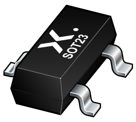


BC847x-Q series

45 V, 100 mA NPN general-purpose transistors

Rev. 2 — 24 June 2021

Product data sheet

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[1]	Package		PNP complement
	Nexperia	JEDEC	
BC847-Q	SOT23	TO-236AB	BC857-Q
BC847A-Q			BC857A-Q
BC847B-Q			BC857B-Q
BC847C-Q			BC857C-Q

[1] Valid for all available selection groups.

2. Features and benefits

- General-purpose transistors
- SMD plastic packages
- Three different 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

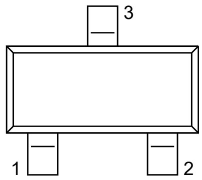
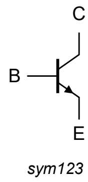
Table 2. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	45	V
I_C	collector current		-	-	100	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 2 mA				
	BC847-Q		110	-	800	
	BC847A-Q		110	180	220	
	BC847B-Q		200	290	450	
	BC847C-Q		420	520	800	

5. Pinning information

Table 3. Pinning information

Pin	Symbol	Descrition	Simlified 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
BC847-Q	TO-236AB	plastic surface-mounted package; 3 leads	SOT23
BC847A-Q			
BC847B-Q			
BC847C-Q			

7. Marking

Table 5. Marking codes

Type number		Marking code
BC847-Q	[1]	1H%
BC847A-Q	[1]	1E%
BC847B-Q	[1]	1F%
BC847C-Q	[1]	1G%

[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		-	50	V
V_{CEO}	collector-emitter voltage	open base		-	45	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	100	mA
I_{CM}	peak collector current	single pulse; $t_{p \leq 1\ ms}$		-	200	mA
I_{BM}	peak base current	single pulse; $t_{p \leq 1\ ms}$		-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	250	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	150	°C
T_{stg}	storage temperature			-65	150	°C

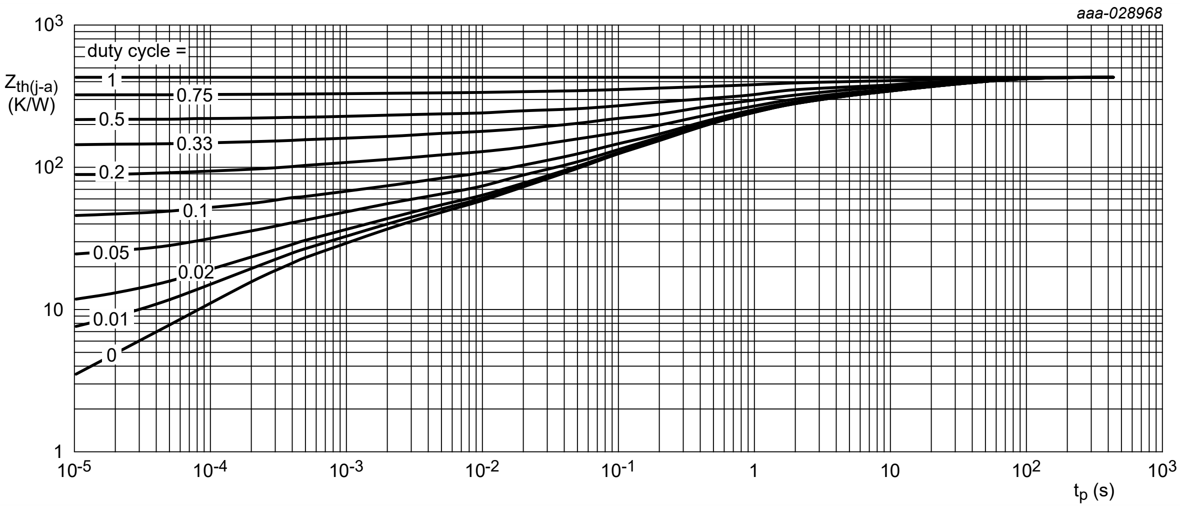
[1] Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.

