



# BC806H series

80 V, 500 mA PNP general-purpose transistors

Rev. 1 — 26 March 2020

Product data sheet

## 1. General description

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

Table 1. Product overview

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

## 2. Features and benefits

- High current
- High voltage
- Two current gain selections
- High-temperature applications up to 175 °C
- AEC-Q101 qualified

## 3. Applications

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

## 4. Quick reference data

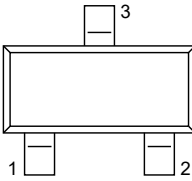
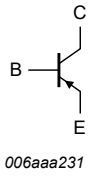
Table 2. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{CE0}$	collector-emitter voltage	open base; $T_{amb} = 25\text{ °C}$		-	-	-80	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						
	BC806-16H	$V_{CE} = -1\text{ V}$ ; $I_C = -100\text{ mA}$ ; $T_{amb} = 25\text{ °C}$	[1]	100	-	250	
	BC806-25H	$T_{amb} = 25\text{ °C}$	[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)	 006aaa231
2	E	emitter		
3	C	collector		

## 6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC806-16H	TO-236AB	plastic, surface-mounted package; 3 leads	SOT23
BC806-25H			

## 7. Marking

Table 5. Marking

Type number	Marking code [1]
BC806-16H	QN%
BC806-25H	QP%

[1] % = placeholder for manufacturing site code

## 8. Limiting values

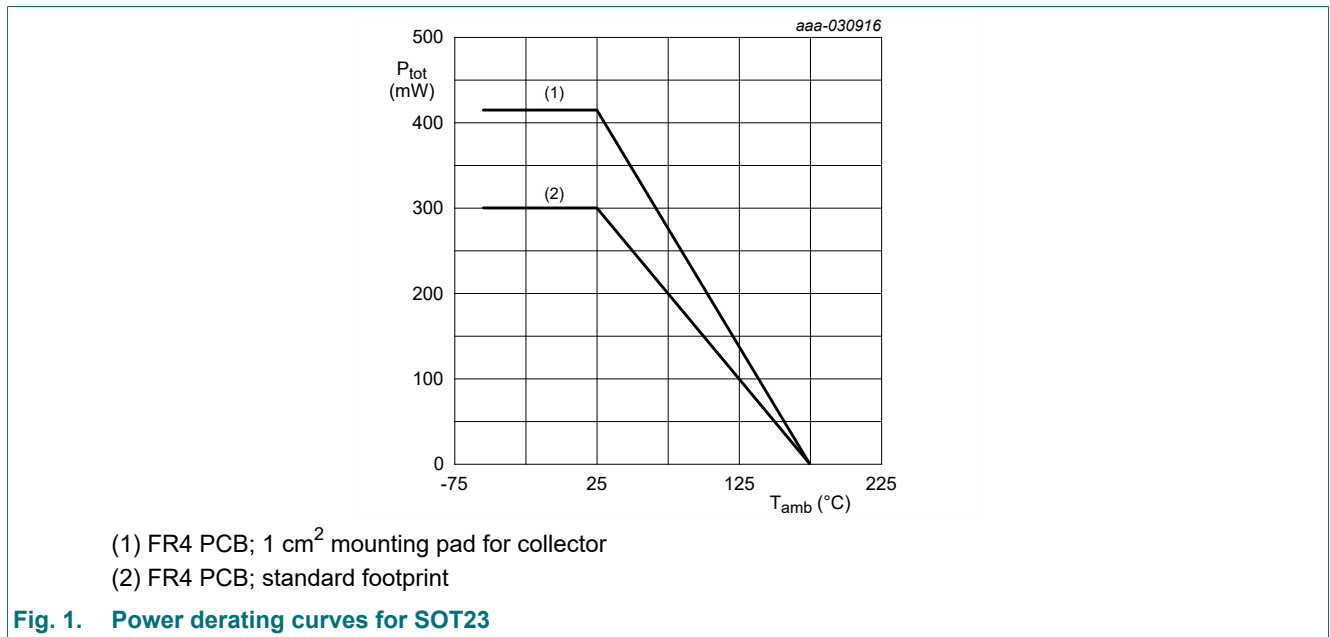
**Table 6. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit	
$V_{CBO}$	collector-base voltage	open emitter; $T_{amb} = 25\text{ °C}$	-	-80	V	
$V_{CEO}$	collector-emitter voltage	open base; $T_{amb} = 25\text{ °C}$	-	-80	V	
$V_{EBO}$	emitter-base voltage	open collector; $T_{amb} = 25\text{ °C}$	-	-8	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	$T_{amb} \leq 25\text{ °C}$ ; $T_{amb} = 25\text{ °C}$	[1]	-	300	mW
			[2]	-	415	mW
$T_j$	junction temperature		-	175	°C	
$T_{amb}$	ambient temperature		-55	175	°C	
$T_{stg}$	storage temperature		-65	175	°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 cm<sup>2</sup>.



## 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; $T_{amb} = 25\text{ °C}$	[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 cm<sup>2</sup>.

