



BC846x series

65 V, 100 mA NPN general-purpose transistors

Rev. 12 — 1 July 2022

Product data sheet

1. General description

NPN general-purpose transistors in a small SOT23 (TO236AB) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		PNP complement
	Nexperia	JEDEC	
BC846	SOT23	TO-236AB	BC856
BC846A			BC856A
BC846B			BC856B

2. Features and benefits

- General-purpose transistors
- SMD plastic package
- Two different gain selections

3. Applications

- General-purpose switching and amplification

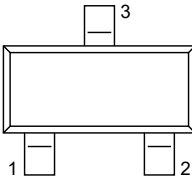
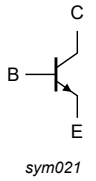
4. Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CE0}	collector-emitter voltage	open base	-	-	65	V
I_C	collector current		-	-	100	mA
	DCcurrent gain					
h_{FE}	BC846	$V_{CE} = 5\text{ V}; I_C = 2\text{ mA}$	110	-	450	
	BC846A		110	180	220	
	BC846B		200	290	450	

5. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		 sym021
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC846	TO-236AB	Plastic surface-mounted package; 3 leads	SOT23
BC846A			
BC846B			

7. Marking

Table 5. Marking

Type number	Marking code[1]
BC846	1D%
BC846A	1A%
BC846B	1B%

[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	-	80	V
V _{CEO}	collector-emitter voltage	open base	-	65	V
V _{EBO}	emitter-base voltage	open collector	-	6	V
I _C	collector current		-	100	mA
I _{CM}	peak collector current	single pulse; t _p ≤ 1 ms	-	200	mA
I _{BM}	peak base current	single pulse; t _p ≤ 1 ms	-	200	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C [1]	-	250	mW
T _j	junction temperature		-	150	°C
T _{amb}	ambient temperature		-65	150	°C
T _{stg}	storage temperature		-65	150	°C

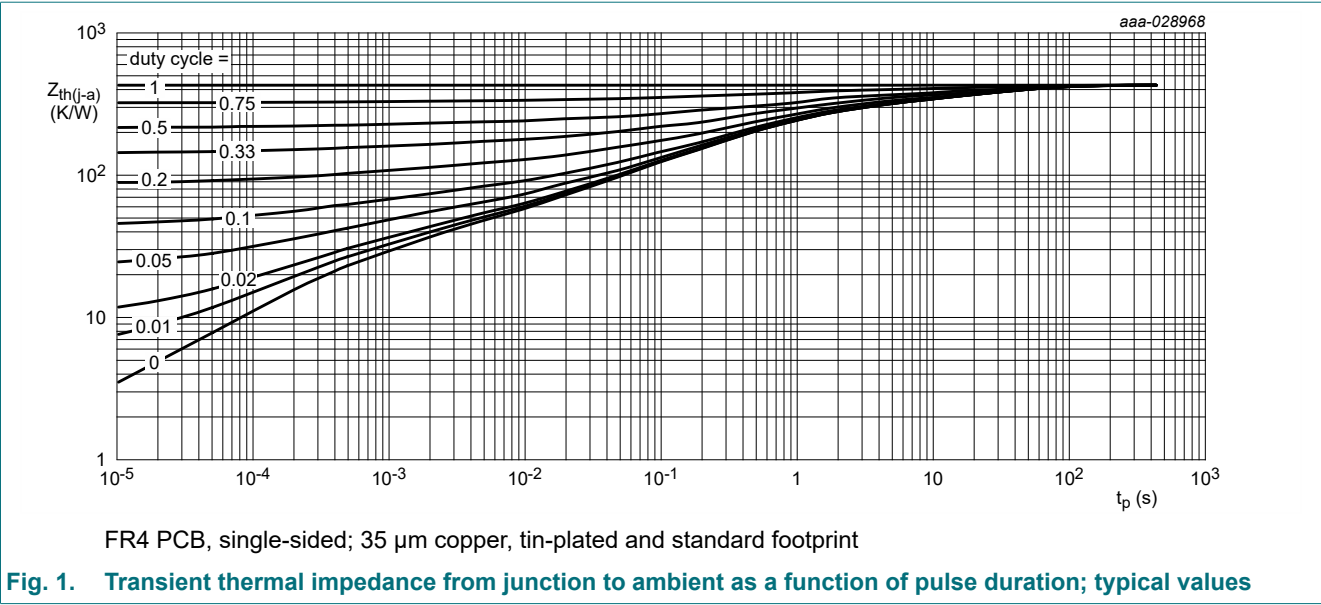
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

