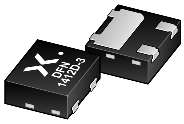


BC857xQC series

45 V, 100 mA PNP general-purpose transistor

Rev. 1 — 27 October 2021 Product data sheet

1. General description

PNP general-purpose transistor in an ultra small DFN1412D-3 (SOT8009) leadless Surface-Mounted Device (SMD) plastic package with side-wettable flanks.

Table 1. Product overview

Type number	Package		NPN complement:
	Nexperia	JEDEC	
BC857AQC	SOT8009	MO-340CA	BC847AQC
BC857BQC			BC847BQC
BC857CQC			BC847CQC

2. Features and benefits

- High power dissipation capability
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- Smaller footprint compared to conventional leaded SMD packages
- Low package height of 0.5 mm

3. Applications

- General-purpose switching and amplification
- Space restricted applications

4. Quick reference data

Table 2. Quick reference data

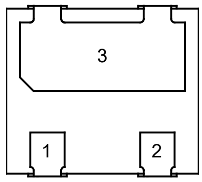
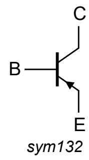
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-45	V
I_C	collector current		-	-	-100	mA
I_{CM}	peak collector current	single pulse; t_p ≤ 1 ms	-	-	-200	mA
h_{FE}	DC current gain					
	BC857AQC	V_{CE} = -5 V; I_C = -2 mA	125	-	250	
	BC857BQC		220	-	475	
	BC857CQC		420	-	800	

nexperia

5. Pinning information

Table 3. Pinning

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

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC857AQC	DFN1412D-3	plastic leadless ultra small outline package with side-wettable flanks (SWF); 3 terminals; 0.8 mm pitch; body: 1.4 mm x 1.2 mm x 0.48 mm	SOT8009
BC857BQC			
BC857CQC			

7. Marking

Table 5. Marking

Type number	Marking code
BC857AQC	9F
BC857BQC	9G
BC857CQC	9H

8. Limiting values

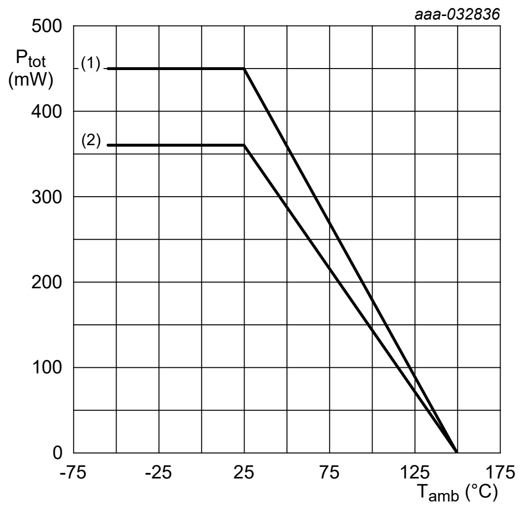
Table 6. Limiting values

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

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

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 ≤ 1 ms		-	-200	mA
I_{BM}	peak base current	single pulse; t_p ≤ 1 ms		-	-100	mA
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[1]	-	360	mW
			[2]	-	450	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; 35 µm copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB; single-sided; 70 µm copper; tin-plated and standard footprint.



(1) FR4 PCB; single-sided; 70 µm copper, standard footprint
(2) FR4 PCB; single-sided; 35 µm copper, standard footprint

Fig. 1. Power derating curves DFN1412D-3 (SOT8009)

