

BC806-16H-QR Datasheet



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DiGi Electronics Part Number BC806-16H-QR-DG

Manufacturer Nexperia USA Inc.

Manufacturer Product Number BC806-16H-QR

Description BC806-16H-Q/SOT23/TO-236AB

Detailed Description Bipolar (BJT) Transistor PNP 80 V 500 mA 80MHz 30

0 mW Surface Mount TO-236AB



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Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
BC806-16H-QR	Nexperia USA Inc.
Series:	Product Status:
BC806H	Active
Transistor Type:	Current - Collector (Ic) (Max):
PNP	500 mA
Voltage - Collector Emitter Breakdown (Max):	Vce Saturation (Max) @ lb, lc:
80 V	400mV @ 50mA, 500mA
Current - Collector Cutoff (Max):	DC Current Gain (hFE) (Min) @ Ic, Vce:
100nA (ICBO)	100 @ 100mA, 1V
Power - Max:	Frequency - Transition:
300 mW	80MHz
Operating Temperature:	Grade:
175°C (TJ)	Automotive
Qualification:	Mounting Type:
AEC-Q101	Surface Mount
Package / Case:	Supplier Device Package:
TO-236-3, SC-59, SOT-23-3	TO-236AB

Environmental & Export classification

8541.21.0095

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	



80 V, 500 mA PNP general-purpose transistors

Rev. 1 — 18 October 2023

Product data sheet

1. General description

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

Table 1. Product overview

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

2. Features and benefits

- · High current
- High voltage
- · Two current gain selections
- High-temperature applications up to 175 °C
- Qualified according to AEC-Q101 and recommended for use in automotive applications

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	Тур	Max	Unit
V _{CEO}	collector-emitter voltage	open base; T _{amb} = 25 °C		-	-	-80	V
I _C	collector current	T _{amb} = 25 °C		-	-	-500	mA
I _{CM}	peak collector current	single pulse; t _p ≤ 1 ms; T _{amb} = 25 °C		-	-	-1	Α
h _{FE}	DC current gain		'	'	'	•	'
	BC806-16H-Q	$V_{CE} = -1 \text{ V; } I_{C} = -100 \text{ mA ;}$	[1]	100	-	250	
	BC806-25H-Q	T _{amb} = 25 °C	[1]	160	-	400	

[1] pulsed; $t_p \le 300 \ \mu s$; $\delta \le 0.02$



5. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	В	base	3	C
2	E	emitter		B —
3	С	collector		
				Ē
			1	006aaa231
			(SOT23)	

6. Ordering information

Table 4. Ordering information

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

7. Marking

Table 5. Marking

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

[1] % = placeholder for manufacturing site code

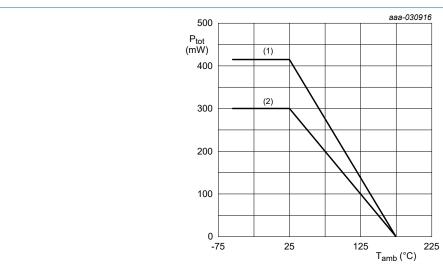
8. Limiting values

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 °C		-	-80	V
V_{CEO}	collector-emitter voltage	open base; T _{amb} = 25 °C		-	-80	V
V_{EBO}	emitter-base voltage	open collector; T _{amb} = 25 °C		-	-8	V
Ic	collector current	T _{amb} = 25 °C	T _{amb} = 25 °C		-500	mA
I _{CM}	peak collector current	single pulse; $t_p \le 1$ ms; $T_{amb} = 25$	°C	-	-1	А
I _{BM}	peak base current	single pulse; t _p ≤ 1 ms; T _{amb} = 25	°C	-	-200	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C; T _{amb} = 25 °C	[1]	-	300	mW
			[2]	-	415	mW
Tj	junction temperature			-	175	°C
T _{amb}	ambient temperature			-55	175	°C
T _{stg}	storage temperature			-65	175	°C

- Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint. Device mounted on an FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 $\rm cm^2$.



- (1) FR4 PCB; 1 cm² mounting pad for collector
- (2) FR4 PCB; standard footprint

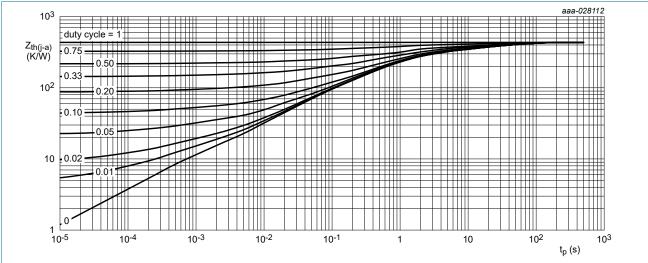
Power derating curves for SOT23 Fig. 1.