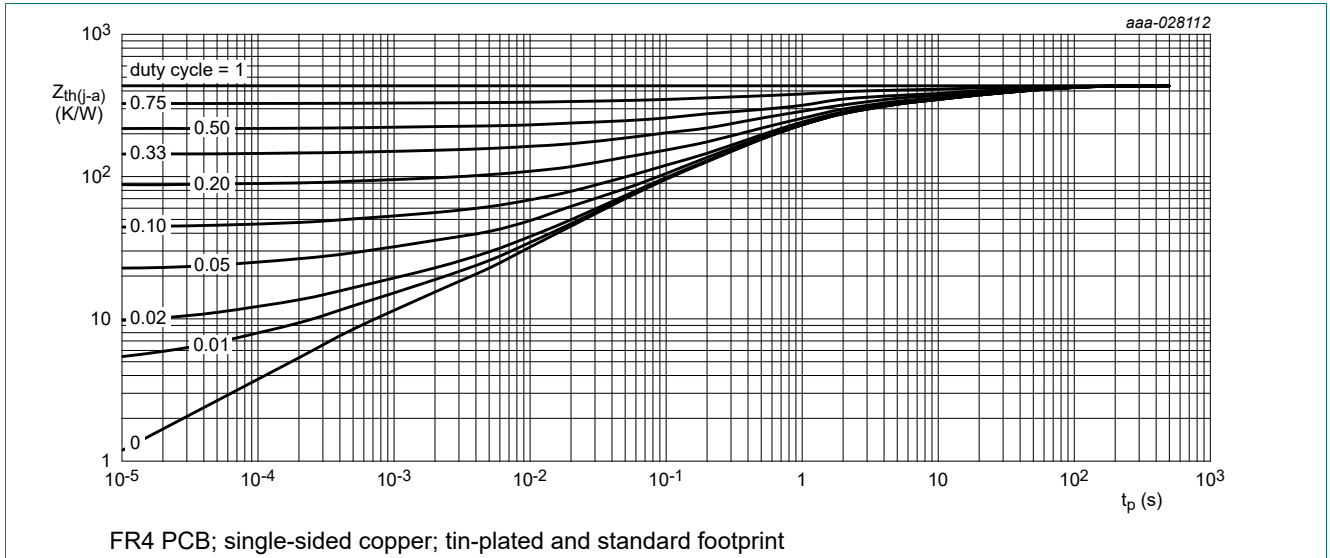


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

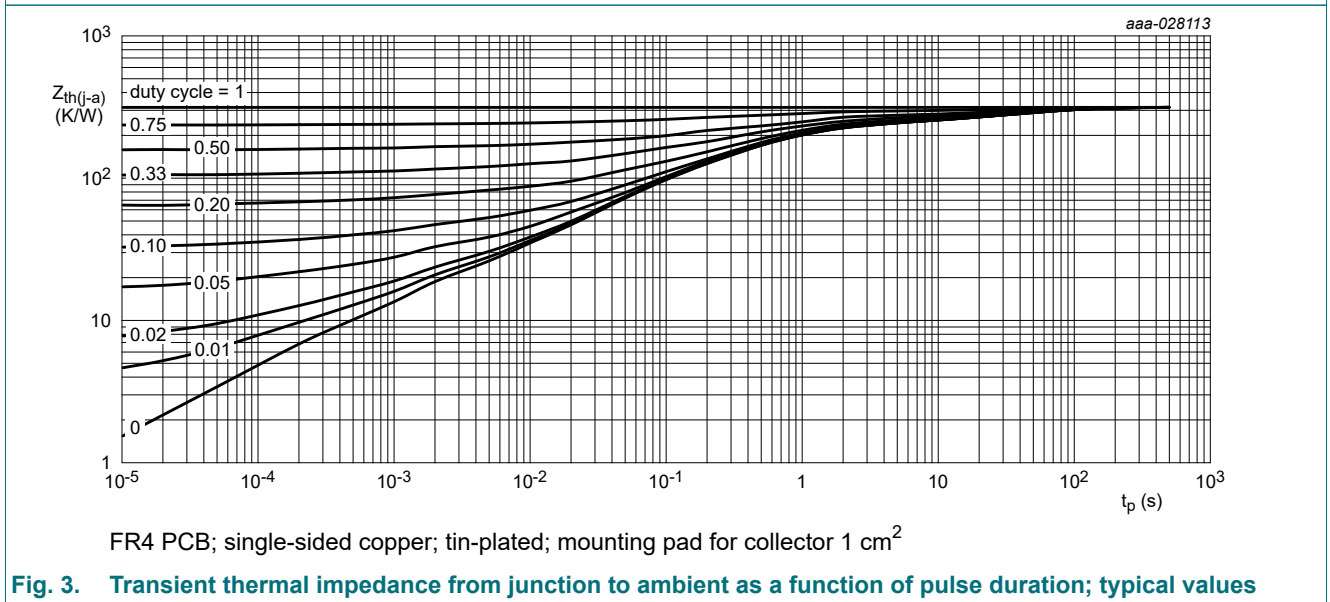


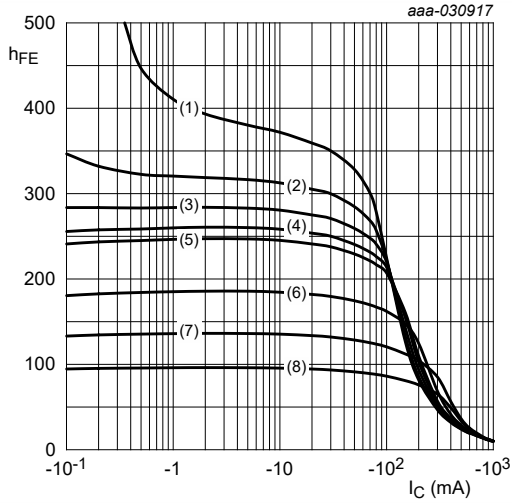
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100 \mu\text{A}$ ; $I_E = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-80	-		V	
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -2 \text{ mA}$ ; $I_E = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-80	-		V	
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = -100 \mu\text{A}$ ; $I_C = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-8	-		V	
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -64 \text{ V}$ ; $I_E = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA	
		$V_{CB} = -64 \text{ V}$ ; $I_E = 0 \text{ A}$ ; $T_j = 150 \text{ }^\circ\text{C}$	-	-	-5	$\mu\text{A}$	
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -6.4 \text{ V}$ ; $I_C = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA	
$h_{FE}$	DC current gain						
	BC806-16H	$V_{CE} = -1 \text{ V}$ ; $I_C = -100 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	100	-	250	
	BC806-25H	$V_{CE} = -1 \text{ V}$ ; $I_C = -100 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	160	-	400	
		$V_{CE} = -2 \text{ V}$ ; $I_C = -500 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	30	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -100 \text{ mA}$ ; $I_B = -10 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	-	-	-150	mV
		$I_C = -500 \text{ mA}$ ; $I_B = -50 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	-	-	-400	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]	-	-	-1.2	V
$f_T$	transition frequency	$V_{CE} = -5 \text{ V}$ ; $I_C = -50 \text{ mA}$ ; $f = 100 \text{ MHz}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		80	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = -10 \text{ V}$ ; $I_E = I_C = 0 \text{ A}$ ; $f = 1 \text{ MHz}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	5	-	pF
$C_e$	emitter capacitance	$V_{EB} = -0.5 \text{ V}$ ; $I_C = I_E = 0 \text{ A}$ ; $f = 1 \text{ MHz}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	47	-	pF