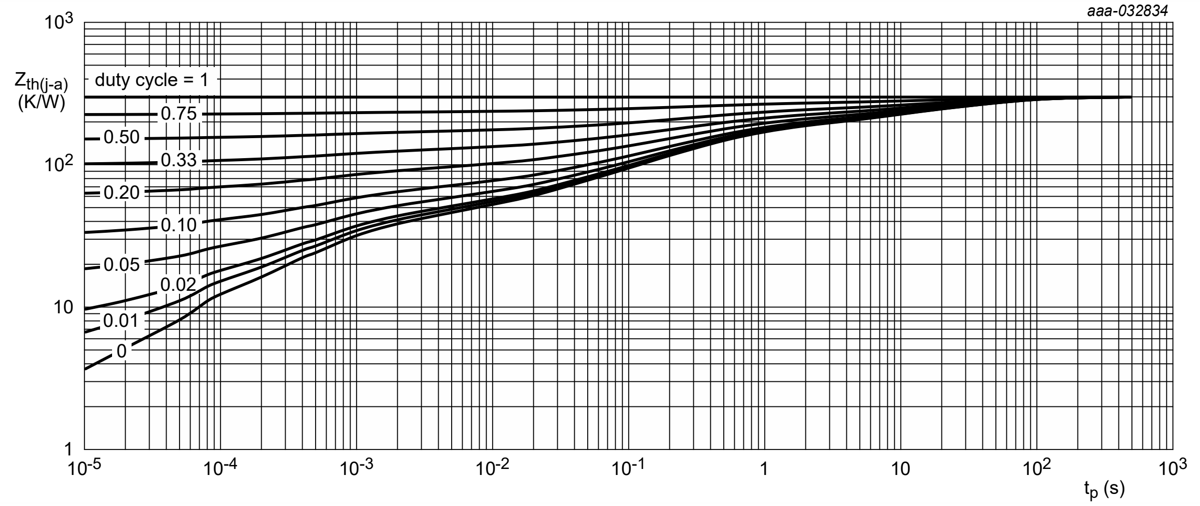
9. Thermal characteristics

Table 7. Thermal characteristics

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

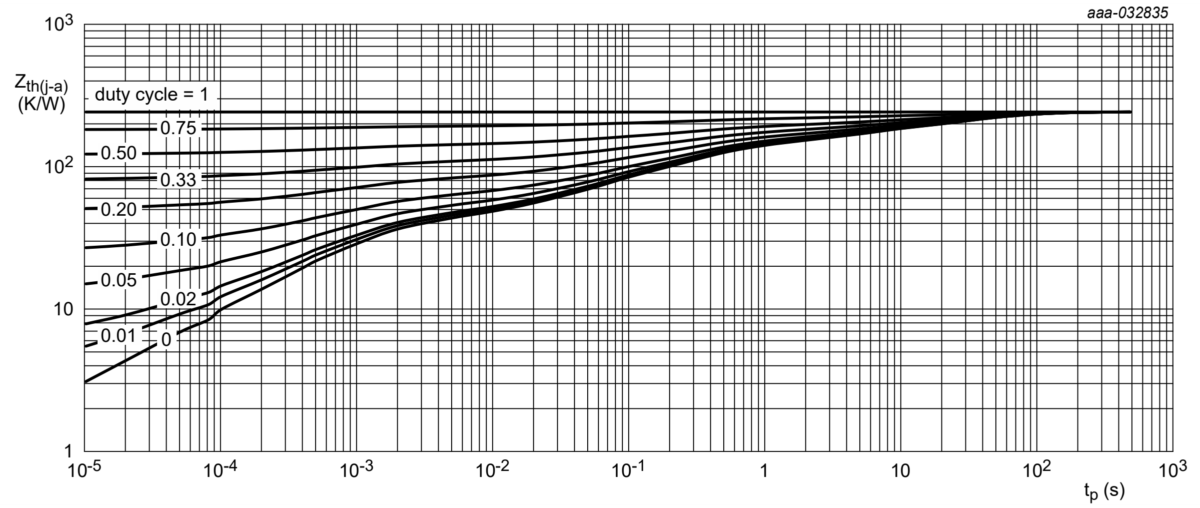
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	348	K/W
			[2]	-	-	278	K/W

[1] Device mounted on an FR4 PCB; single-sided; 35 µm copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB; single-sided; 70 µm copper; tin-plated and standard footprint.



