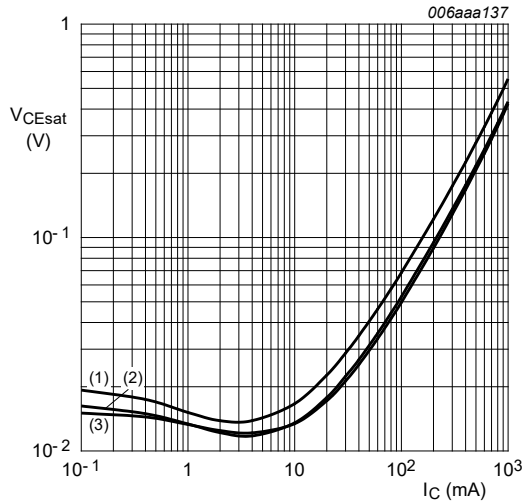
$V_{CE} = 1\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



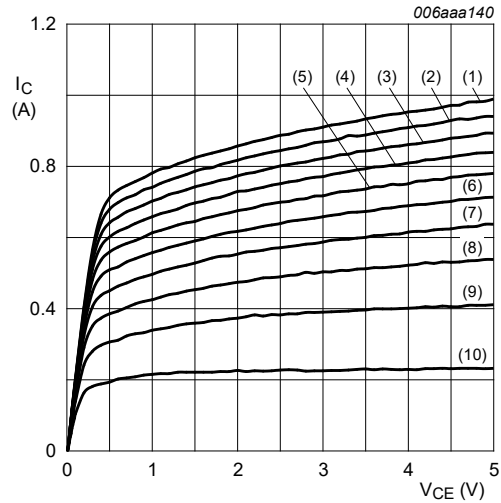
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



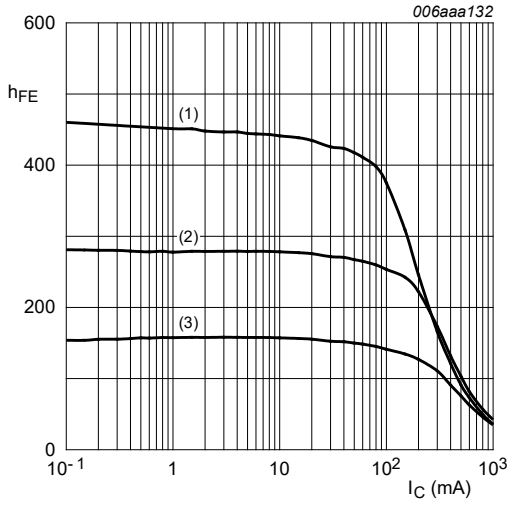
$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



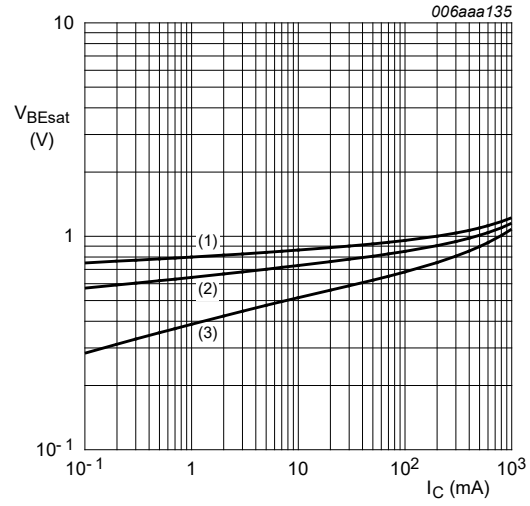
$T_{amb} = 25\text{ °C}$
 (1) $I_B = 16.0\text{ mA}$
 (2) $I_B = 14.4\text{ mA}$
 (3) $I_B = 12.8\text{ mA}$
 (4) $I_B = 11.2\text{ mA}$
 (5) $I_B = 9.6\text{ mA}$
 (6) $I_B = 8.0\text{ mA}$
 (7) $I_B = 6.4\text{ mA}$
 (8) $I_B = 4.8\text{ mA}$
 (9) $I_B = 3.2\text{ mA}$
 (10) $I_B = 1.6\text{ mA}$

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



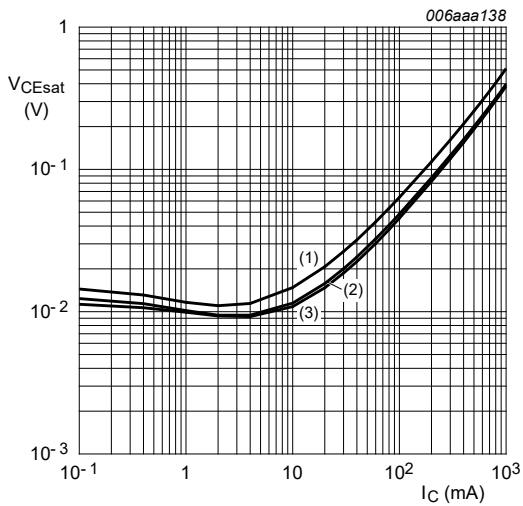
$V_{CE} = 1\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