9. Thermal characteristics

Table 7. Thermal characteristics

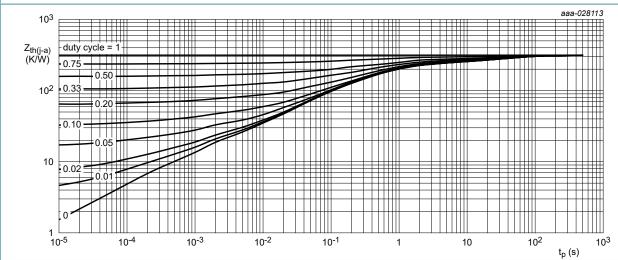
Symbol	Parameter	Conditions		Min	Тур	Max	Unit
R _{th(j-a)}	thermal resistance from junction to ambient	in free air;	[1]	-	-	500	K/W
		T _{amb} = 25 °C	[2]	-	-	363	K/W

- [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.



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

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



FR4 PCB; single-sided copper; tin-plated; mounting pad for collector 1 cm²

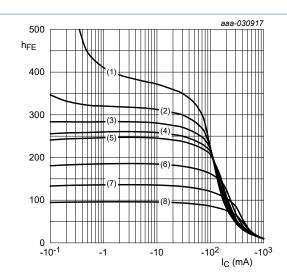
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100 \ \mu A; I_E = 0 \ A; T_{amb} = 25 \ ^{\circ}C$		-80	-		V
V _{(BR)CEO}	collector-emitter breakdown voltage	$I_C = -2 \text{ mA}; I_B = 0 \text{ A}; T_{amb} = 25 \text{ °C}$		-80	-		V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = -100 \ \mu A; \ I_C = 0 \ A; \ T_{amb} = 25 \ ^{\circ}C$		-8	-		V
I _{CBO}	collector-base	V _{CB} = -64 V; I _E = 0 A; T _{amb} = 25 °C		-	-	-100	nA
	cut-off current	V _{CB} = -64 V; I _E = 0 A; T _j = 150 °C		-	-	-5	μA
I _{EBO}	emitter-base cut-off current	V _{EB} = -6.4 V; I _C = 0 A; T _{amb} = 25 °C		-	-	-100	nA
h _{FE}	DC current gain		'	'		'	
	BC806-16H-Q	V _{CE} = -1 V; I _C = -100 mA; T _{amb} = 25 °C	[1]	100	-	250	
	BC806-25H-Q	V _{CE} = -1 V; I _C = -100 mA; T _{amb} = 25 °C	[1]	160	-	400	
		V _{CE} = -2 V; I _C = -500 mA; T _{amb} = 25 °C	[1]	30	-	-	
V _{CEsat}	collector-emitter	I _C = -100 mA; I _B = -10 mA; T _{amb} = 25 °C	[1]	-	-	-150	mV
	saturation voltage	I_C = -500 mA; I_B = -50 mA; T_{amb} = 25 °C	[1]	-	-	-400	mV
V_{BE}	base-emitter voltage	V _{CE} = -1 V; I _C = -500 mA; T _{amb} = 25 °C	[1]	-	-	-1.2	V
f _T	transition frequency	V _{CE} = -5 V; I _C = -50 mA; f = 100 MHz; T _{amb} = 25 °C		80	-	-	MHz
C _c	collector capacitance	V_{CB} = -10 V; I_{E} = i_{e} = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	5	-	pF
C _e	emitter capacitance	V_{EB} = -0.5 V; I_{C} = I_{c} = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	47	-	pF