FR4 PCB; single-sided; 35 µm copper, standard footprint

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



FR4 PCB; single-sided; 70 µm copper, standard footprint

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

10. Characteristics

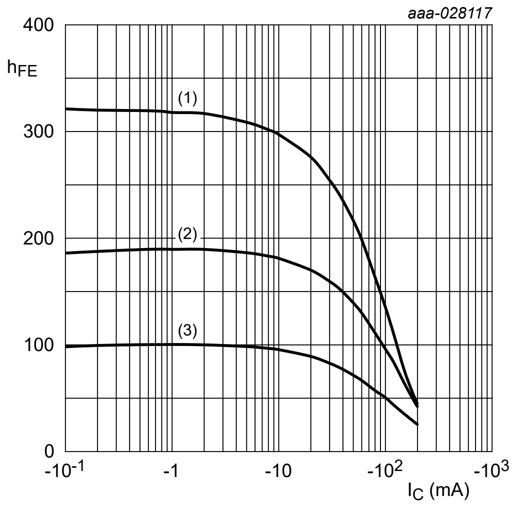
Table 8. Characteristics

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		-50	-	-	V
$V_{(BR)CES}$	collector-emitter peak voltage	I_C = -2 mA; I_E = 0 A		-45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = -100 μA; I_C = 0 A		-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						
	BC857AQC	V_{CE} = -5 V; I_C = -2 mA		125	-	250	
	BC857BQC			220	-	475	
	BC857CQC			420	-	800	
V_{CEsat}	collector-emitter saturation voltage	I_C = -10 mA; I_B = -0.5 mA		-	-	-300	mV
		I_C = -100 mA; I_B = -5 mA	[1]	-	-	-650	mV
V_{BE}	base-emitter voltage	V_{CE} = -5 V ; I_C = -2 mA	[2]	-600	-	-750	mV
		V_{CE} = -5 V ; I_C = -10 mA	[2]	-	-	-820	mV
V_{BEsat}	base-emitter saturation voltage	I_C = -10 mA ; I_B = -0.5 mA		-	-700	-	mV
		I_C = -100 mA ; I_B = -5 mA	[1]	-	-850	-	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		-	2	-	pF
C_e	emitter capacitance	V_{EB} = -0.5 V; I_C = i_c = 0 A; f = 1 MHz		-	10	-	pF
NF	noise figure	V_{CE} = -5 V; I_C = -200 μA; R_S = 2 kΩ; f = 1 kHz; B = 200 Hz		-	-	10	dB

[1] pulsed; t_p ≤ 300 μs; δ ≤ 0.02

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



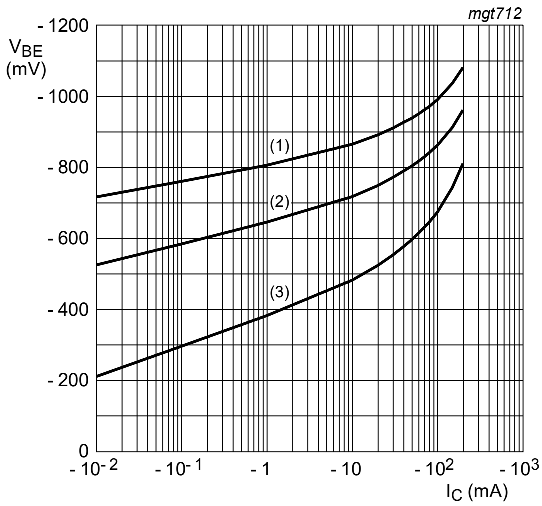
V_{CE} = -5 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 4. BC857AQC: DC current gain as a function of collector current; typical values



