

ANTREX Electronics

Electronic Components Sourcing Information

Product Reference Information

Part Number:	BC816-16R
Manufacturer:	Nexperia USA Inc.
Package:	TO-236-3, SC-59, SOT-23-3
Availability:	Please confirm with sales

Product Page:

<https://antrexco.com/product/details/nexperia-usa-inc/bc816-16r.html>

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Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.



BC816 series

80 V, 500 mA NPN general-purpose transistors

Rev. 2 — 5 November 2019

Product

1. General description

NPN general-purpose transistors in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		PNP complement:
	Nexperia	JEDEC	
BC816-16	SOT23	TO-236AB	BC806-16
BC816-25	SOT23	TO-236AB	BC806-25

2. Features and benefits

- High current
- High voltage
- Two current gain selections
- AEC-Q101 qualified

3. Applications

- General-purpose switching and amplification
- 48 V automotive board net

4. Quick reference data

Table 2. Quick reference data

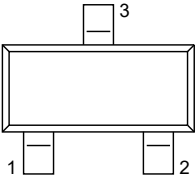
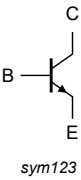
$T_{amb} = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	80	V
I_C	collector current			-	-	500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1\text{ ms}$		-	-	1	A
h_{FE}	DC current gain						
	BC816-16	$V_{CE} = 1\text{ V}; I_C = 100\text{ mA}$	[1]	100	-	250	
	BC816-25		[1]	160	-	400	

[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	 TO-236AB (SOT23)	 sym123
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC816-16	TO-236AB	plastic surface-mounted package; 3 leads	SOT23
BC816-25			

