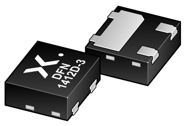

BC817QCH-Q series

45 V, 500 mA NPN general-purpose transistors

Rev. 1 — 25 January 2022 — Product data sheet

1. General description

NPN 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			PNP complement
	Name	JEDEC	Version	
BC817-16QCH-Q	DFN1412D-3	MO-340CA	SOT8009	BC807-16QCH-Q
BC817-25QCH-Q				BC807-25QCH-Q
BC817-40QCH-Q				BC807-40QCH-Q

2. Features and benefits

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

4. Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base; T_{amb} = 25 °C		-	-	45	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	A
h_{FE}	DC current gain						
	BC817-16QCH-Q	V_{CE} = 1 V; I_C = 100 mA T_{amb} = 25 °C	[1]	100	-	250	
	BC817-25QCH-Q			160	-	400	
	BC817-40QCH-Q			250	-	600	

[1] pulsed; t_p ≤ 300 µs; δ ≤ 0.02

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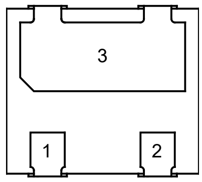
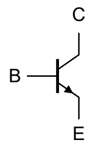
5. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Transparent top view **DFN1412D-3 (SOT8009)**	 *sym021*
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	**Description**	**Version**
BC817-16QCH-Q	DFN1412D-3	DFN1412D-3: plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body: 1.4 x 1.2 x 0.5 mm	SOT8009 (MO-340CA)
BC817-25QCH-Q			
BC817-40QCH-Q			

7. Marking

Table 5. Marking

Type number	Marking code
BC817-16QCH-Q	8V
BC817-25QCH-Q	8W
BC817-40QCH-Q	8Y

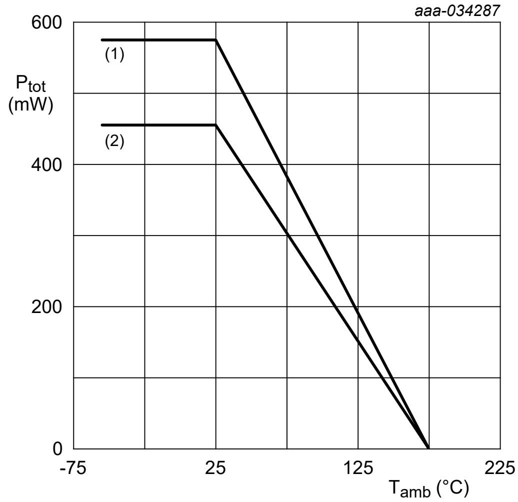
8. Limiting values

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		-	50	V
V_{CEO}	collector-emitter voltage	open base; T_{amb} = 25 °C		-	45	V
V_{EBO}	emitter-base voltage	open collector; T_{amb} = 25 °C		-	5	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	A
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	[1]	-	455	mW
			[2]	-	575	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 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, tin-plated and standard footprint
(2) FR4 PCB; single-sided 35 µm copper, tin-plated and standard footprint