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]	-	-	500	K/W

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



FR4 PCB; single-sided copper; tin-plated and standard footprint

Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

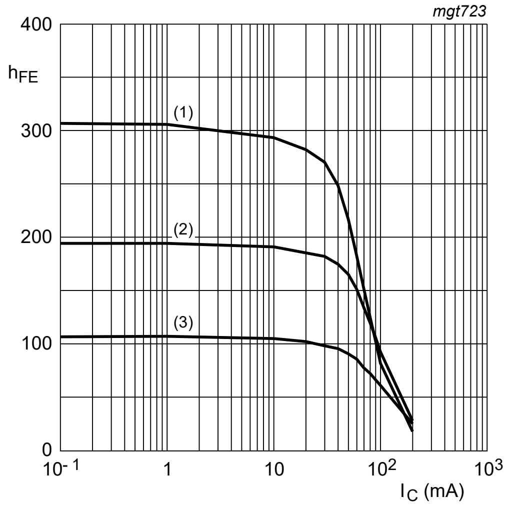
10. Characteristics

Table 8. Characteristics

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

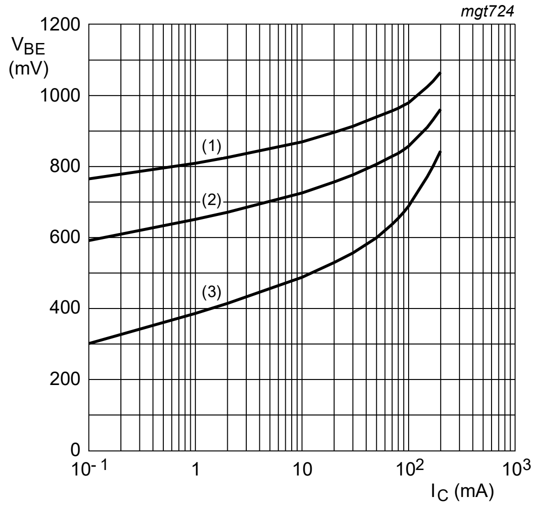
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 100 µA; I_E = 0 A		50	-	-	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 2 mA; V_{BE} = 0 A		45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 0 A; I_E = 100 µA		6	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = 30 V; I_E = 0 A		-	-	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		-	-	100	nA
h_{FE}	DC current gain						
	BC847A-Q	V_{CE} = 5 V; I_C = 10 µA		-	170	-	
	BC847B-Q			-	280	-	
	BC847C-Q			-	420	-	
	BC847-Q	V_{CE} = 5 V; I_C = 2 mA		110	-	800	
	BC847A-Q			110	180	220	
	BC847B-Q			200	290	450	
	BC847C-Q			420	520	800	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA		-	90	200	mV
		I_C = 100 mA; I_B = 5 mA	[1]	-	200	400	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA	[2]	-	700	-	mV
		I_C = 100 mA; I_B = 5 mA	[2]	-	900	-	mV
V_{BE}	base-emitter voltage	V_{CE} = 5 V; I_C = 2 mA	[2]	580	660	700	mV
		V_{CE} = 5 V; I_C = 10 mA		-	-	770	mV
f_T	transition frequency	V_{CE} = 5 V; I_C = 10 mA; f = 100 MHz		100	-	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = i_e = 0 A; f = 1 MHz		-	-	1.5	pF
C_e	emitter capacitance	V_{EB} = 0.5 V; I_C = i_c = 0 A; f = 1 MHz		-	11	-	pF
NF	noise figure	I_C = 200 µA; V_{CE} = 5 V; R_S = 2 kΩ; f = 1 kHz; B = 200Hz		-	2	10	dB

[1] pulsed; t_p ≤ 300 µs; δ ≤ 0.02
[2] V_{BE} decreases by approximately 2 mV/K with increasing temperature