7. Marking

Table 5. Marking

Type number	Marking code [1]
BC816-16	%GT
BC816-25	%GU

[1] % = placeholder for manufacturing site code

8. Limiting values

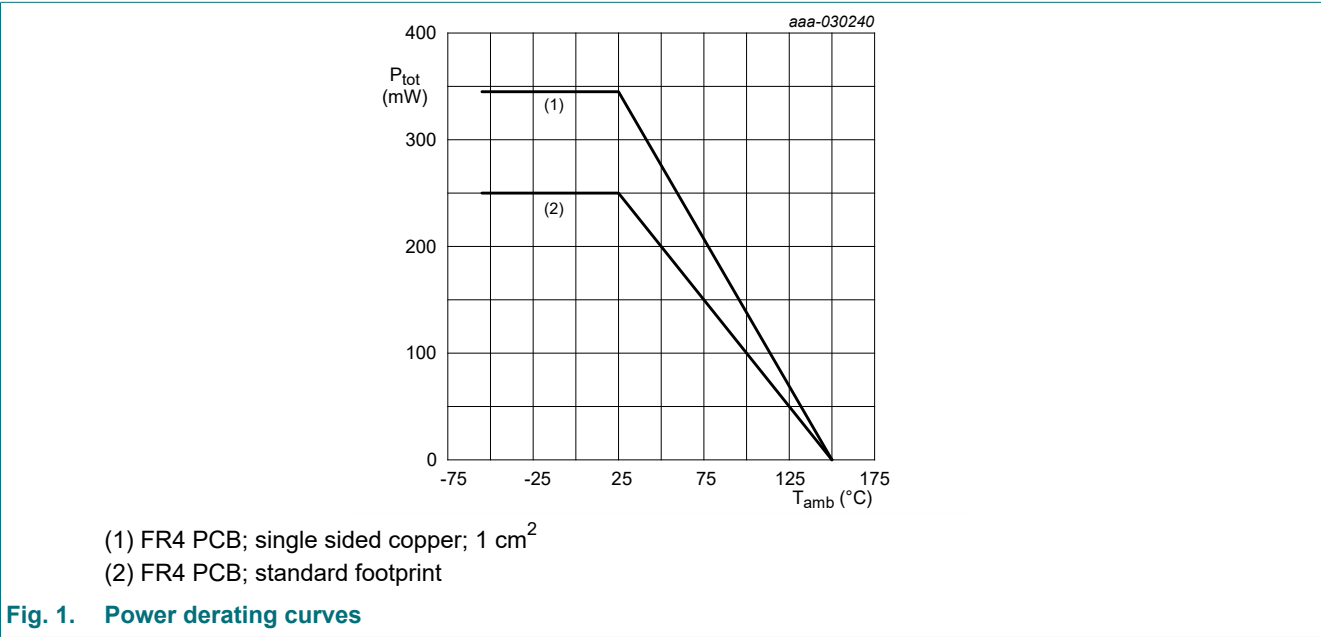
Table 6. Limiting values

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	-	80	V
V_{CEO}	collector-emitter voltage	open base	-	80	V
V_{EBO}	emitter-base voltage	open collector	-	7	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	$T_{amb} \leq 25\text{ °C}$	[1]	250	mW
			[2]	345	mW
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	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] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm².



9. Thermal characteristics

Table 7. Thermal characteristics

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

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]	-	-	363	K/W

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

[2] Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm².