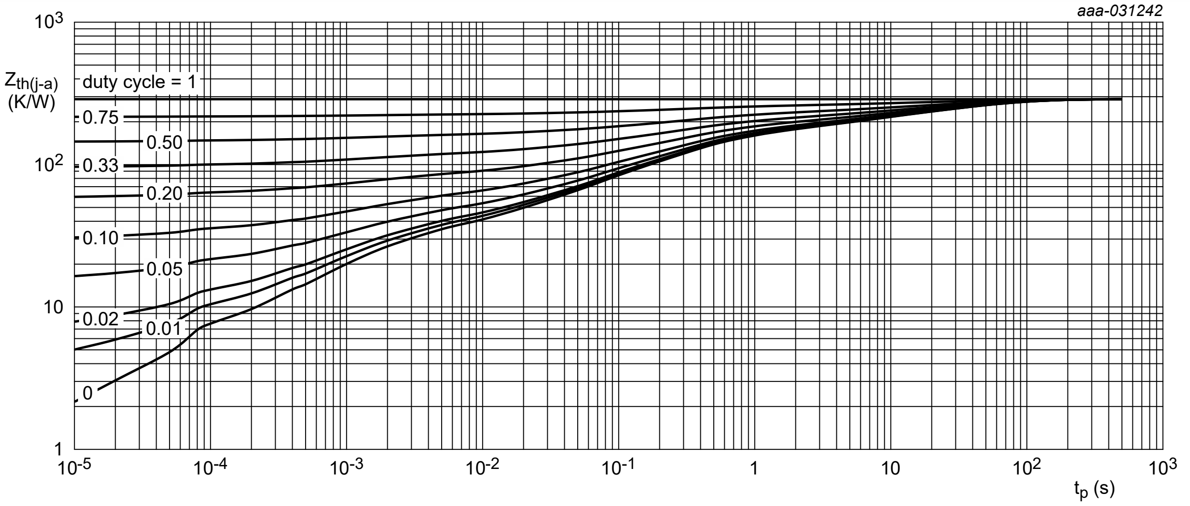
Fig. 1. Power derating curves for SOT8009

9. Thermal characteristics

Table 7. Thermal characteristics

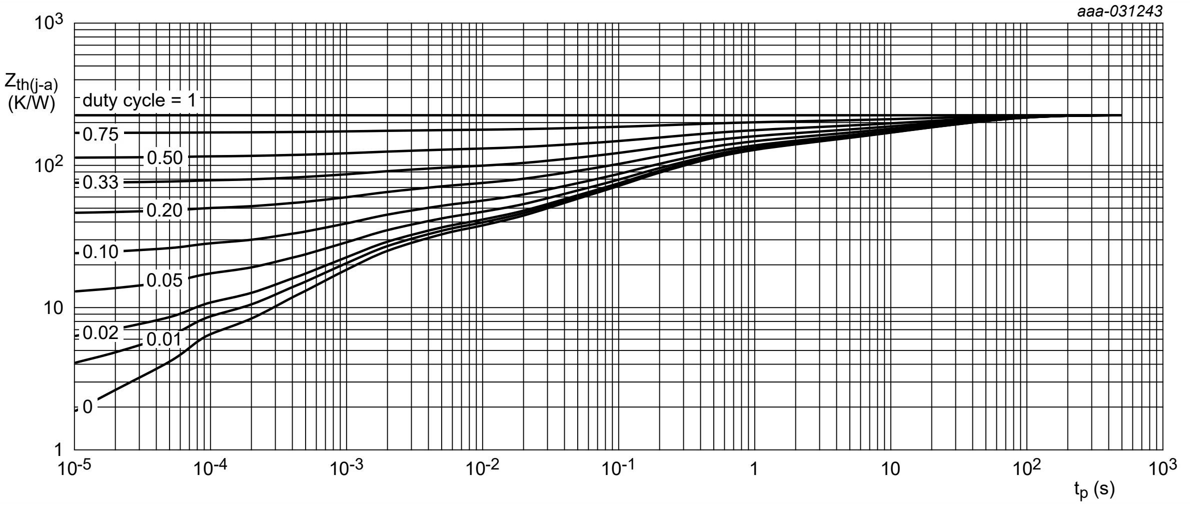
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air; T_{amb} = 25 °C	[1]	-	-	329	K/W
			[2]	-	-	261	K/W

[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 35µm 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 70µm copper, tin-plated and standard footprint