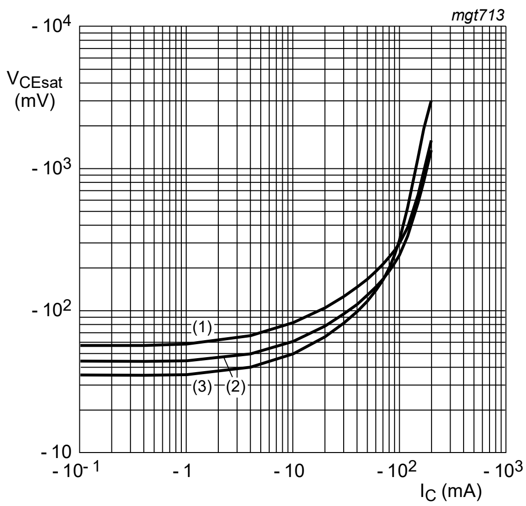
V_{CE} = -5 V

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig. 5. BC857AQC: Base-emitter voltage as a function of collector current; typical values



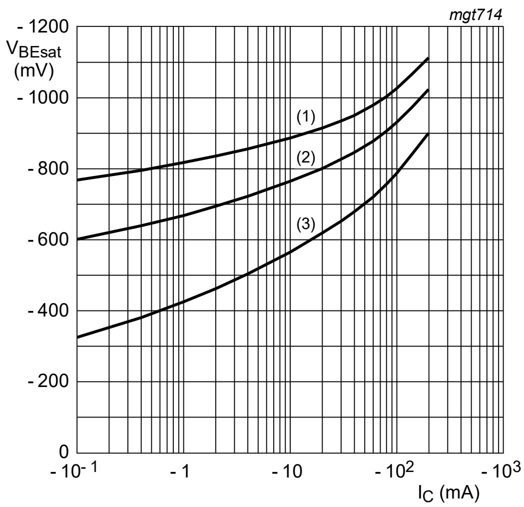
I_C/ I_B= 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 6. BC857AQC: Collector-emitter saturation voltage as a function of collector current; typical values



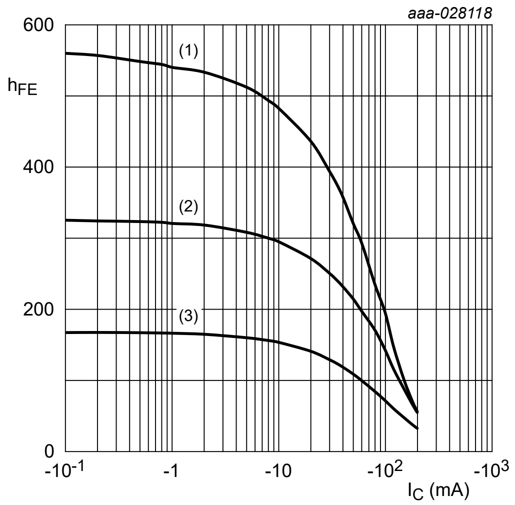
I_C/ I_B= 20

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

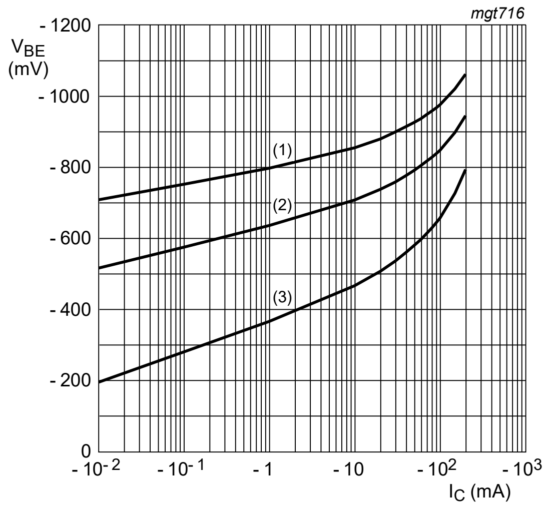
(3) T_{amb} = 150 °C

Fig. 7. BC857AQC: Base-emitter saturation voltage as a function of collector current; typical values