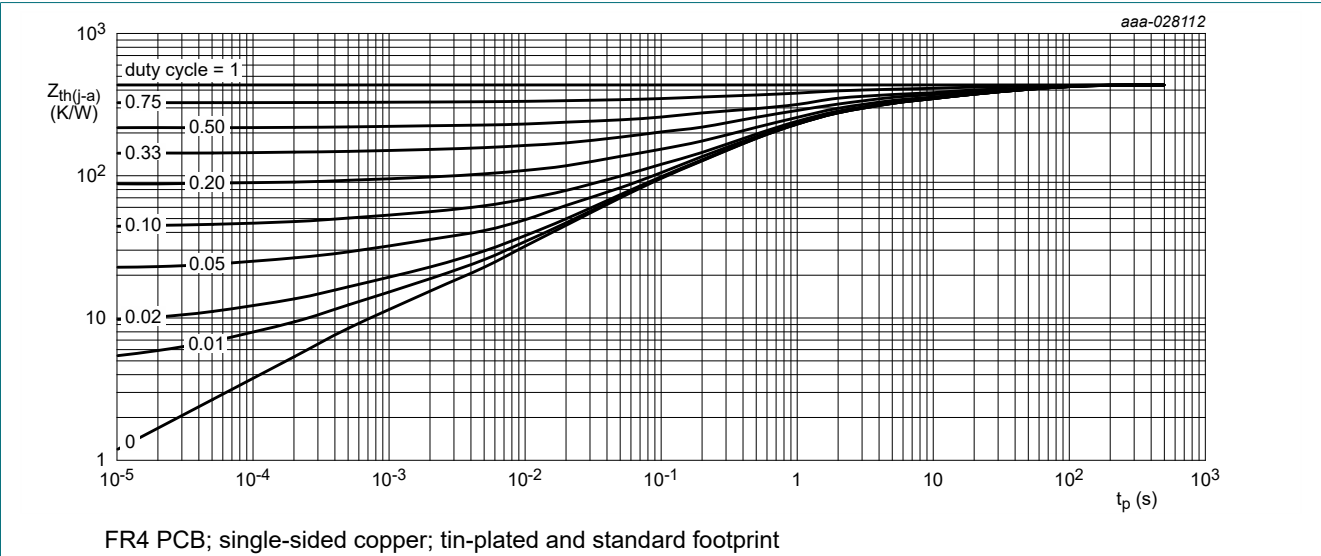


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

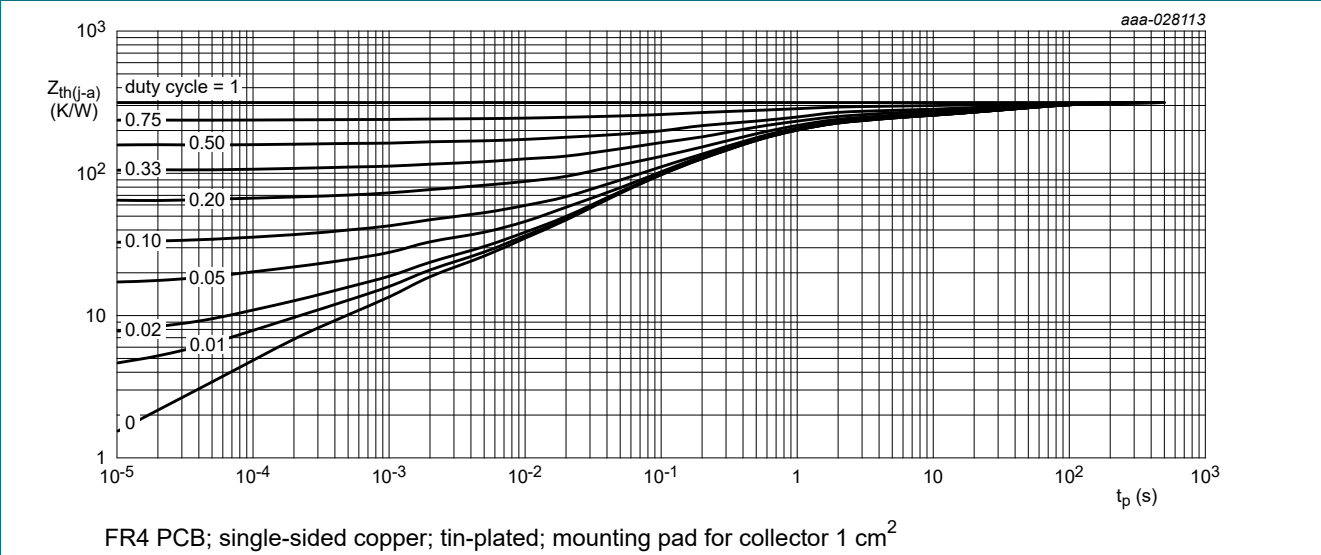


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 8. Characteristics
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _{(BR)CBO}	collector-base breakdown voltage	I _C = 100 µA; I _E = 0 A		80	-		V
V _{(BR)CEO}	collector-emitter breakdown voltage	I _C = 2 mA; I _E = 0 A		80	-		V
V _{(BR)EBO}	emitter-base breakdown voltage	I _E = 100 µA; I _C = 0 A		7	-		V
I _{CBO}	collector-base cut-off current	V _{CB} = 64 V; I _E = 0 A		-	-	100	nA
		V _{CB} = 64 V; I _E = 0 A; T _J = 150 °C		-	-	5	µA
I _{EBO}	emitter-base cut-off current	V _{EB} = 5.6 V; I _C = 0 A		-	-	100	nA
h _{FE}	DC current gain						
	BC816-16	V _{CE} = 1 V; I _C = 100 mA	[1]	100	-	250	
	BC816-25	V _{CE} = 1 V; I _C = 100 mA	[1]	160	-	400	
		V _{CE} = 2 V; I _C = 500 mA	[1]	30	-	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = 100 mA; I _B = 10 mA	[1]	-	-	150	mV
		I _C = 500 mA; I _B = 50 mA	[1]	-	-	400	mV
V _{BE}	base-emitter voltage	V _{CE} = 1 V; I _C = 500 mA	[1]	-	-	1.2	V
f _T	transition frequency	V _{CE} = 5 V; I _C = 50 mA; f = 100 MHz		100	-	-	MHz
C _c	collector capacitance	V _{CB} = 10 V; I _E = i _e = 0 A; f = 1 MHz		-	2	-	pF