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

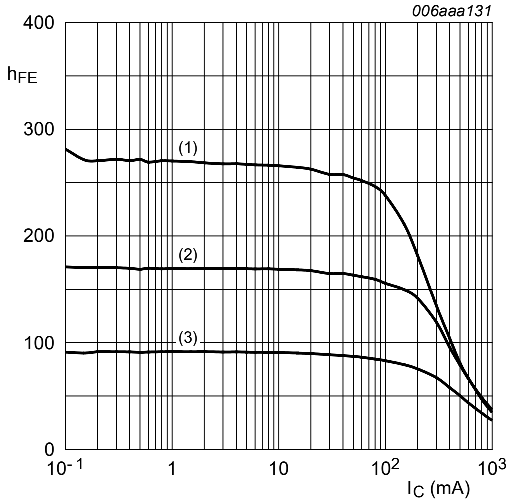
10. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 100 μA; I_E = 0 A; T_{amb} = 25 °C		50	-		V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 10 mA; I_E = 0 A; T_{amb} = 25 °C		45	-		V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 100 μA; I_C = 0 A; T_{amb} = 25 °C		5	-		V
I_{CBO}	collector-base cut-off current	V_{CB} = 20 V; I_E = 0 A; T_{amb} = 25 °C		-	-	100	nA
		V_{CB} = 20 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						
	BC817-16QCH-Q	V_{CE} = 1 V; I_C = 100 mA; T_{amb} = 25 °C	[1]	100	-	250	
	BC817-25QCH-Q			160	-	400	
	BC817-40QCH-Q			250	-	600	
		V_{CE} = 1 V; I_C = 500 mA; T_{amb} = 25 °C	[1]	40	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 500 mA; I_B = 50 mA; T_{amb} = 25 °C	[1]	-	-	700	mV
V_{BE}	base-emitter voltage	V_{CE} = 1 V; I_C = 500 mA; T_{amb} = 25 °C	[1] [2]	-	-	1.2	V
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		-	3	-	pF

[1] pulsed; t_p ≤ 300 μs; δ ≤ 0.02

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



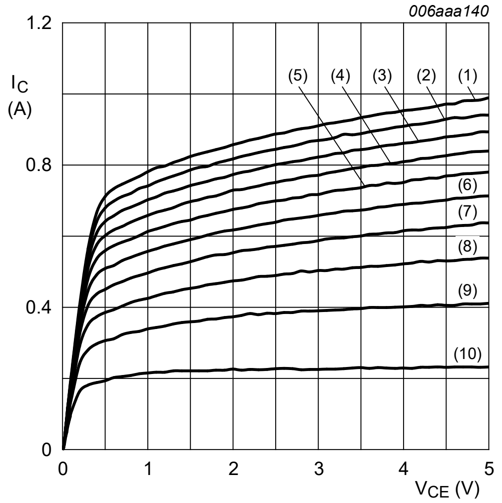
V_{CE} = 1 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 4. BC817-16QCH-Q: DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

(1) I_B = 16.0 mA

(2) I_B = 14.4 mA

(3) I_B = 12.8 mA

(4) I_B = 11.2 mA

(5) I_B = 9.6 mA

(6) I_B = 8.0 mA

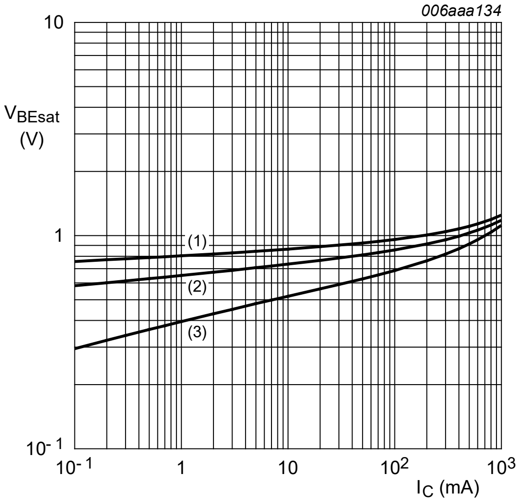
(7) I_B = 6.4 mA

(8) I_B = 4.8 mA

(9) I_B = 3.2 mA

(10) I_B = 1.6 mA

Fig. 5. BC817-16QCH-Q: Collector current as a function of collector-emitter voltage; typical values



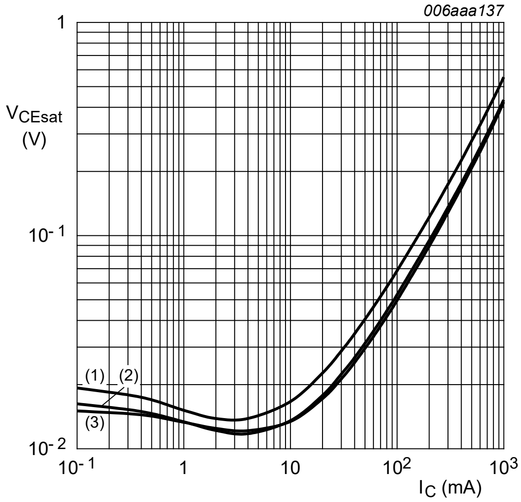
IC/IB = 10

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig. 6. BC817-16QCH-Q: Base-emitter saturation voltage as a function of collector current; typical values