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] [2]	-	-	500	K/W

[1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided; 35 µm copper; tin-plated and standard footprint.
[2] Valid for all available selection groups.



10. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _{(BR)CBO}	collector-base breakdown voltage	I _C = 100 μA; I _E = 0 A; T _{amb} = 25 °C		80	-	-	V
V _{(BR)CEO}	collector-emitter breakdown voltage	I _C = 10 mA; I _E = 0 A; T _{amb} = 25 °C		65	-	-	V
V _{(BR)EBO}	emitter-base breakdown voltage	I _E = 100 μA; I _C = 0 A; T _{amb} = 25 °C		6	-	-	V
I _{CBO}	collector-base cut-off current	V _{CB} = 30 V; I _E = 0 A; T _{amb} = 25 °C		-	-	15	nA
		V _{CB} = 30 V; I _E = 0 A; T _j = 150 °C		-	-	5	μA
I _{EBO}	emitter-base cut-off current	V _{EB} = 5 V; I _C = 0 A; T _{amb} = 25 °C		-	-	100	nA
h _{FE}	DC current gain						
	BC846A	V _{CE} = 5 V; I _C = 10 μA; T _{amb} = 25 °C		-	180	-	
	BC846B			-	290	-	
	BC846	V _{CE} = 5 V; I _C = 2 mA; T _{amb} = 25 °C		110	-	450	
	BC846A			110	180	220	
	BC846B			200	290	450	
V _{CEsat}	collector-emitter saturation voltage	I _C =10 mA; I _B = 0.5 mA; T _{amb} = 25 °C		-	90	200	mV
		I _C =100 mA; I _B = 5 mA; T _{amb} = 25 °C	[1]	-	200	400	mV
V _{BEsat}	base-emitter saturation voltage	I _C =10 mA; I _B = 0.5 mA; T _{amb} = 25 °C	[2]	-	760	-	mV
		I _C =100 mA; I _B = 5 mA; T _{amb} = 25 °C		-	900	-	mV
V _{BE}	base-emitter voltage	I _C = 2 mA; V _{CE} = 5 V; T _{amb} = 25 °C	[3]	580	660	700	mV
		I _C = 10 mA; V _{CE} = 5 V; T _{amb} = 25 °C	[3]	-	-	770	mV
f _T	transition frequency	V _{CE} = 5 V; I _C = 10 mA; f = 100 MHz; T _{amb} = 25 °C		100	-	-	MHz
C _c	collector capacitance	V _{CB} = 10 V; I _E = i _e = 0 A; f = 1 MHz; T _{amb} = 25 °C		-	2	3	pF
C _e	emitter capacitance	V _{EB} = 0.5 V; I _C = i _c = 0 A; f = 1 MHz; T _{amb} = 25 °C		-	11	-	pF
NF	noise figure	I _C = 200 A; V _{CE} = 5 V; R _S = 2 kΩ; f = 1 kHz; B = 200 Hz; T _{amb} = 25 °C		-	2	10	dB

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

[2] V_{BEsat} decreases by approximately 1.7 mV/K with increasing temperature.