[1] pulsed; t_p ≤ 300 µs; δ ≤ 0.02

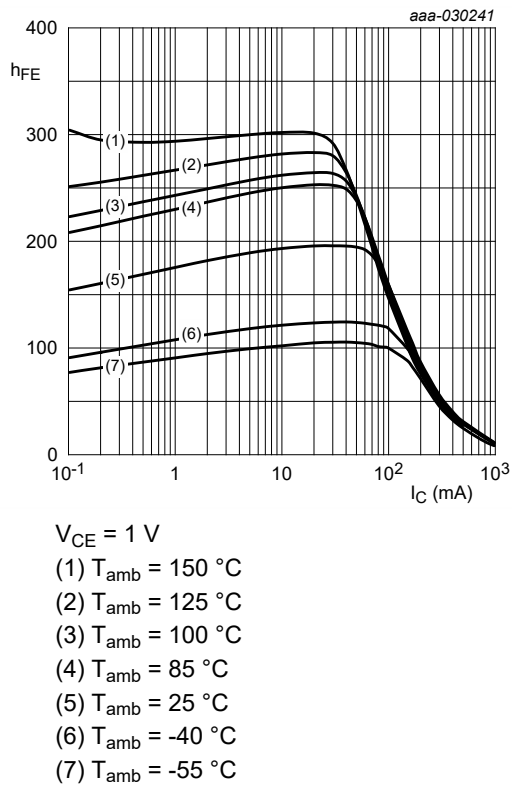


Fig. 4. BC816-16: DC current gain as a function of collector current; typical values

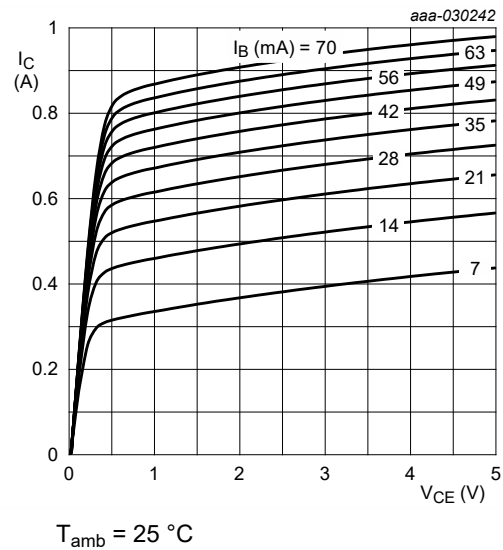


Fig. 5. BC816-16: Collector current as a function of collector-emitter voltage; typical values

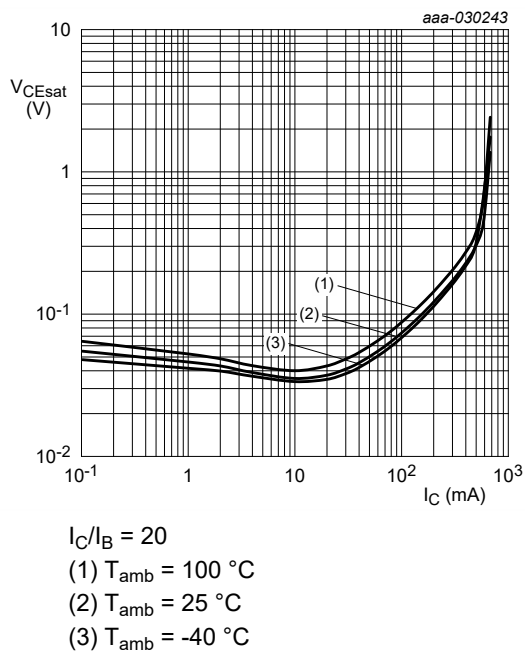


Fig. 6. BC816-16: Collector-emitter saturation voltage as a function of collector current; typical values