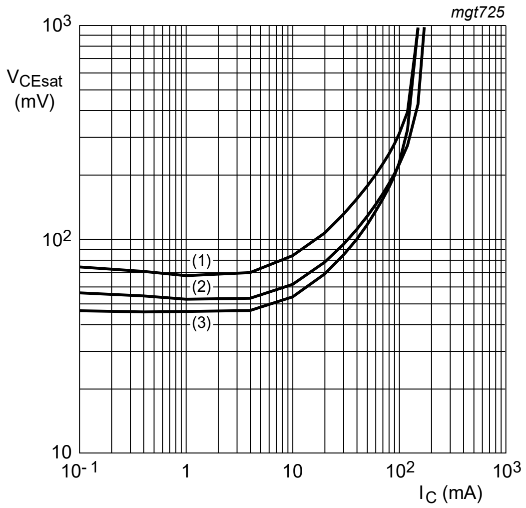
V_{CE} = 5 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 2. BC847A-Q: DC current gain as a function of collector current; typical values



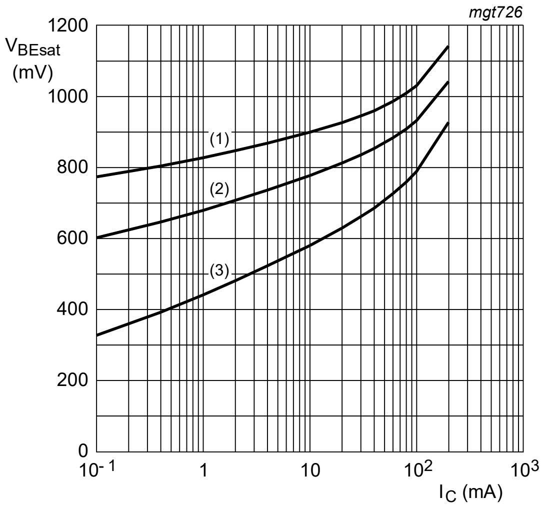
V_{CE} = 5 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 3. BC847A-Q: Base-emitter voltage as a function of collector current; typical values



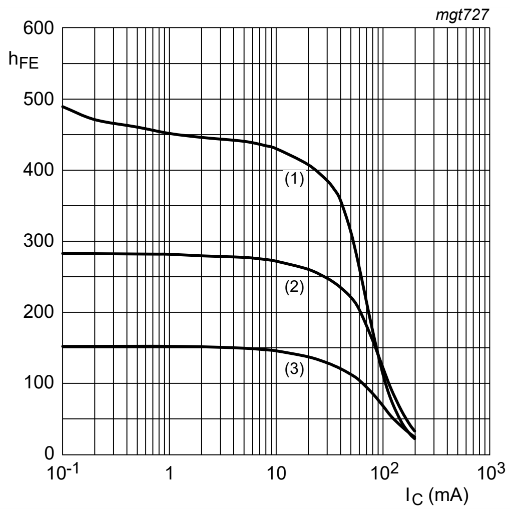
I_C/I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 4. BC847A-Q: 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} = 25 °C
(3) T_{amb} = 150 °C

Fig. 5. BC847A-Q: Base-emitter saturation voltage as a function of collector current; typical values



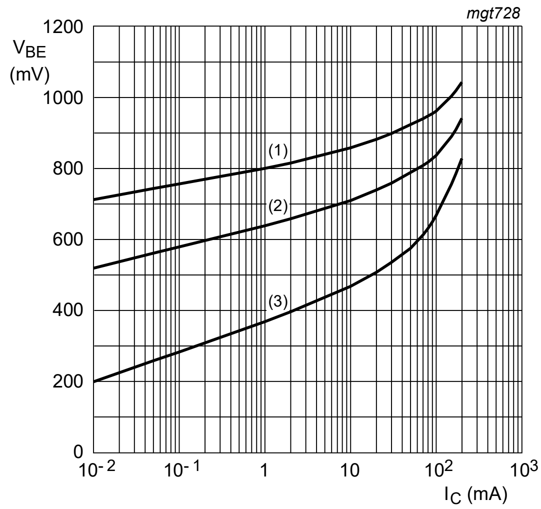
V_{CE} = 5 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 6. BC847B-Q: DC current gain as a function of collector current; typical values