^[1] pulsed; $t_p \le 300 \ \mu s$; $\delta \le 0.02$



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

(1)
$$T_{amb}$$
 = 175 °C

(2)
$$T_{amb} = 150 \, ^{\circ}C$$

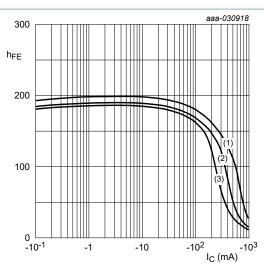
(3)
$$T_{amb}$$
 = 125 °C

(4)
$$T_{amb}$$
 = 100 °C

(5)
$$T_{amb}$$
 = 85 °C

(7)
$$T_{amb} = -40 \, ^{\circ}C$$

(8) $T_{amb} = -55 \, ^{\circ}C$

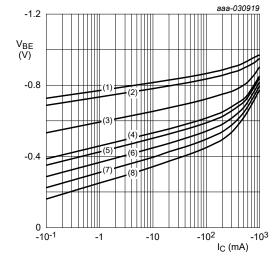


$$(1) V_{CE} = -5 V$$

(2)
$$V_{CE} = -2 V$$

(3)
$$V_{CE} = -1 V$$

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



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

(1)
$$T_{amb} = -55 \, ^{\circ}C$$

(2)
$$T_{amb} = -40 \, ^{\circ}C$$

(3)
$$T_{amb} = 25 \, ^{\circ}C$$

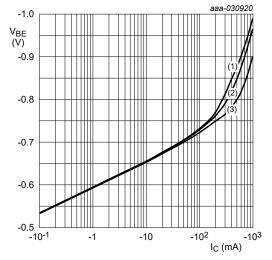
(4)
$$T_{amb} = 85 \, ^{\circ}C$$

(5)
$$T_{amb} = 100 \, ^{\circ}C$$

$$(7) T_{amb} = 150 °C$$

(8)
$$T_{amb} = 175 \, ^{\circ}C$$

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

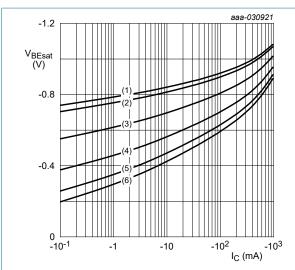


$$(1) V_{CE} = -1 V$$

(2)
$$V_{CE} = -2 V$$

(3)
$$V_{CE} = -5 V$$

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



$$IC/IB = 10$$

(1)
$$T_{amb} = -55 \, ^{\circ}C$$

(2)
$$T_{amb} = -40 \, ^{\circ}C$$

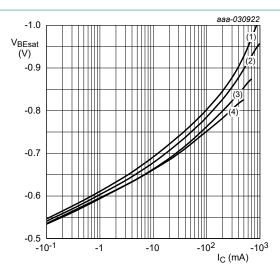
(3)
$$T_{amb} = 25 \, ^{\circ}C$$

(4)
$$T_{amb}$$
 = 100 °C

(5)
$$T_{amb} = 150 \, ^{\circ}C$$

(6) $T_{amb} = 175 \, ^{\circ}C$

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



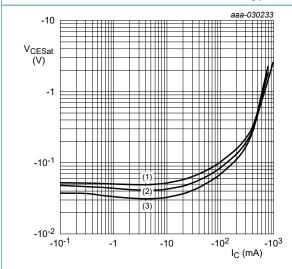
(1)
$$IC/IB = 10$$

(2)
$$IC/IB = 20$$

(3)
$$IC/IB = 50$$

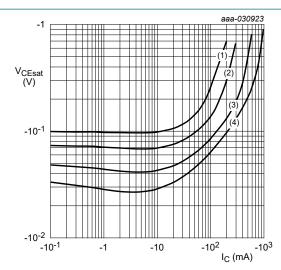
$$(4) IC/IB = 100$$

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



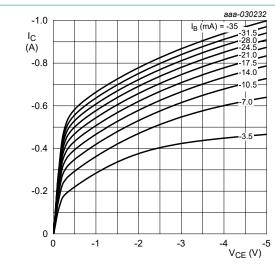
- $I_C/I_B = 20$
- (1) $T_{amb} = 100 \, ^{\circ}C$
- (2) $T_{amb} = 25 \, ^{\circ}C$
- (3) $T_{amb} = -40 \, ^{\circ}C$

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



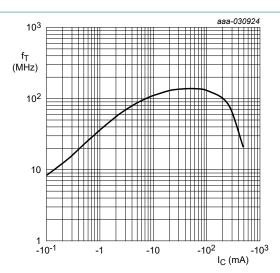
- T_{amb} = 25 °C
- (1) IC/IB = 100
- (2) IC/IB = 50
- (3) IC/IB = 20
- (4) IC/IB = 10

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



T_{amb} = 25 °C

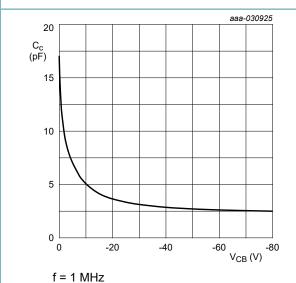
Fig. 12. BC806-16H-Q: Collector current as a function of collector-emitter voltage; typical values