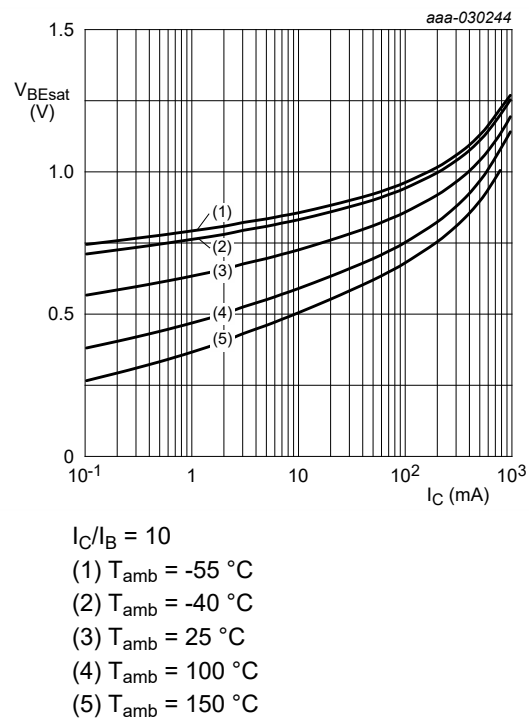
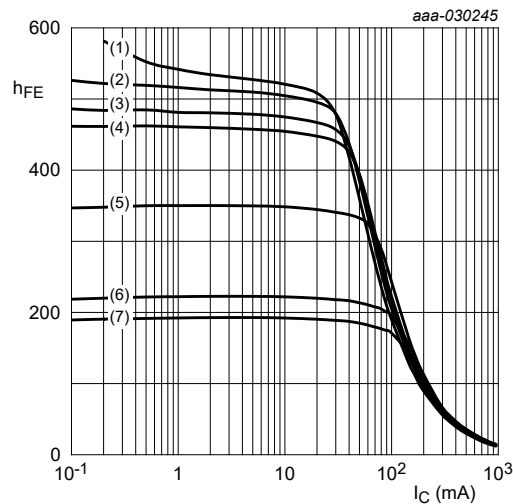
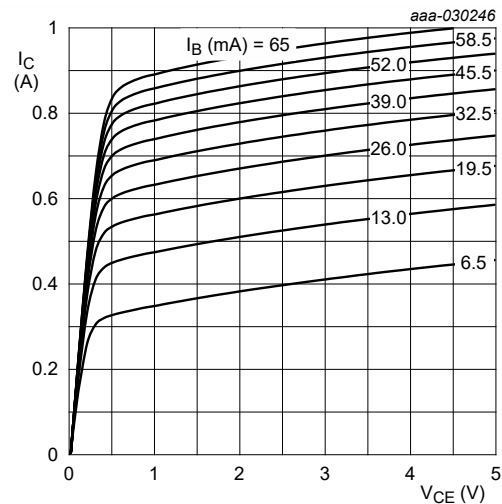


Fig. 7. BC816-16: Base-emitter saturation voltage as a function of collector current; typical values



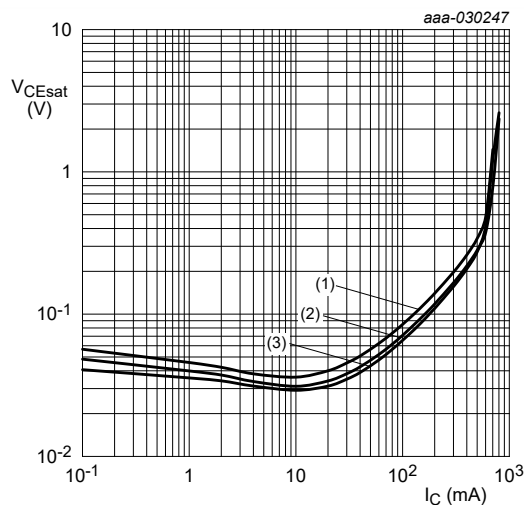
$V_{CE} = 1$ V
(1) $T_{amb} = 150$ °C
(2) $T_{amb} = 125$ °C
(3) $T_{amb} = 100$ °C
(4) $T_{amb} = 85$ °C
(5) $T_{amb} = 25$ °C
(6) $T_{amb} = -40$ °C
(7) $T_{amb} = -55$ °C

Fig. 8. BC816-25: DC current gain as a function of collector current; typical values



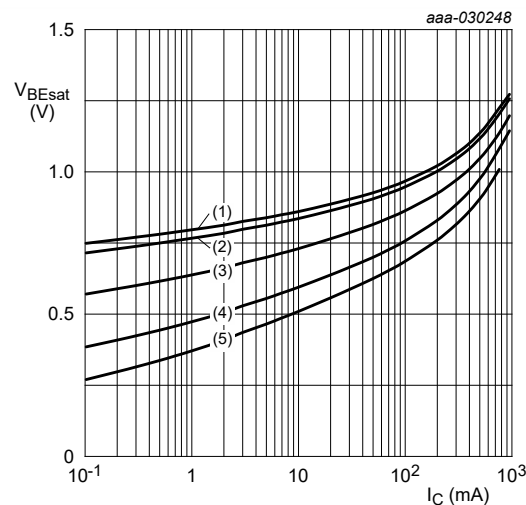
$T_{amb} = 25$ °C

Fig. 9. BC816-25: Collector current as a function of collector-emitter voltage; typical values