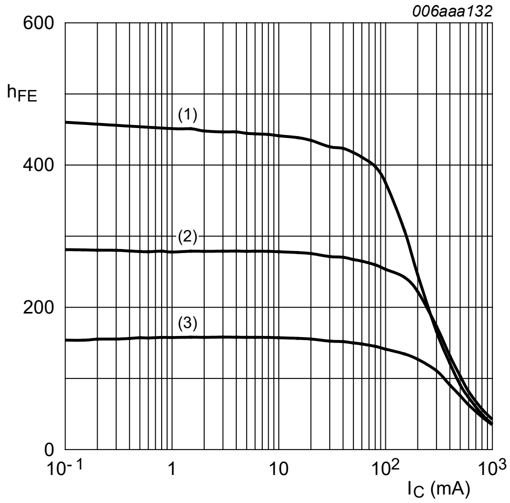
IC/IB = 10

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

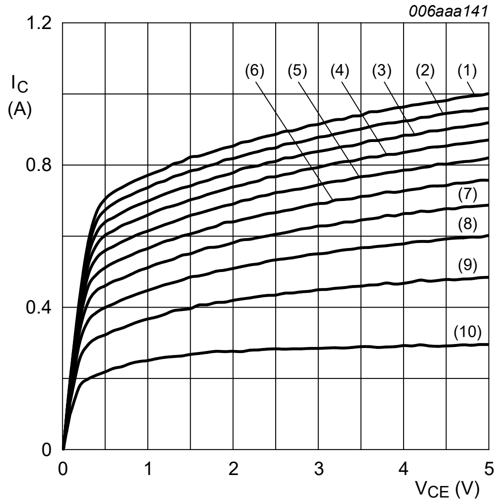
(3) T_{amb} = -55 °C

Fig. 7. BC817-16QCH-Q: Collector-emitter saturation voltage as a function of collector current; typical values



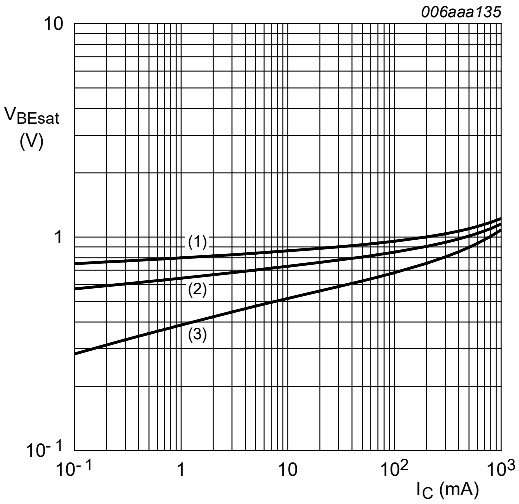
V_{CE} = 1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 8. BC817-25QCH-Q: DC current gain as a function of collector current; typical values



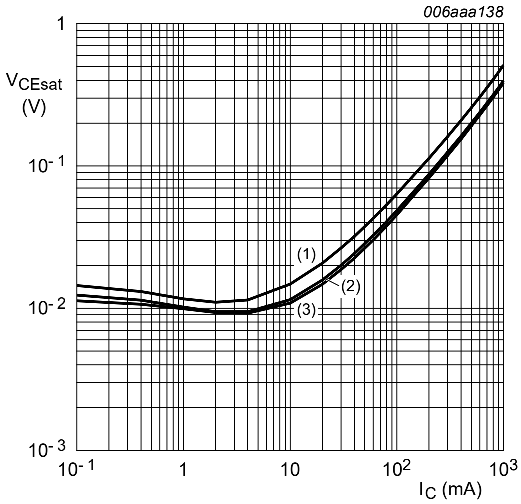
T_{amb} = 25 °C
(1) I_B = 13.0 mA
(2) I_B = 11.7 mA
(3) I_B = 10.4 mA
(4) I_B = 9.1 mA
(5) I_B = 7.8 mA
(6) I_B = 6.5 mA
(7) I_B = 5.2 mA
(8) I_B = 3.9 mA
(9) I_B = 2.6 mA
(10) I_B = 1.3 mA