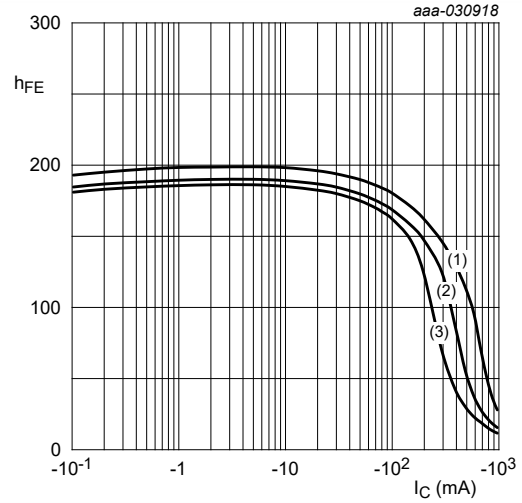
[1] pulsed;  $t_p \leq 300 \mu\text{s}$ ;  $\delta \leq 0.02$



$V_{CE} = -1 \text{ V}$

- (1)  $T_{amb} = 175 \text{ }^\circ\text{C}$
- (2)  $T_{amb} = 150 \text{ }^\circ\text{C}$
- (3)  $T_{amb} = 125 \text{ }^\circ\text{C}$
- (4)  $T_{amb} = 100 \text{ }^\circ\text{C}$
- (5)  $T_{amb} = 85 \text{ }^\circ\text{C}$
- (6)  $T_{amb} = 25 \text{ }^\circ\text{C}$
- (7)  $T_{amb} = -40 \text{ }^\circ\text{C}$
- (8)  $T_{amb} = -55 \text{ }^\circ\text{C}$

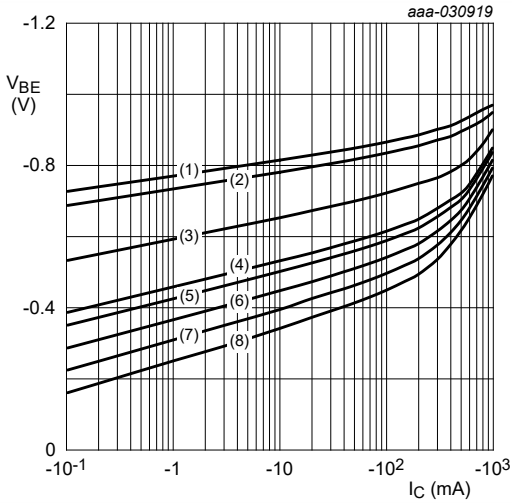
Fig. 4. BC806-16H: DC current gain as a function of collector current; typical values



$T_{amb} = 25 \text{ }^\circ\text{C}$

- (1)  $V_{CE} = -5 \text{ V}$
- (2)  $V_{CE} = -2 \text{ V}$
- (3)  $V_{CE} = -1 \text{ V}$

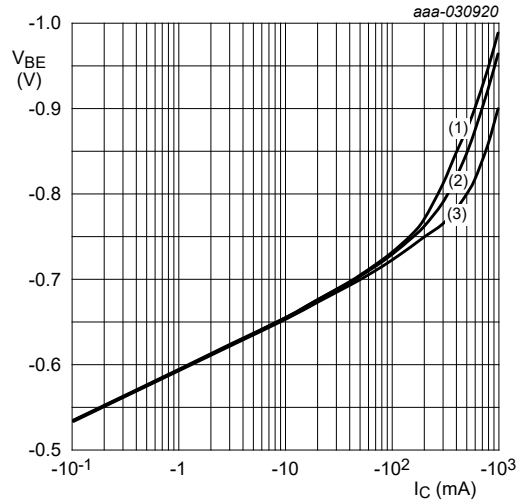
Fig. 5. BC806-16H: DC current gain as a function of collector current; typical values



$V_{CE} = -5 \text{ V}$

- (1)  $T_{amb} = -55 \text{ }^\circ\text{C}$
- (2)  $T_{amb} = -40 \text{ }^\circ\text{C}$
- (3)  $T_{amb} = 25 \text{ }^\circ\text{C}$
- (4)  $T_{amb} = 85 \text{ }^\circ\text{C}$
- (5)  $T_{amb} = 100 \text{ }^\circ\text{C}$
- (6)  $T_{amb} = 125 \text{ }^\circ\text{C}$
- (7)  $T_{amb} = 150 \text{ }^\circ\text{C}$
- (8)  $T_{amb} = 175 \text{ }^\circ\text{C}$

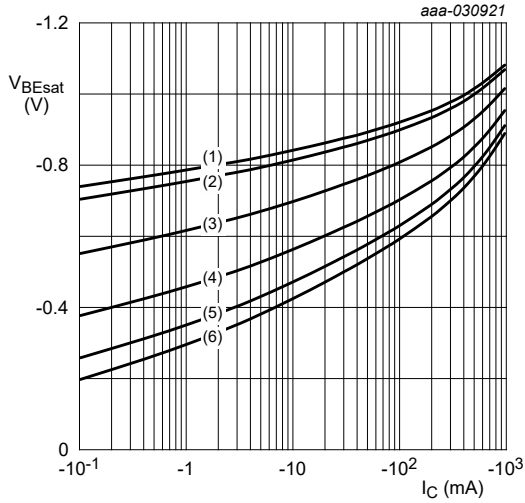
Fig. 6. BC806-16H: Base-emitter voltage as a function of collector current; typical values



$T_{amb} = 25 \text{ }^\circ\text{C}$

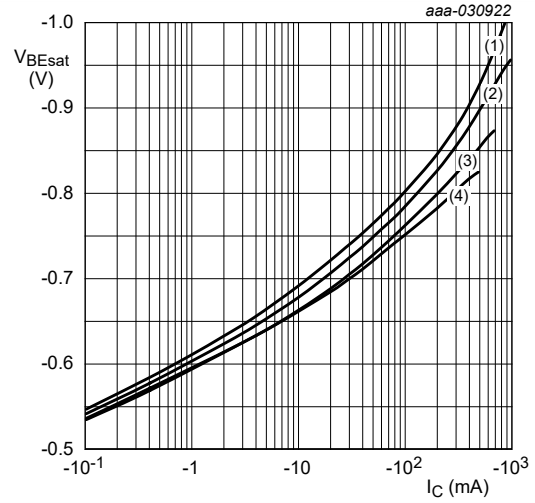
- (1)  $V_{CE} = -1 \text{ V}$
- (2)  $V_{CE} = -2 \text{ V}$
- (3)  $V_{CE} = -5 \text{ V}$