$I_C/I_B = 20$
(1) $T_{amb} = 100$ °C
(2) $T_{amb} = 25$ °C
(3) $T_{amb} = -40$ °C

Fig. 10. BC816-25: Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 10$
(1) $T_{amb} = -55$ °C
(2) $T_{amb} = -40$ °C
(3) $T_{amb} = 25$ °C
(4) $T_{amb} = 100$ °C
(5) $T_{amb} = 150$ °C

Fig. 11. BC816-25: Base-emitter saturation voltage as a function of collector current; 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

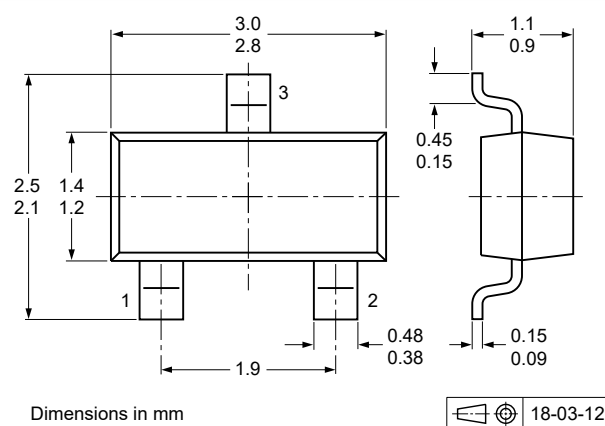