 $f = 100 \text{ MHz}; V_{CE} = -5 \text{ V}$

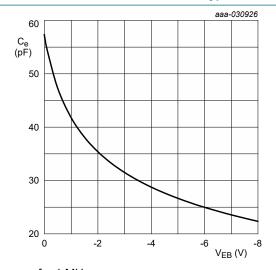
 T_{amb} = 25 °C

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



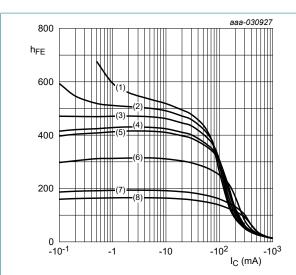
T_{amb} = 25 °C

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



f = 1 MHz $T_{amb} = 25 °C$

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



 $V_{CE} = -1 V$

(1) $T_{amb} = 175 \, ^{\circ}C$

(2) $T_{amb} = 150 \, ^{\circ}C$

(3) $T_{amb} = 125 \, ^{\circ}C$

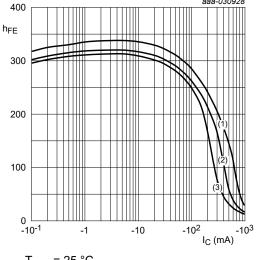
(4) $T_{amb} = 100 \, ^{\circ}C$

 $(5) T_{amb} = 85 °C$

(6) T_{amb} = 25 °C

 $(7) T_{amb} = -40 °C$

(8) $T_{amb} = -55 \, ^{\circ}C$



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

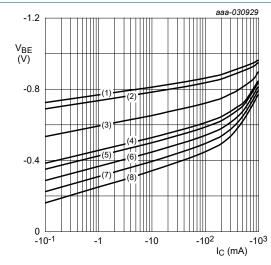
(1) $V_{CE} = -5 V$

(2) $V_{CE} = -2 V$

 $(3) V_{CE} = -1 V$

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





 $V_{CE} = -5 V$

(1) $T_{amb} = -55$ °C

(2) $T_{amb} = -40 \, ^{\circ}C$

(3) T_{amb} = 25 °C

(4) $T_{amb} = 85 \, ^{\circ}C$

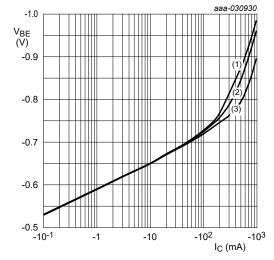
(5) $T_{amb} = 100 \, ^{\circ}C$

(6) $T_{amb} = 125 \, ^{\circ}C$

 $(7) T_{amb} = 150 °C$

(8) $T_{amb} = 175 \, ^{\circ}C$

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



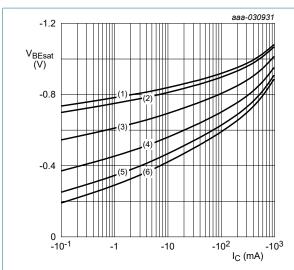
T_{amb} = 25 °C

(1) $V_{CE} = -1 V$

(2) $V_{CE} = -2 V$

(3) $V_{CE} = -5 V$

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



IC/IB = 10

(1)
$$T_{amb} = -55 \, ^{\circ}C$$

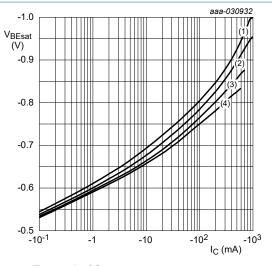
(2)
$$T_{amb} = -40 \, ^{\circ}C$$

(3)
$$T_{amb} = 25 \, ^{\circ}C$$

(4)
$$T_{amb}$$
 = 100 °C

$$(5) T_{amb} = 150 °C$$

(6)
$$T_{amb} = 175 \, ^{\circ}C$$



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

(1)
$$IC/IB = 10$$

(2)
$$IC/IB = 20$$

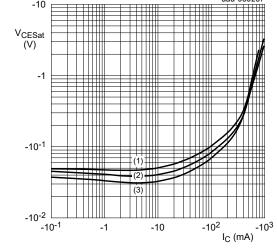
(3)
$$IC/IB = 50$$

$$(4) IC/IB = 100$$

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



Fig. 20. BC806-25H-Q: Base-emitter saturation voltage



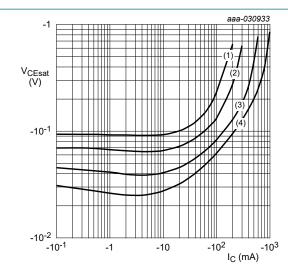
 $I_{\rm C}/I_{\rm B} = 20$