Fig. 7. BC806-16H: Base-emitter voltage as a function of collector current; typical values



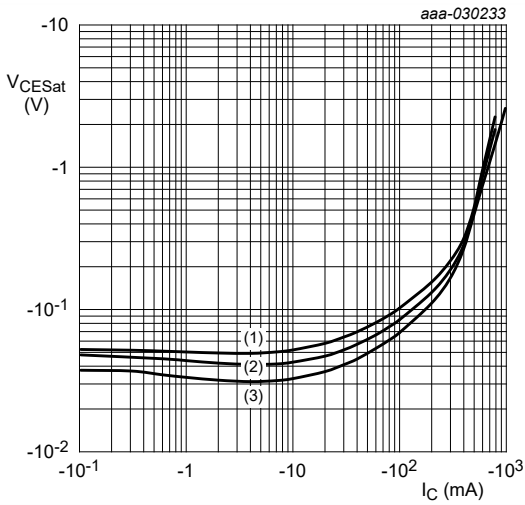
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = -40\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (4)  $T_{amb} = 100\text{ }^\circ\text{C}$   
 (5)  $T_{amb} = 150\text{ }^\circ\text{C}$   
 (6)  $T_{amb} = 175\text{ }^\circ\text{C}$

**Fig. 8. BC806-16H: Base-emitter saturation voltage as a function of collector current; typical values**



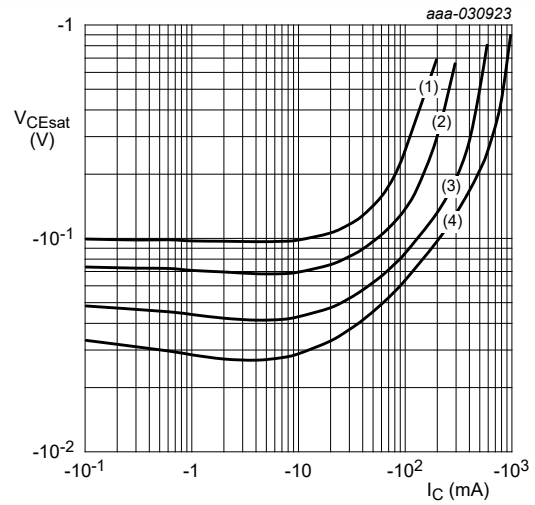
$T_{amb} = 25\text{ }^\circ\text{C}$   
 (1)  $I_C/I_B = 10$   
 (2)  $I_C/I_B = 20$   
 (3)  $I_C/I_B = 50$   
 (4)  $I_C/I_B = 100$

**Fig. 9. BC806-16H: Base-emitter saturation voltage as a function of collector current; typical values**



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

**Fig. 10. BC806-16H: Collector-emitter saturation voltage as a function of collector current; typical values**



$T_{amb} = 25\text{ }^\circ\text{C}$   
 (1)  $I_C/I_B = 100$   
 (2)  $I_C/I_B = 50$   
 (3)  $I_C/I_B = 20$   
 (4)  $I_C/I_B = 10$

**Fig. 11. BC806-16H: Collector-emitter saturation voltage as a function of collector current; typical values**

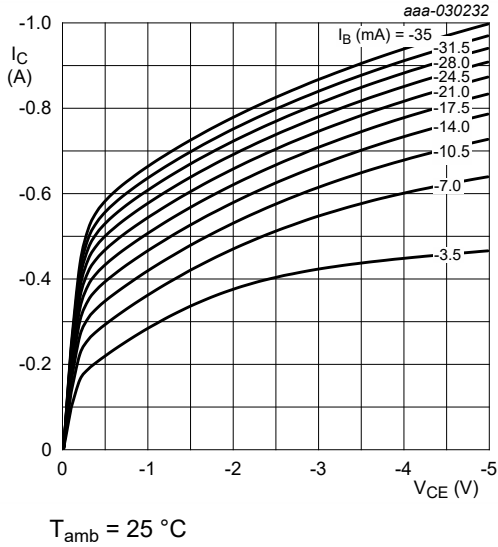


Fig. 12. BC806-16H: Collector current as a function of collector-emitter voltage; typical values

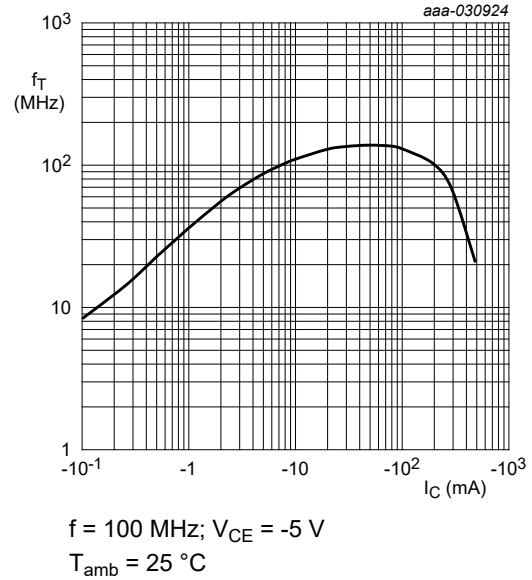


Fig. 13. BC806-16H: Transition frequency as a function of collector current; typical values