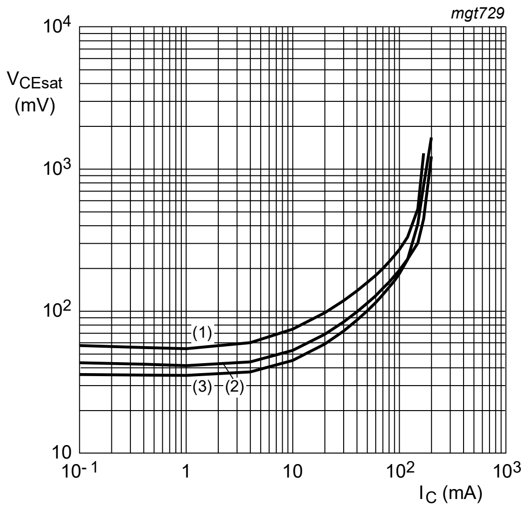
V_{CE} = 5 V

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig. 7. BC847B-Q: Base-emitter voltage as a function of collector current; typical values



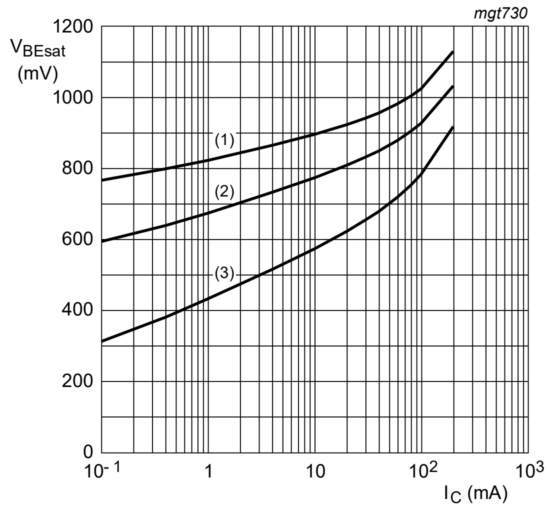
I_C/I_B = 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 8. BC847B-Q: Collector-emitter saturation voltage as a function of collector current; typical values



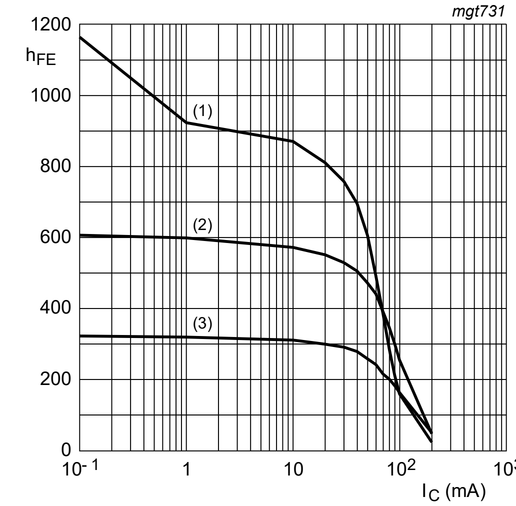
I_C/I_B = 10

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig. 9. BC847B-Q: Base-emitter saturation voltage as a function of collector current; typical values



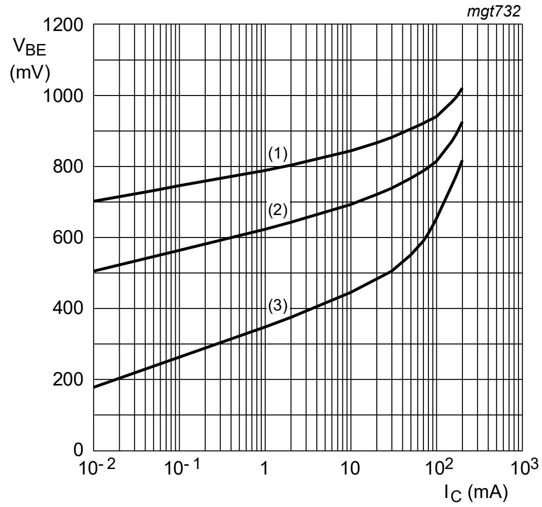
V_{CE} = 5 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 10. BC847C-Q: DC current gain as a function of collector current; typical values