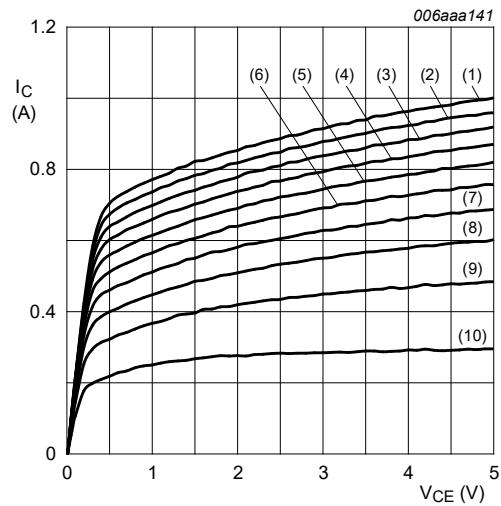
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



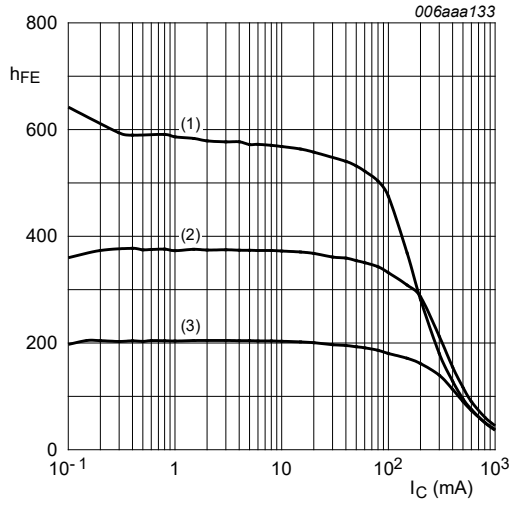
$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



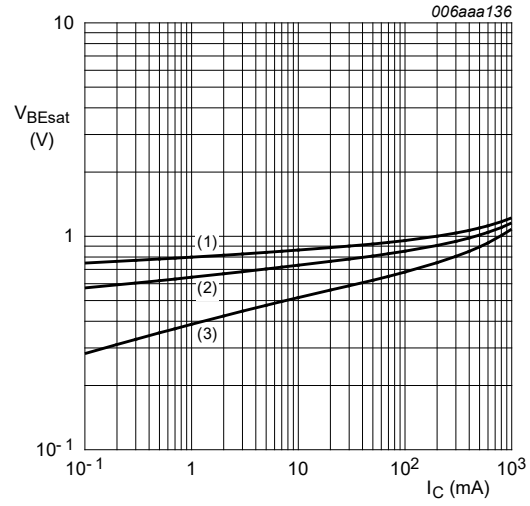
$T_{amb} = 25\text{ °C}$
 (1) $I_B = 13.0\text{ mA}$
 (2) $I_B = 11.7\text{ mA}$
 (3) $I_B = 10.4\text{ mA}$
 (4) $I_B = 9.1\text{ mA}$
 (5) $I_B = 7.8\text{ mA}$
 (6) $I_B = 6.5\text{ mA}$
 (7) $I_B = 5.2\text{ mA}$
 (8) $I_B = 3.9\text{ mA}$
 (9) $I_B = 2.6\text{ mA}$
 (10) $I_B = 1.3\text{ mA}$

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



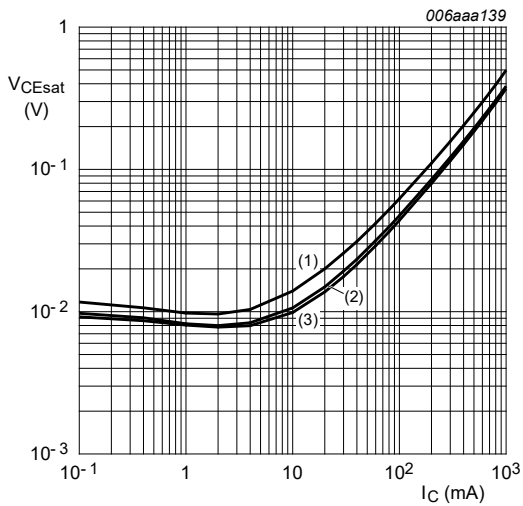
$V_{CE} = 1\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