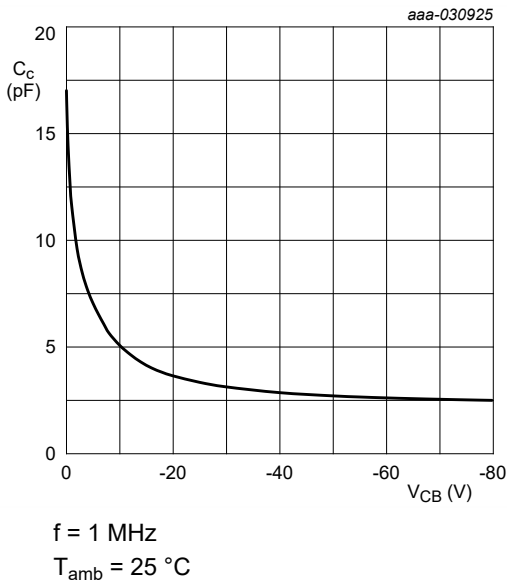


Fig. 14. BC806-16H: Collector capacitance as a function of collector-base voltage; typical values

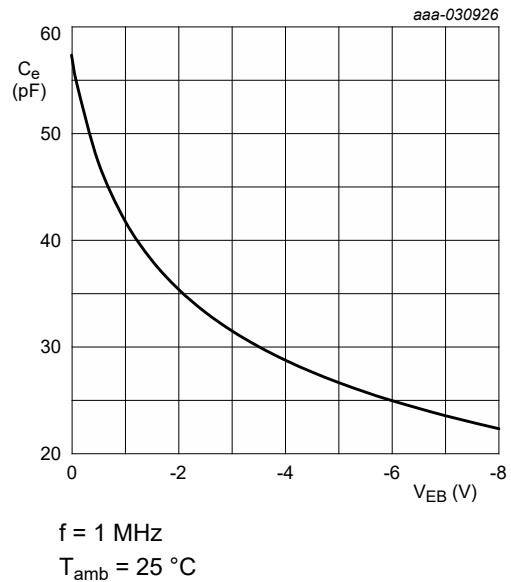
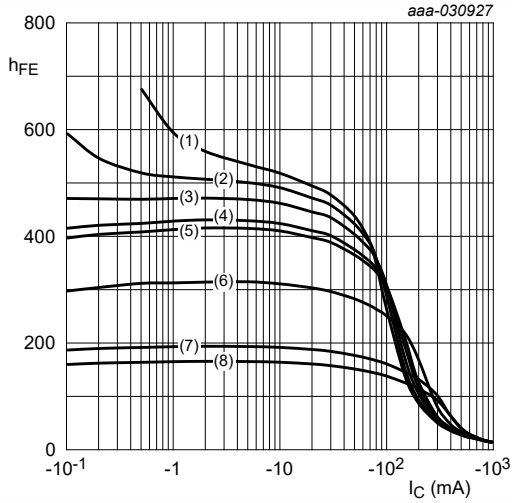


Fig. 15. BC806-16H: Emitter capacitance as a function of emitter-base voltage; typical values

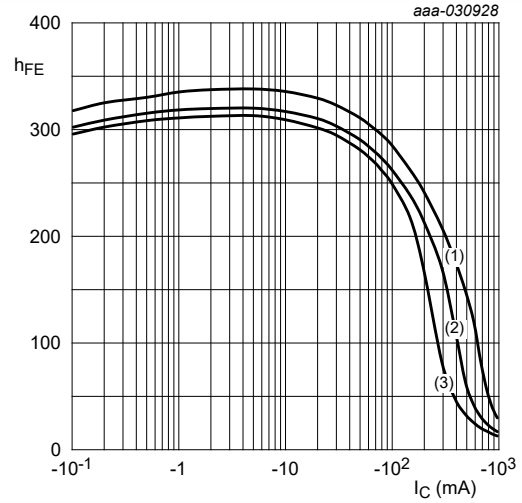




$V_{CE} = -1 \text{ V}$

- (1)  $T_{amb} = 175 \text{ }^\circ\text{C}$
- (2)  $T_{amb} = 150 \text{ }^\circ\text{C}$
- (3)  $T_{amb} = 125 \text{ }^\circ\text{C}$
- (4)  $T_{amb} = 100 \text{ }^\circ\text{C}$
- (5)  $T_{amb} = 85 \text{ }^\circ\text{C}$
- (6)  $T_{amb} = 25 \text{ }^\circ\text{C}$
- (7)  $T_{amb} = -40 \text{ }^\circ\text{C}$
- (8)  $T_{amb} = -55 \text{ }^\circ\text{C}$

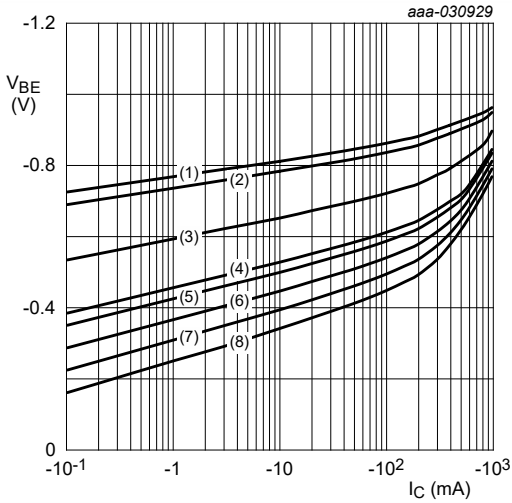
Fig. 16. BC806-25H: DC current gain as a function of collector current; typical values



$T_{amb} = 25 \text{ }^\circ\text{C}$

- (1)  $V_{CE} = -5 \text{ V}$
- (2)  $V_{CE} = -2 \text{ V}$
- (3)  $V_{CE} = -1 \text{ V}$

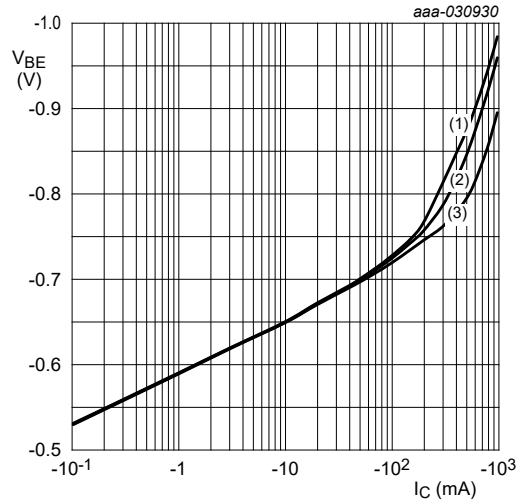
Fig. 17. BC806-25H: DC current gain as a function of collector current; typical values