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

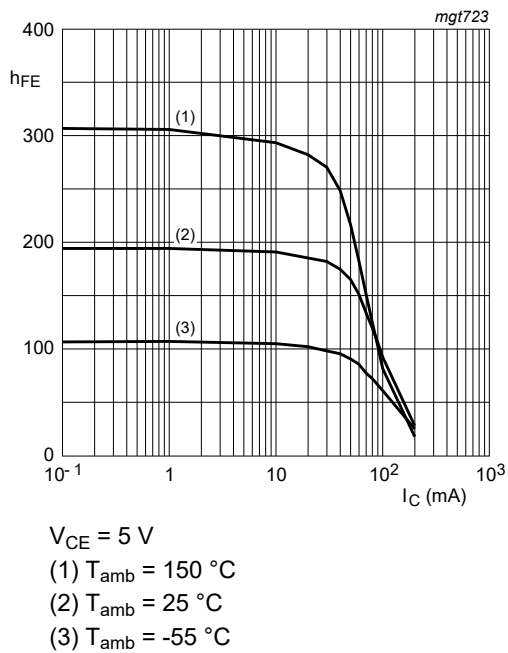


Fig. 2. Group A: DC current gain as a function of collector current; typical values

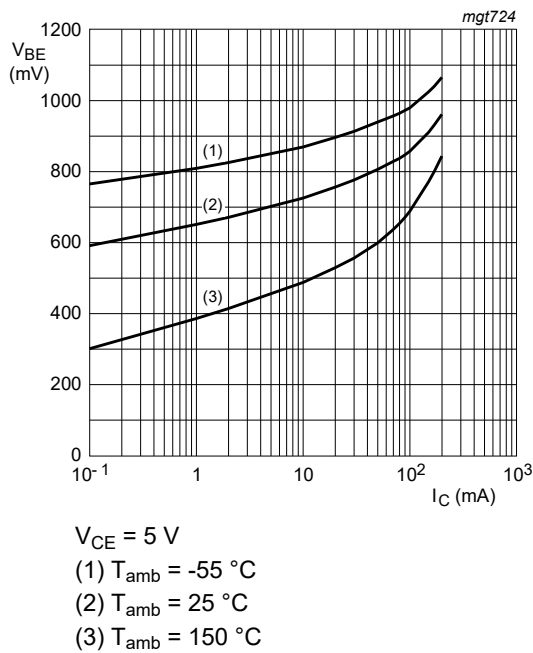


Fig. 3. Group A: Base-emitter voltage as a function of collector current; typical values

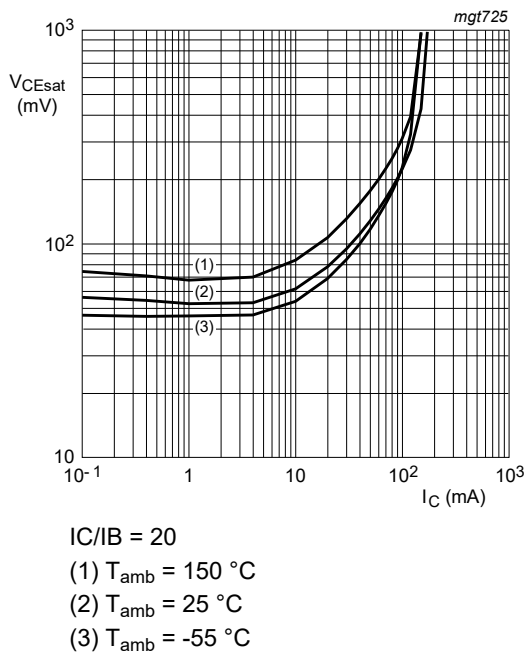


Fig. 4. Group A: Collector-emitter saturation voltage as a function of collector current; typical values