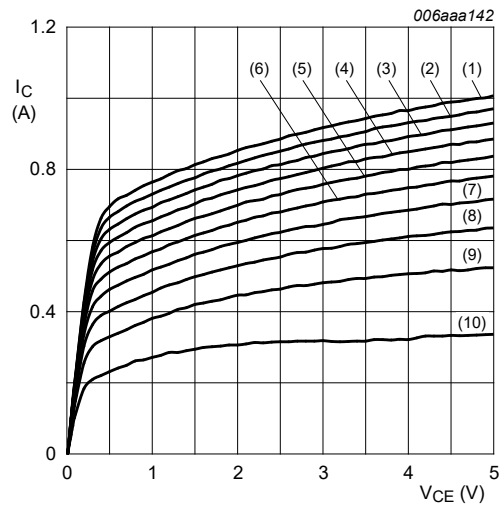
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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

11. Test information

11.1. 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.

12. Package outline

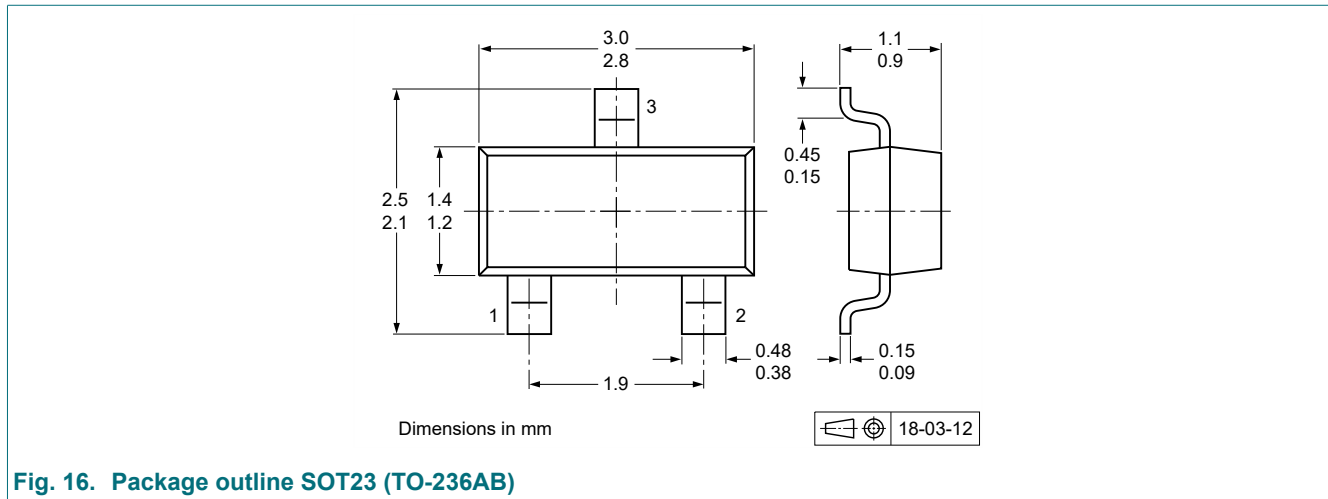


Fig. 16. Package outline SOT23 (TO-236AB)