$V_{CE} = -5 \text{ V}$

- (1)  $T_{amb} = -55 \text{ }^\circ\text{C}$
- (2)  $T_{amb} = -40 \text{ }^\circ\text{C}$
- (3)  $T_{amb} = 25 \text{ }^\circ\text{C}$
- (4)  $T_{amb} = 85 \text{ }^\circ\text{C}$
- (5)  $T_{amb} = 100 \text{ }^\circ\text{C}$
- (6)  $T_{amb} = 125 \text{ }^\circ\text{C}$
- (7)  $T_{amb} = 150 \text{ }^\circ\text{C}$
- (8)  $T_{amb} = 175 \text{ }^\circ\text{C}$

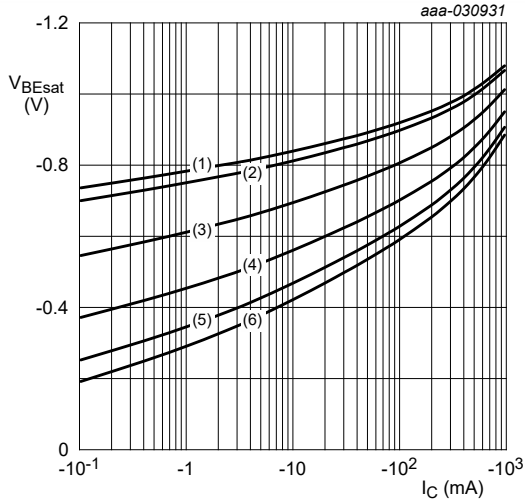
Fig. 18. BC806-25H: Base-emitter voltage as a function of collector current; typical values



$T_{amb} = 25 \text{ }^\circ\text{C}$

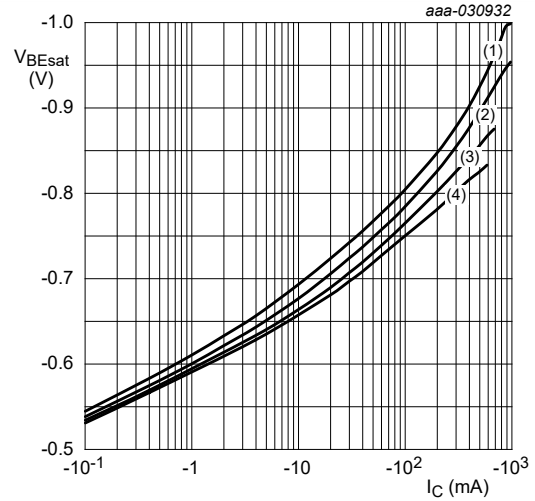
- (1)  $V_{CE} = -1 \text{ V}$
- (2)  $V_{CE} = -2 \text{ V}$
- (3)  $V_{CE} = -5 \text{ V}$

Fig. 19. BC806-25H: Base-emitter voltage as a function of collector current; typical values



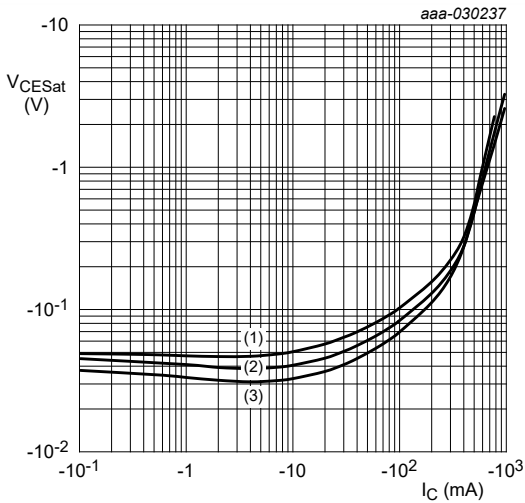
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = -40\text{ °C}$   
 (3)  $T_{amb} = 25\text{ °C}$   
 (4)  $T_{amb} = 100\text{ °C}$   
 (5)  $T_{amb} = 150\text{ °C}$   
 (6)  $T_{amb} = 175\text{ °C}$

**Fig. 20. BC806-25H: Base-emitter saturation voltage as a function of collector current; typical values**



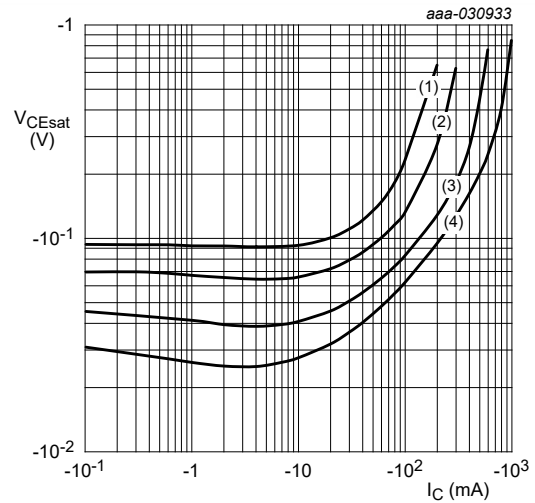
$T_{amb} = 25\text{ °C}$   
 (1)  $I_C/I_B = 10$   
 (2)  $I_C/I_B = 20$   
 (3)  $I_C/I_B = 50$   
 (4)  $I_C/I_B = 100$

**Fig. 21. BC806-25H: Base-emitter saturation voltage as a function of collector current; typical values**



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

**Fig. 22. BC806-25H: Collector-emitter saturation voltage as a function of collector current; typical values**



$T_{amb} = 25\text{ °C}$   
 (1)  $I_C/I_B = 100$   
 (2)  $I_C/I_B = 50$   
 (3)  $I_C/I_B = 20$   
 (4)  $I_C/I_B = 10$