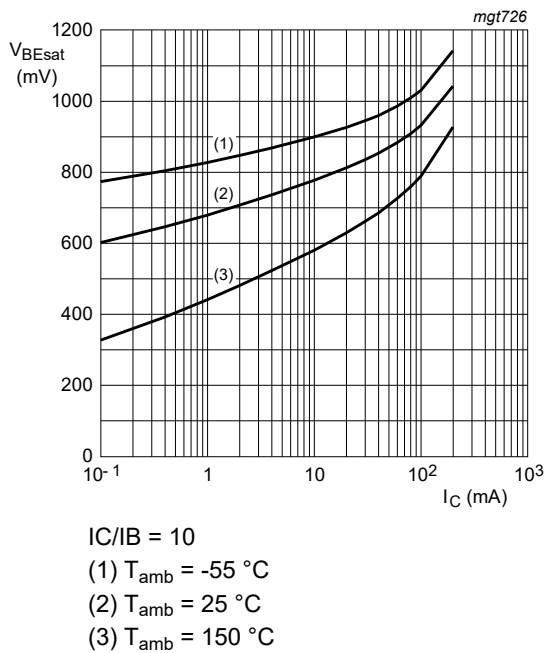


Fig. 5. Group A: Base-emitter saturation voltage as a function of collector current; typical values

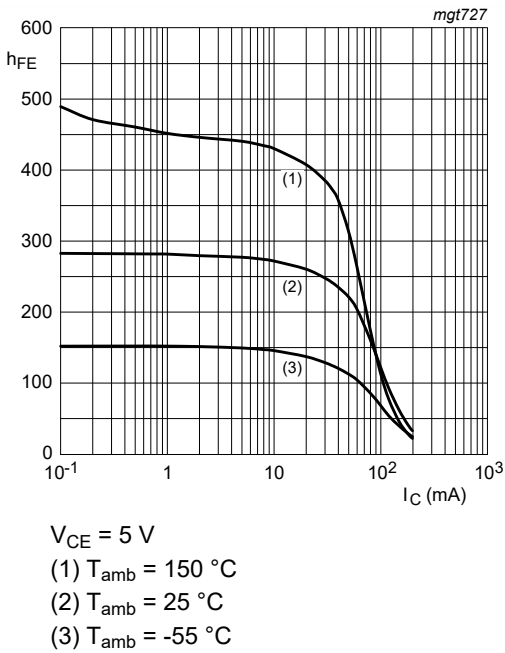


Fig. 6. Group B: DC current gain as a function of collector current; typical values

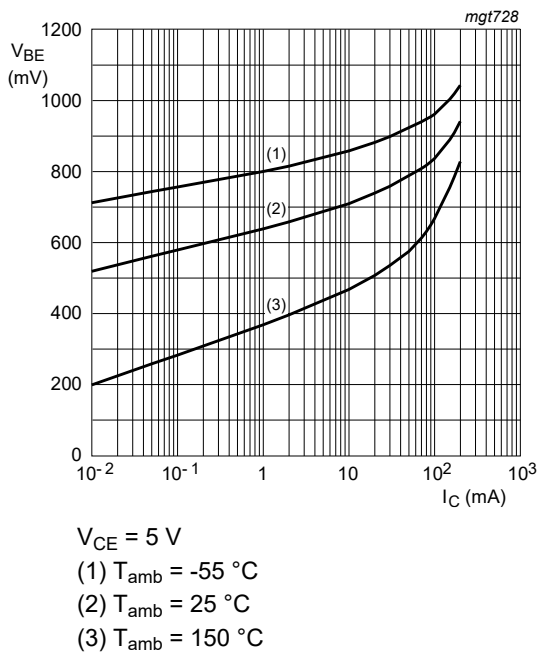


Fig. 7. Group B: Base-emitter voltage as a function of collector current; typical values