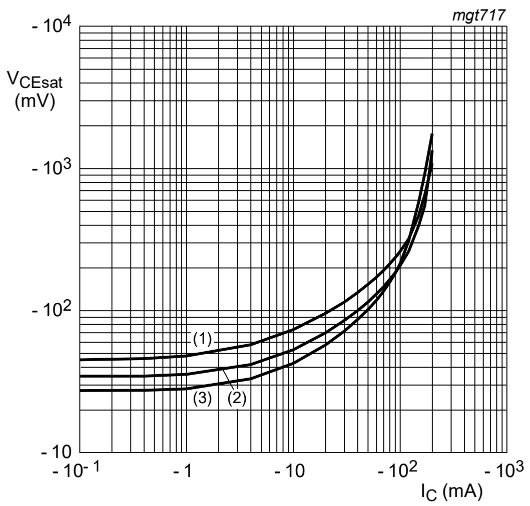
V_{CE} = -5 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 8. BC857BQC: DC current gain as a function of collector current; typical values



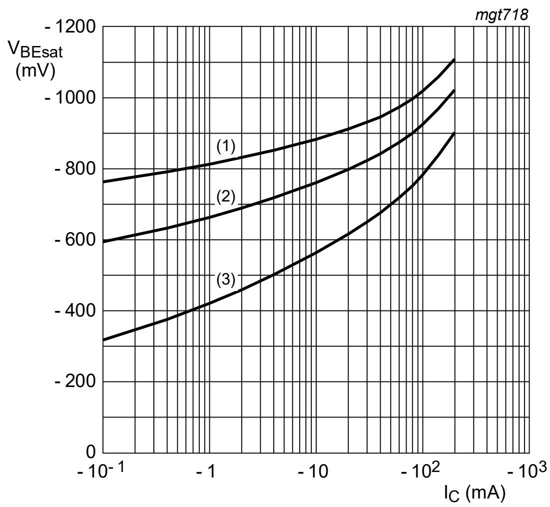
V_{CE} = -5 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 9. BC857BQC: Base-emitter voltage as a function of collector current; typical values



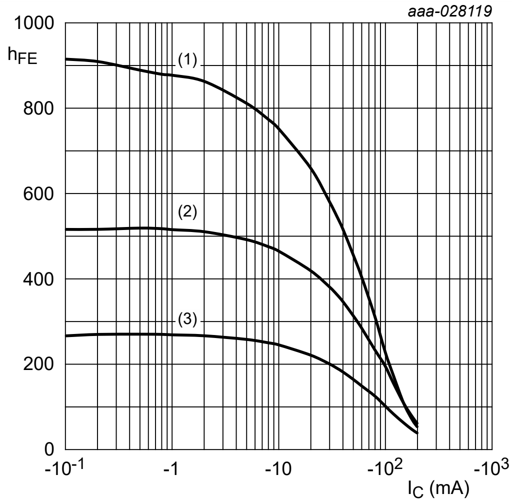
I_C / I_B = 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 10. BC857BQC: Collector-emitter saturation voltage as a function of collector current; typical values



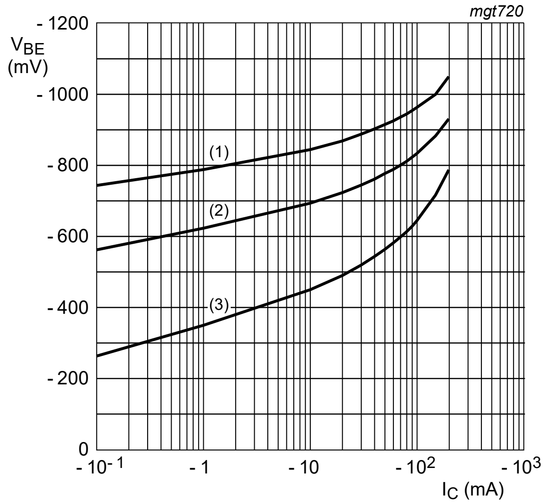
I_C / I_B = 20
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 11. BC857BQC: Base-emitter saturation voltage as a function of collector current; typical values