(1)
$$T_{amb} = 100 \, ^{\circ}C$$

(2)
$$T_{amb} = 25 \, ^{\circ}C$$

(3)
$$T_{amb} = -40 \, ^{\circ}C$$

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



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

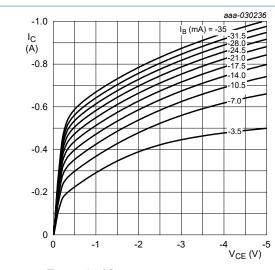
(1)
$$IC/IB = 100$$

(2)
$$IC/IB = 50$$

(3)
$$IC/IB = 20$$

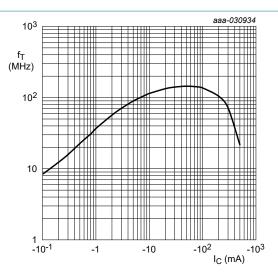
$$(4) IC/IB = 10$$

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



T_{amb} = 25 °C

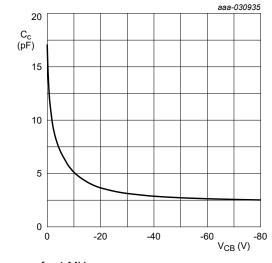
Fig. 24. BC806-25H-Q: Collector current as a function of collector-emitter voltage; typical values



 $f = 100 \text{ MHz}; V_{CE} = -5 \text{ V}$

 T_{amb} = 25 °C

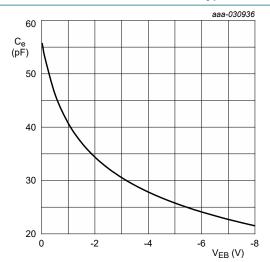
Fig. 25. BC806-25H-Q: Transition frequency as a function of collector current; typical values



f = 1 MHz

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

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



f = 1 MHz

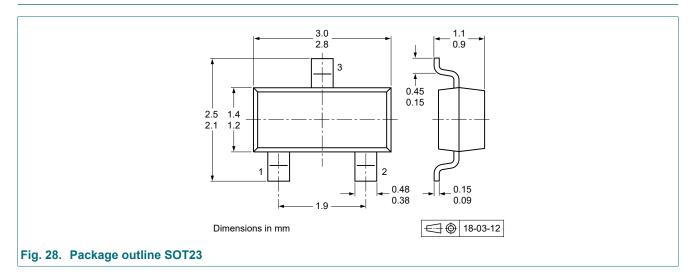
 $T_{amb} = 25 \, ^{\circ}C$

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

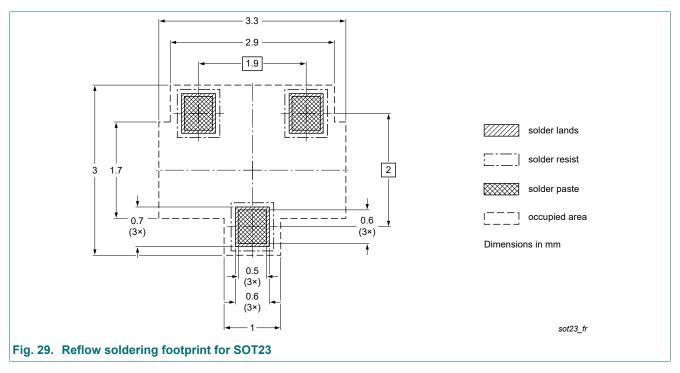
11. Quality information

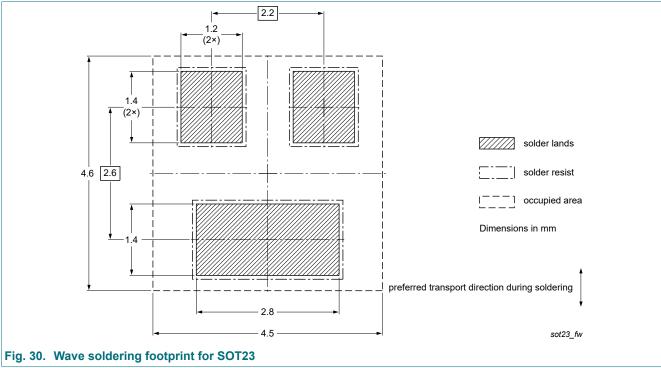
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline



13. Soldering





80 V, 500 mA PNP general-purpose transistors

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC806H-Q_SER v.1	20231018	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.

- Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- 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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80 V, 500 mA PNP general-purpose transistors

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80 V, 500 mA PNP general-purpose transistors

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For more information, please visit: http://www.nexperia.com For sales office addresses, please send an email to: salesaddresses@nexperia.com Date of release: 18 October 2023

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