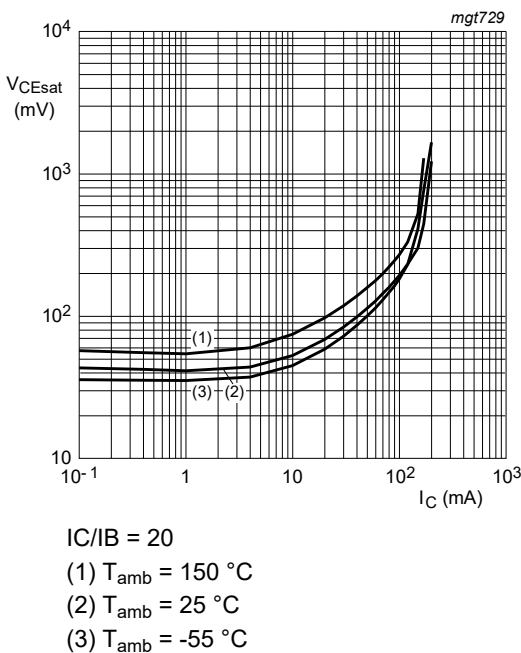


Fig. 8. Group B: Collector-emitter saturation voltage as a function of collector current; typical values

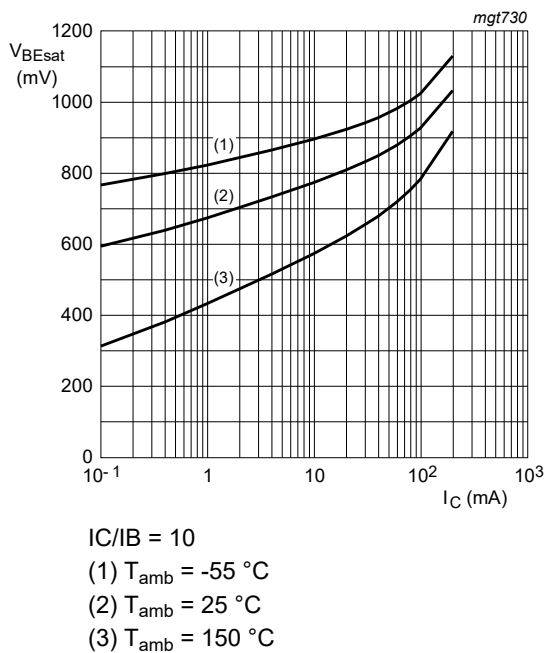


Fig. 9. Group B: Base-emitter saturation voltage as a function of collector current; typical values