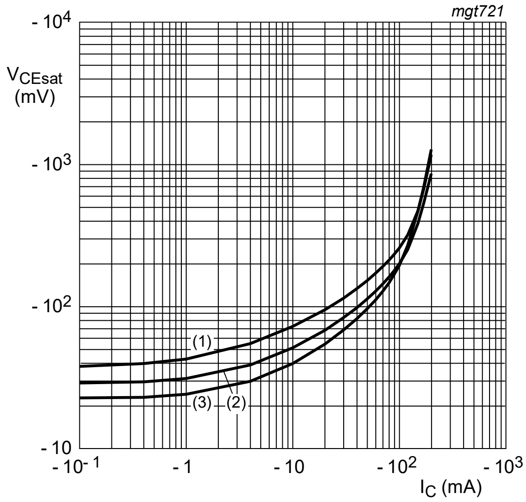
V_{CE} = -5 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 12. BC857CQC: DC current gain as a function of collector current; typical values



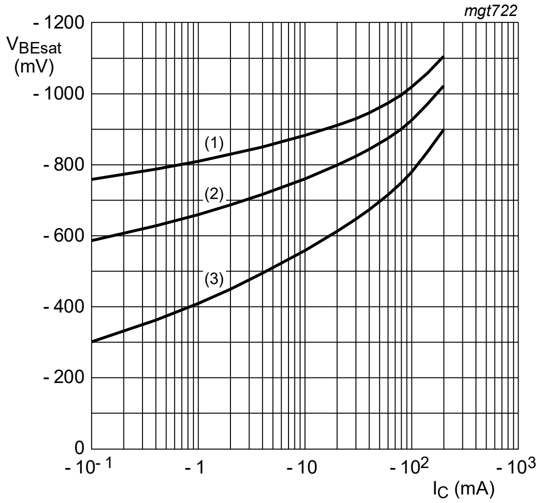
V_{CE} = -5 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 13. BC857CQC: 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. 14. BC857CQC: Collector-emitter saturation voltage as a function of collector current; typical values



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

Fig. 15. BC857CQC: Base-emitter saturation voltage as a function of collector current; typical values

11. Package outline

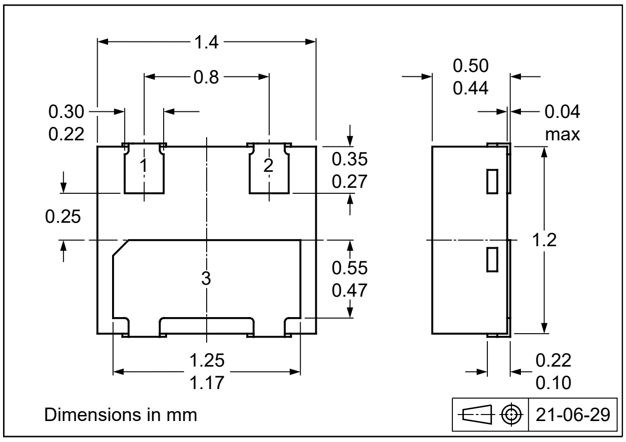


Fig. 16. Package outline DFN1412D-3 (SOT8009)