**Fig. 23. BC806-25H: Collector-emitter saturation voltage as a function of collector current; typical values**

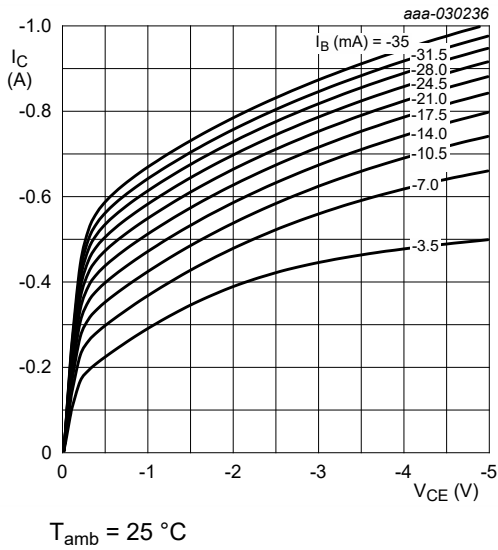


Fig. 24. BC806-25H: Collector current as a function of collector-emitter voltage; typical values

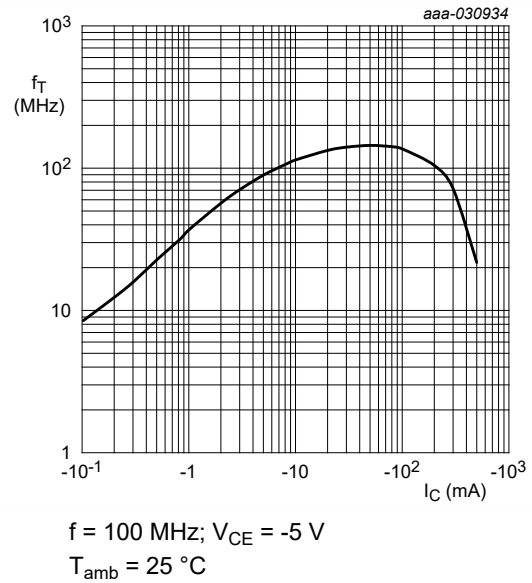


Fig. 25. BC806-25H: Transition frequency as a function of collector current; typical values

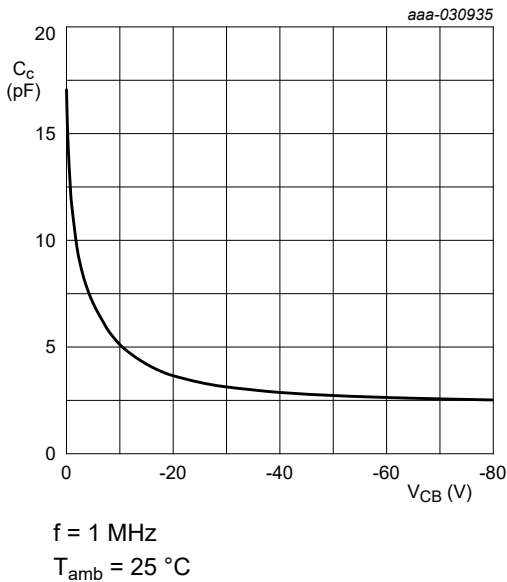


Fig. 26. BC806-25H: Collector capacitance as a function of collector-base voltage; typical values

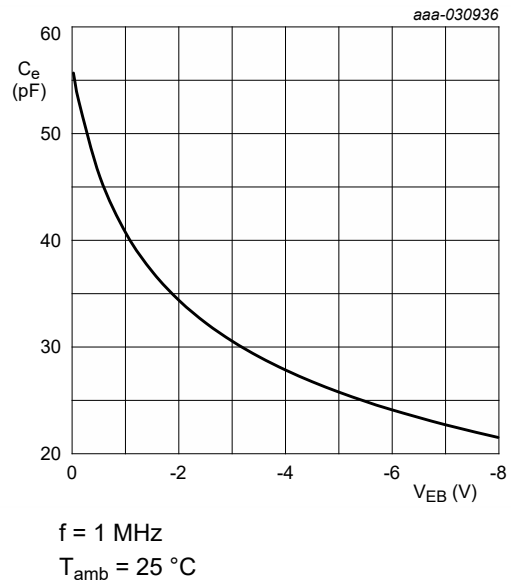
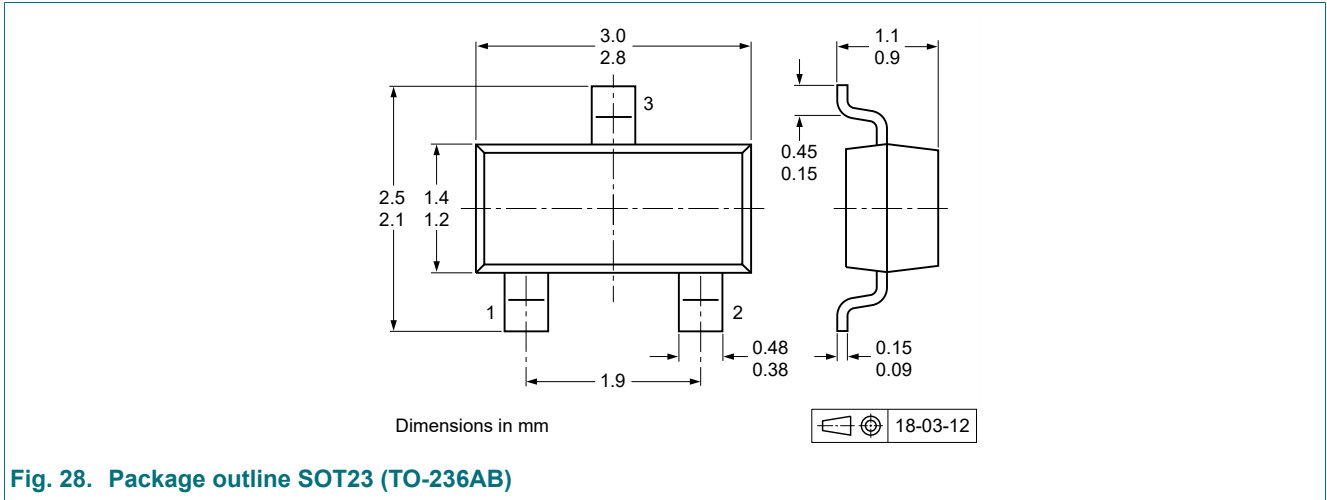


Fig. 27. BC806-25H: Emitter capacitance as a function of emitter-base voltage; typical values