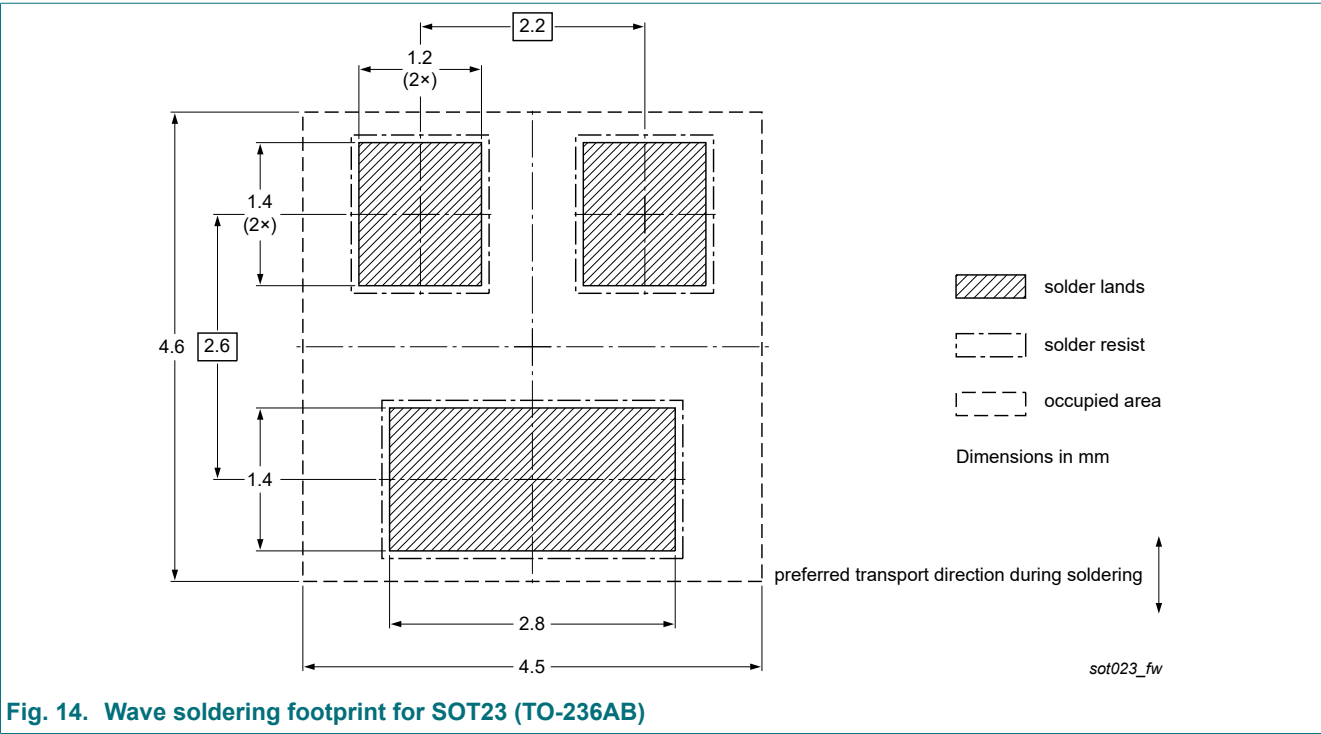
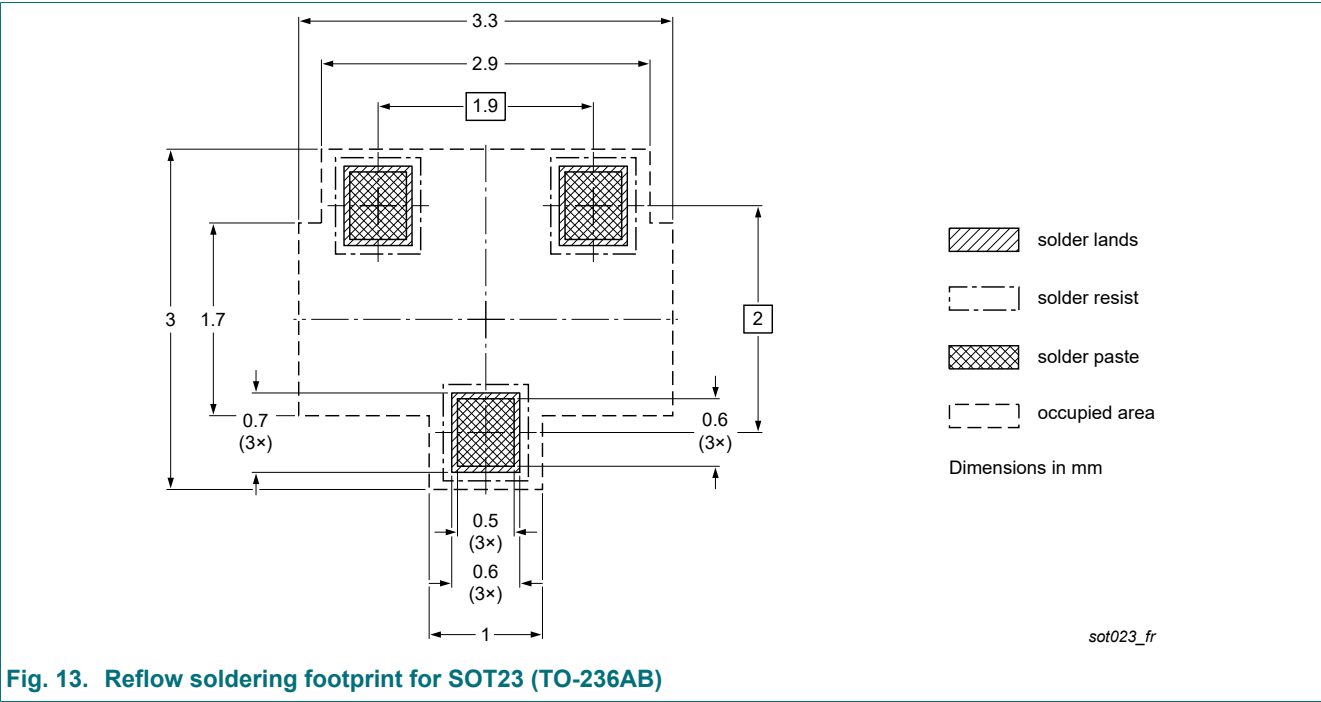


Fig. 12. Package outline SOT23 (TO-236AB)

13. Soldering



14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC816_SER v.2	20191105	Product data sheet	-	BC816_SER v.1
Modifications:	Product status changed			
BC816_SER v.1	20190904	Preliminary 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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