12. Soldering

Footprint information for reflow soldering of DFN1412D-3 package **SOT8009**

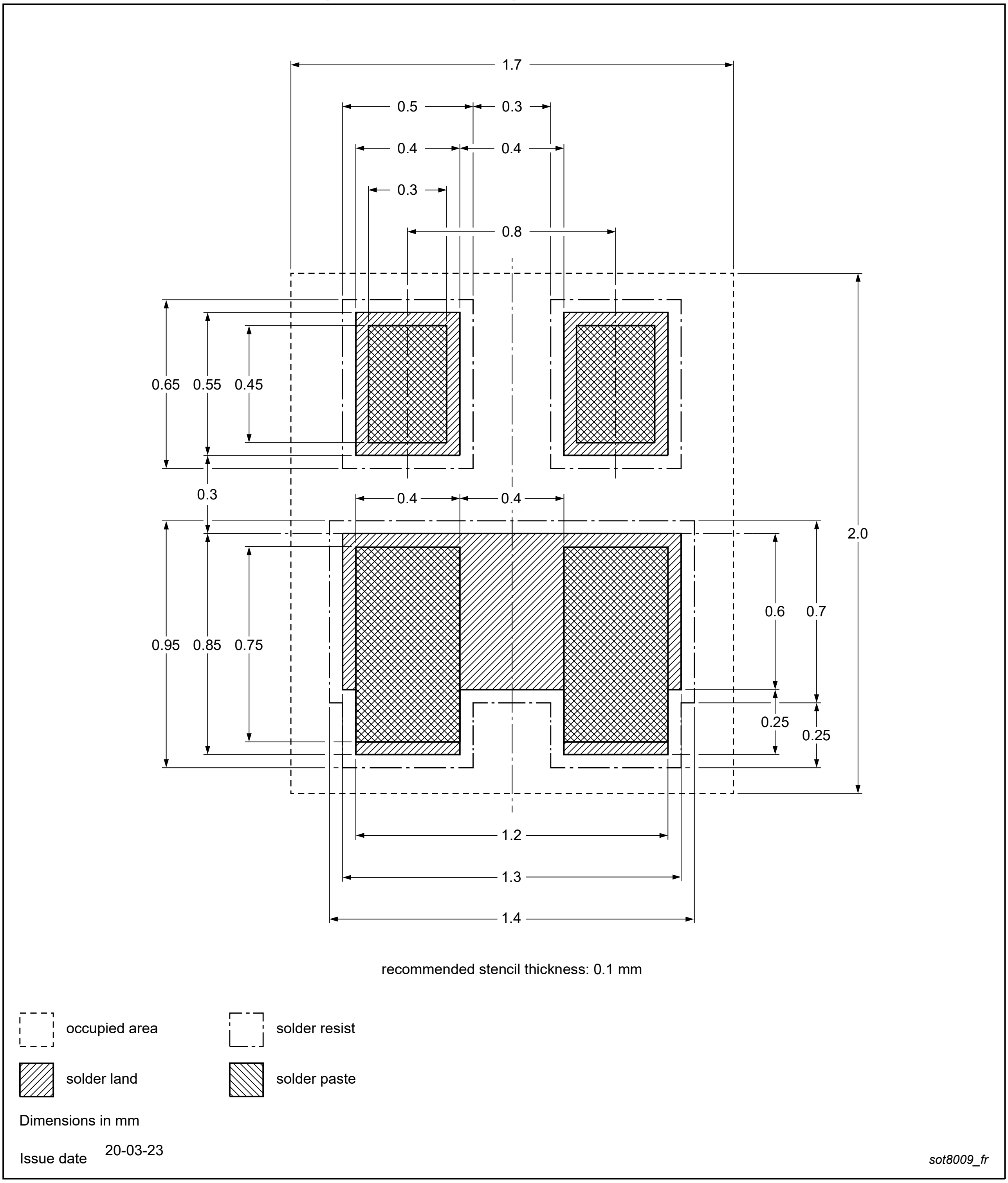


Fig. 17. Reflow soldering footprint for DFN1412D-3 (SOT8009)

13. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC857XQC_SER v.1	20211027	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".
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For sales office addresses, please send an email to: salesaddresses@nexperia.com
Date of release: 27 October 2021

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