11. Package outline

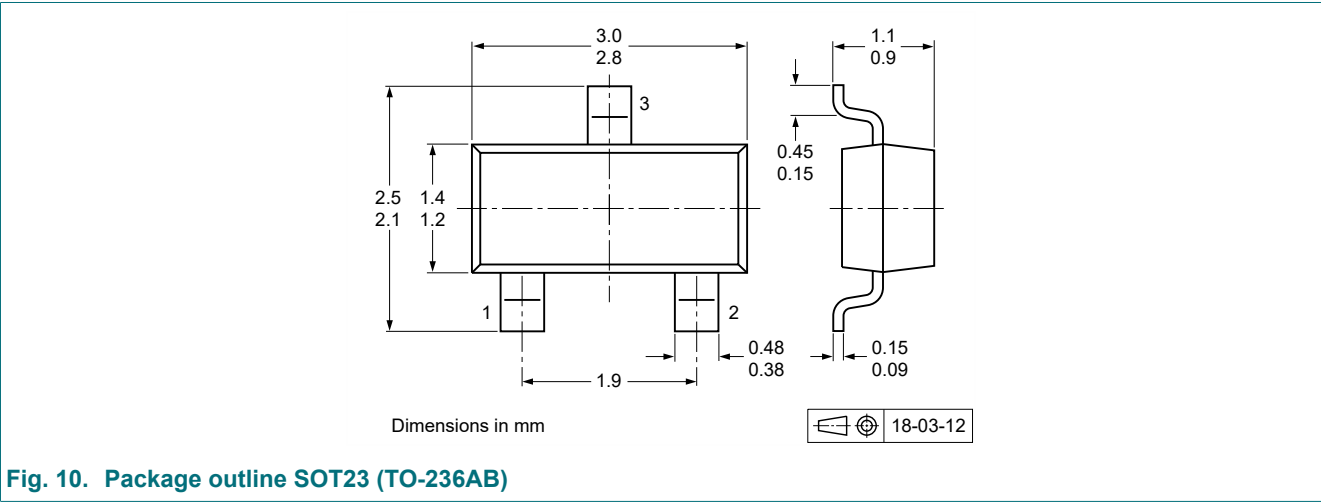
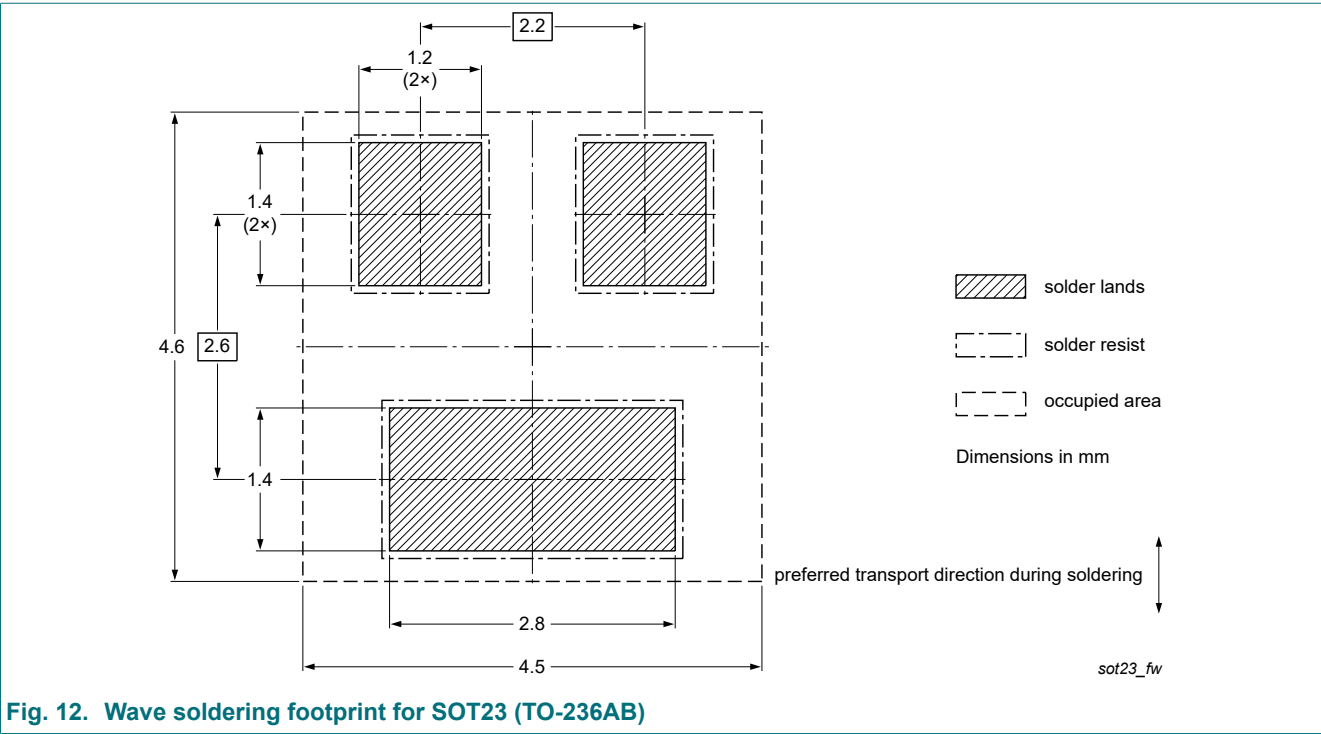
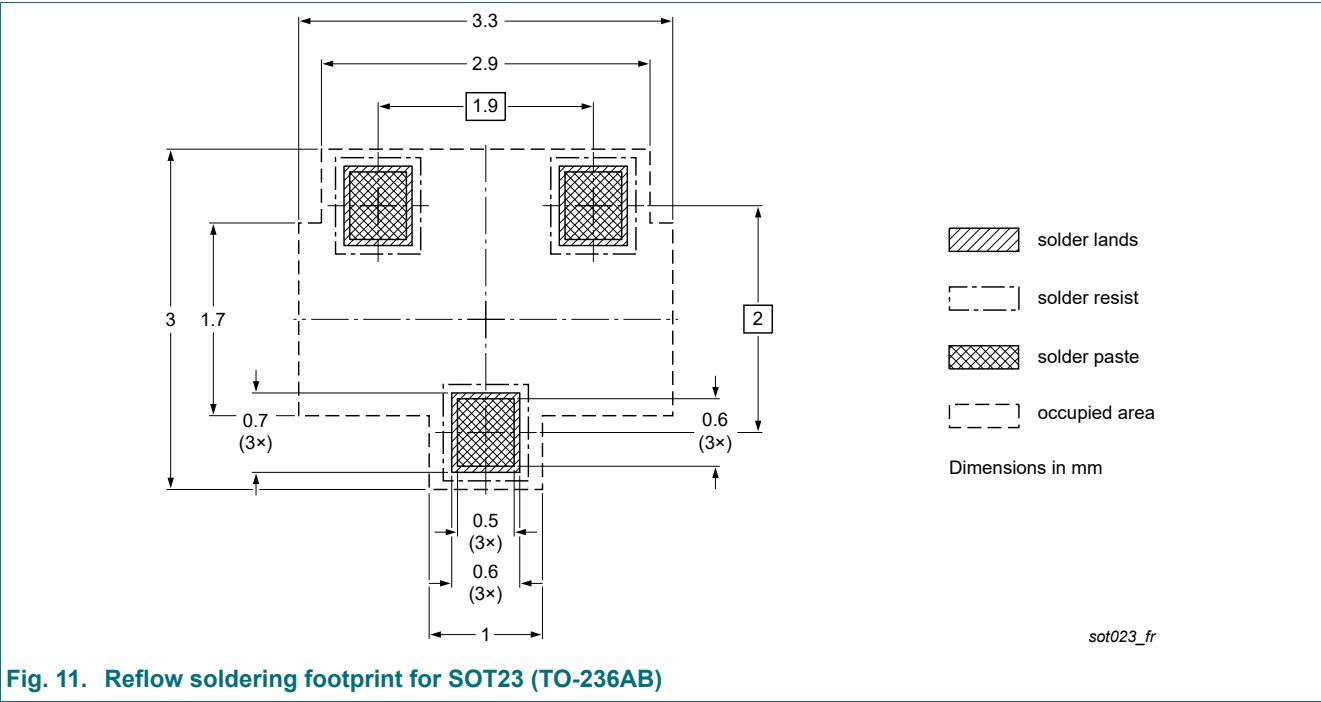


Fig. 10. Package outline SOT23 (TO-236AB)

12. Soldering



13. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC846X_SER v.12	20220701	Product data sheet	-	BC846X_SER v.11
Modifications:	<ul style="list-style-type: none">Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
BC846X_SER v.11	20220520	Product data sheet	-	BC846X_SER v.10
BC846X_SER v.10	20220127	Product data sheet	-	BC846_SER v.9
BC846_SER v.9	20120925	Product data sheet	-	BC846_SER v.8
BC846_SER v.8	20120424	Product data sheet	-	BC846_BC546_SER v.7
BC846_BC546_SER v.7	20091117	Product data sheet	-	BC846_BC546_SER v.6
BC846_BC546_SER v.6	20060207	Product data sheet	-	-

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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