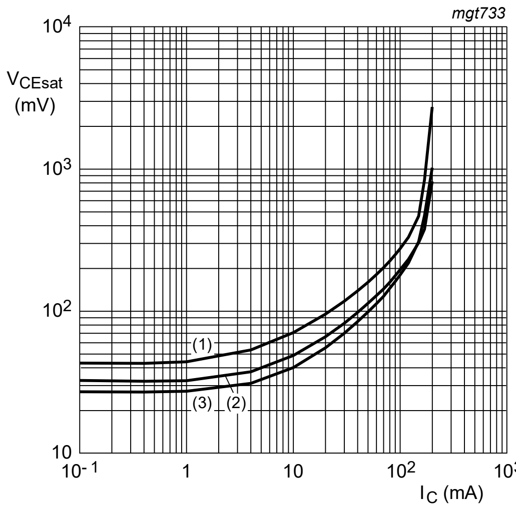
V_{CE} = 5 V

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig. 11. BC847C-Q: Base-emitter voltage as a function of collector current; typical values



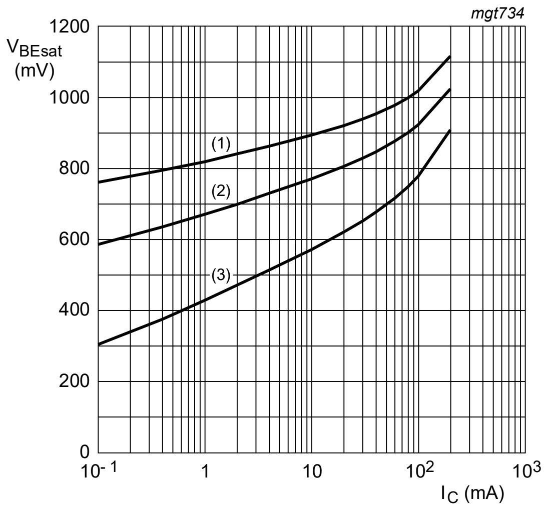
I_C/I_B = 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 12. BC847C-Q: 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} = 25 °C

(3) T_{amb} = 150 °C

Fig. 13. BC847C-Q: 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

Table 9. Package outline

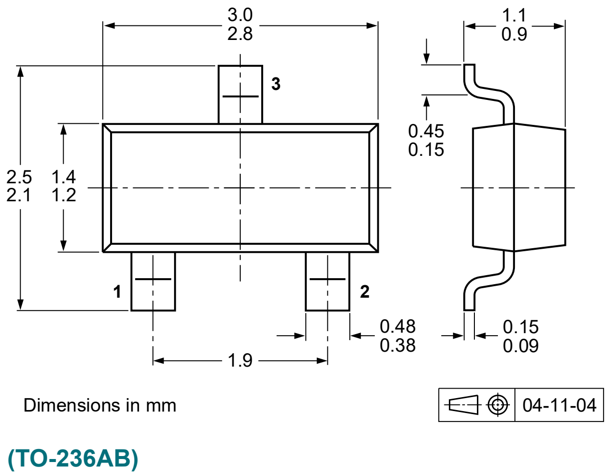


Fig. 14. Package outline SOT23 (TO-236AB)