13. Soldering

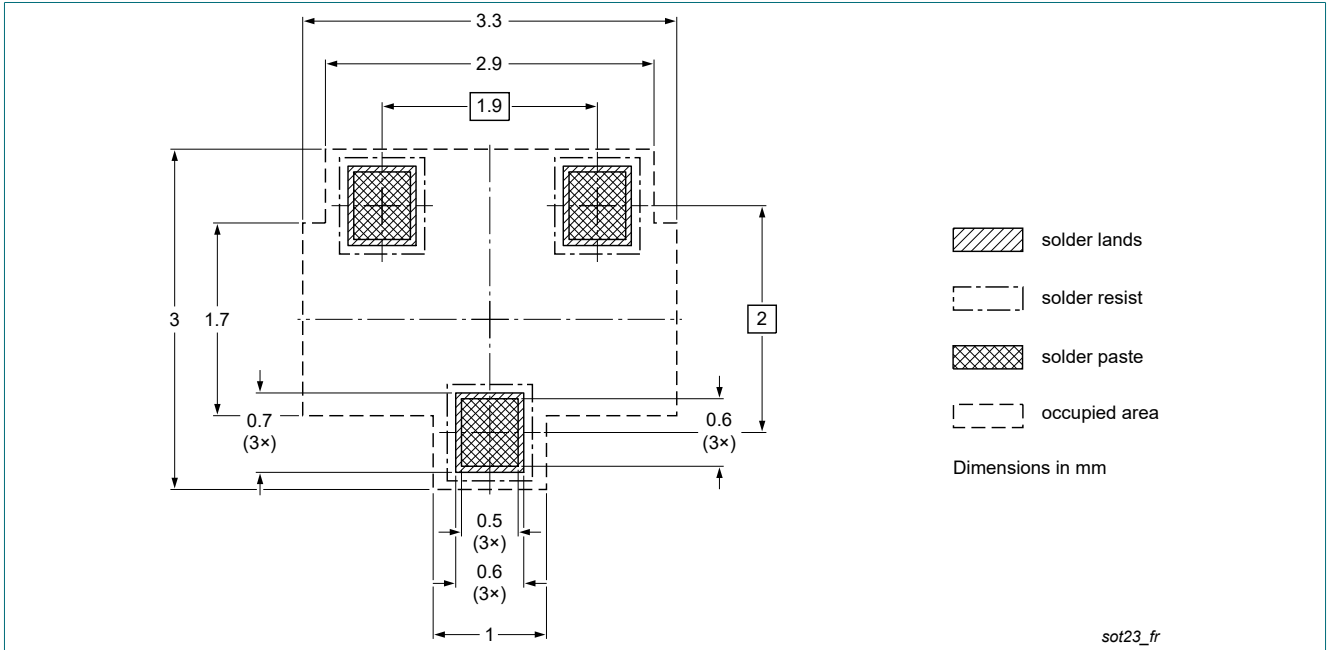


Fig. 17. Reflow soldering footprint for SOT23 (TO-236AB)

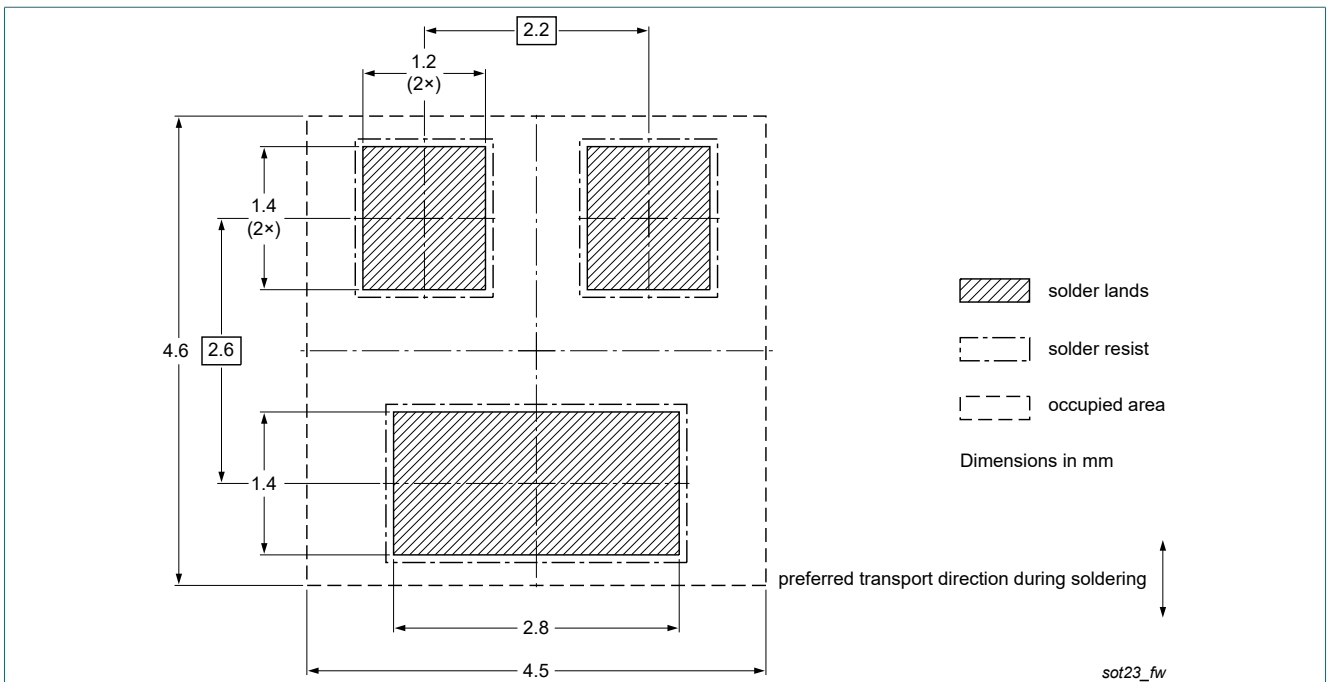


Fig. 18. Wave soldering footprint for SOT23 (TO-236AB)

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC817-Q_SER v.1	20210608	Product data sheet	-	-

15. 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.
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For more information, please visit: <http://www.nexperia.com>

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