## 11. 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



### 13. Soldering

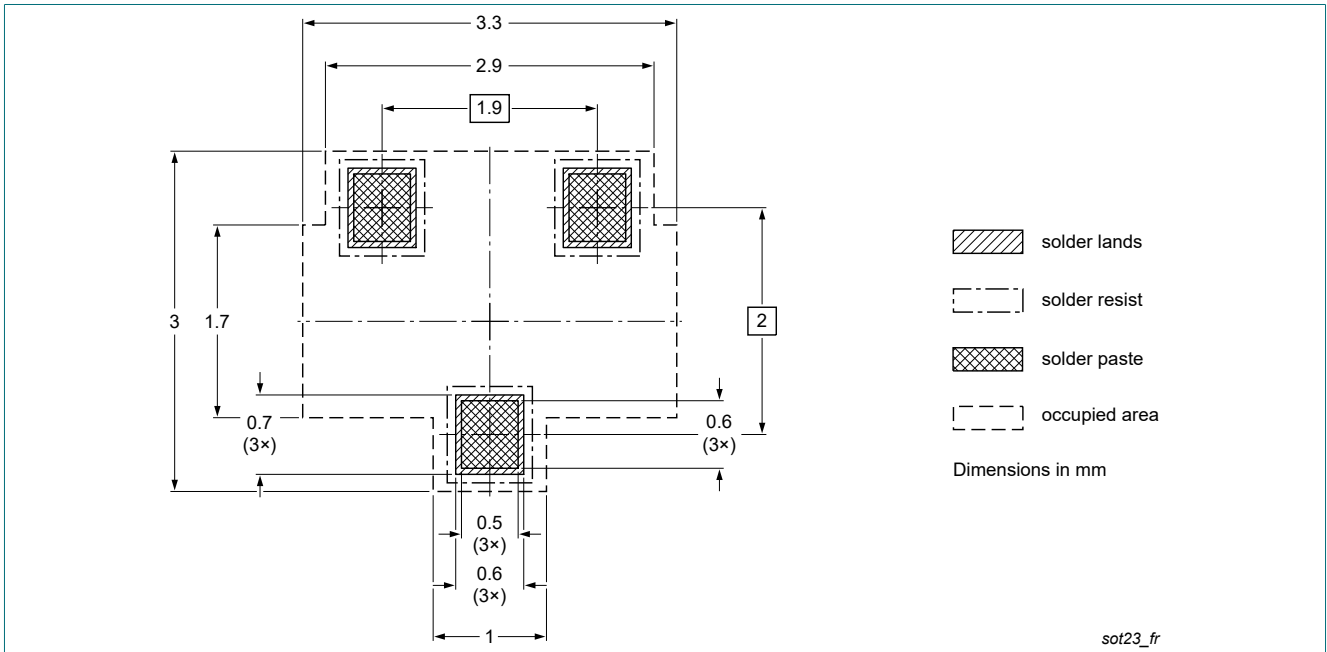


Fig. 29. Reflow soldering footprint for SOT23 (TO-236AB)

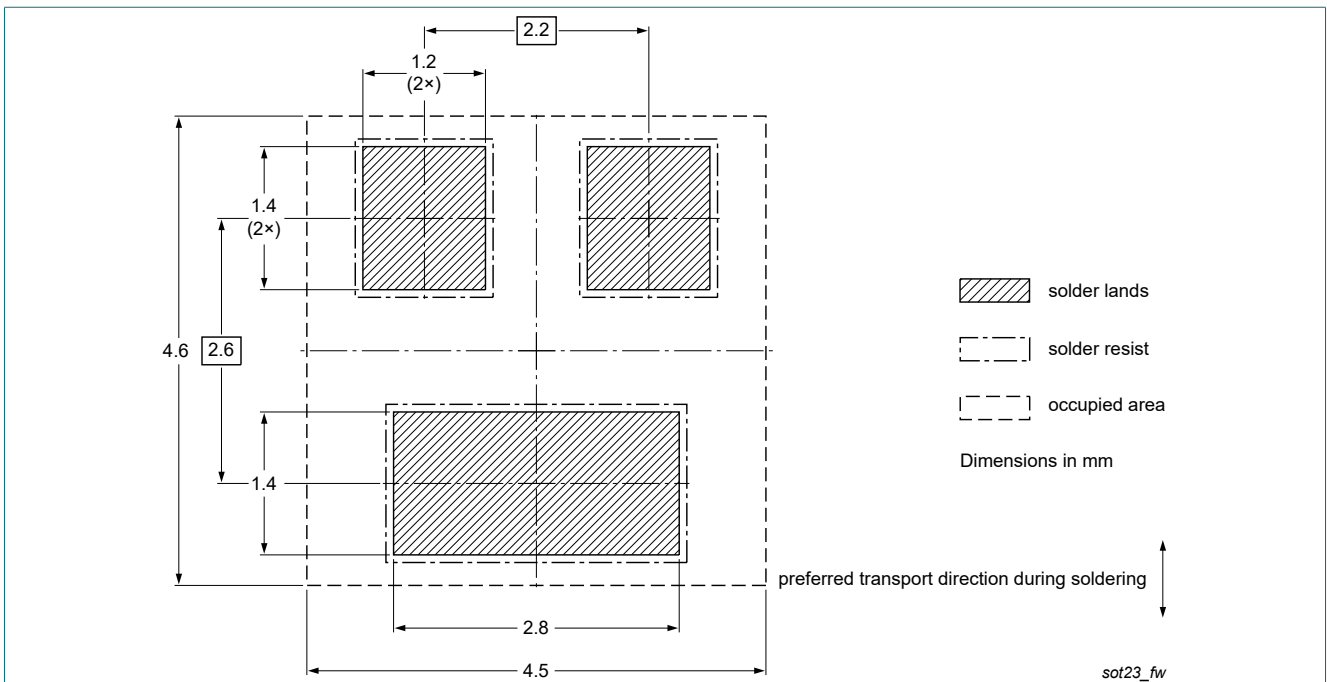


Fig. 30. Wave soldering footprint for SOT23 (TO-236AB)

## 14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC806H_SER v.1	20200326	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".
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For more information, please visit: <http://www.nexperia.com>  
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