13. Soldering

Table 10. Soldering

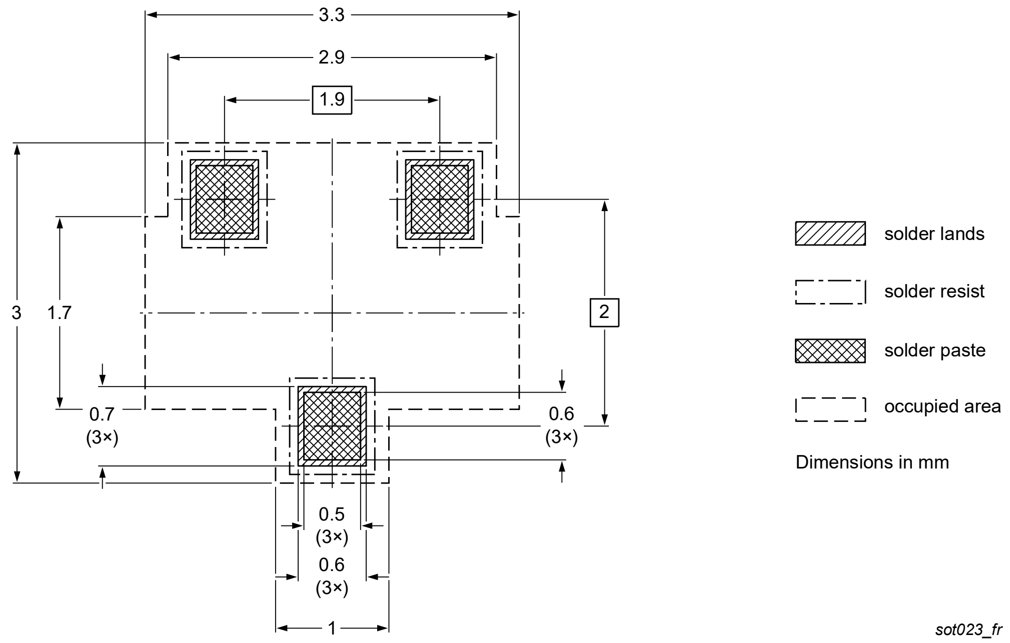


Fig. 15. Reflow soldering footprint SOT23 (TO-236AB)

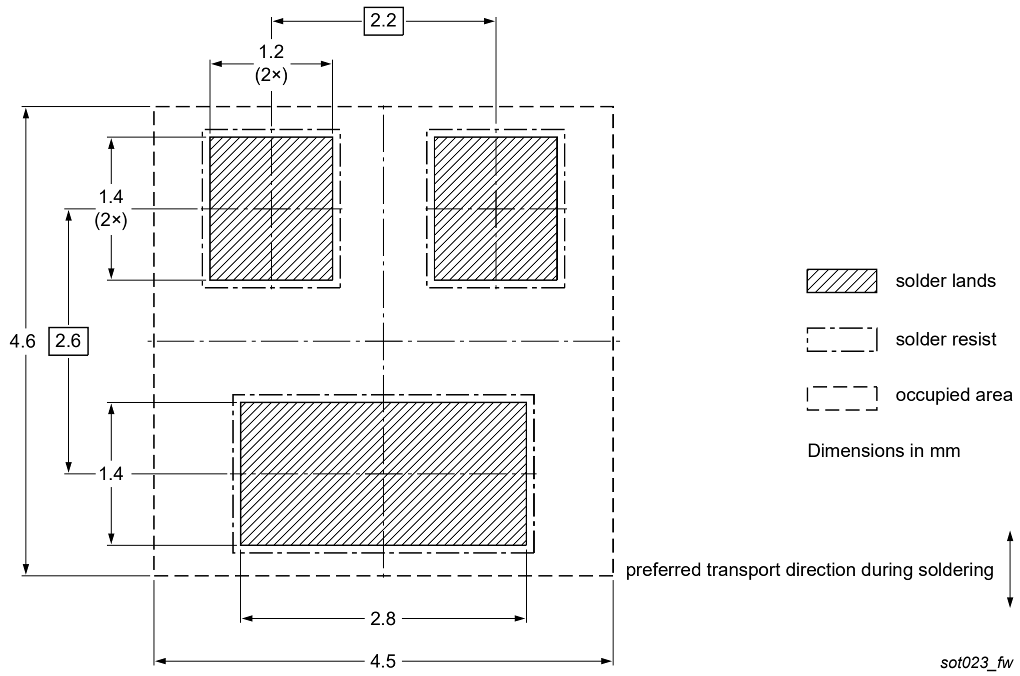


Fig. 16. Wave soldering footprint SOT23 (TO-236AB)

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC847x-Q_SER v.2	20210624	Product data sheet	-	BC847-Q_SER v.1
Modifications:	• Series data sheet reduced to 3 data sheets per package			
BC847-Q_SER v.1	20210617	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.
[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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