Fig. 9. BC817-25QCH-Q: Collector current as a function of collector-emitter voltage; typical values



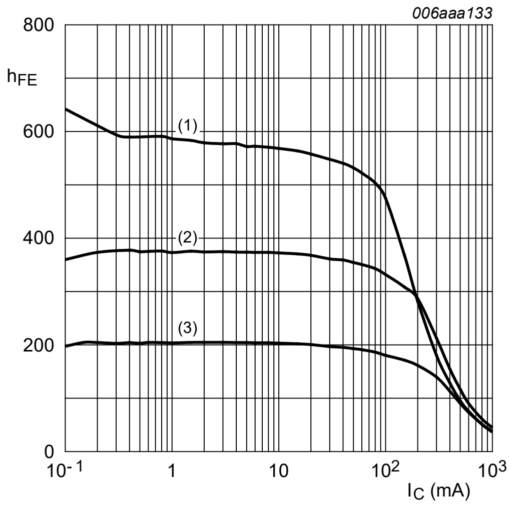
IC/IB = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 10. BC817-25QCH-Q: Base-emitter saturation voltage as a function of collector current; typical values



IC/IB = 10
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 11. BC817-25QCH-Q: Collector-emitter saturation voltage as a function of collector current; typical values



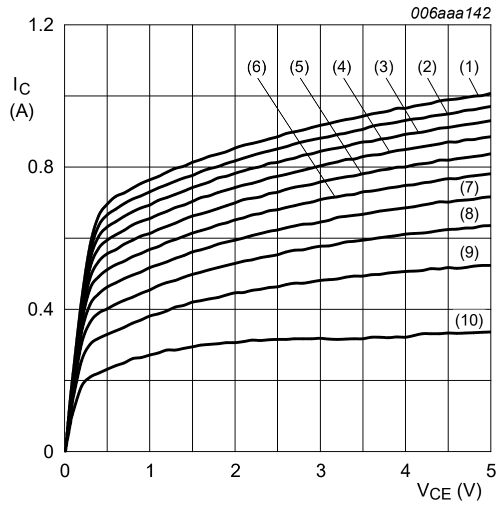
V_{CE} = 1 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 12. BC817-40QCH-Q: DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

(1) I_B = 12.0 mA

(2) I_B = 10.8 mA

(3) I_B = 9.6 mA

(4) I_B = 8.4 mA

(5) I_B = 7.2 mA

(6) I_B = 6.0 mA

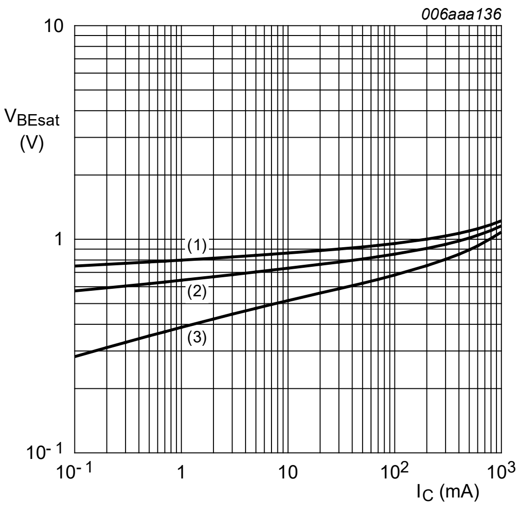
(7) I_B = 4.8 mA

(8) I_B = 3.6 mA

(9) I_B = 2.4 mA

(10) I_B = 1.2 mA

Fig. 13. BC817-40QCH-Q: Transition frequency as a function of collector current; typical values



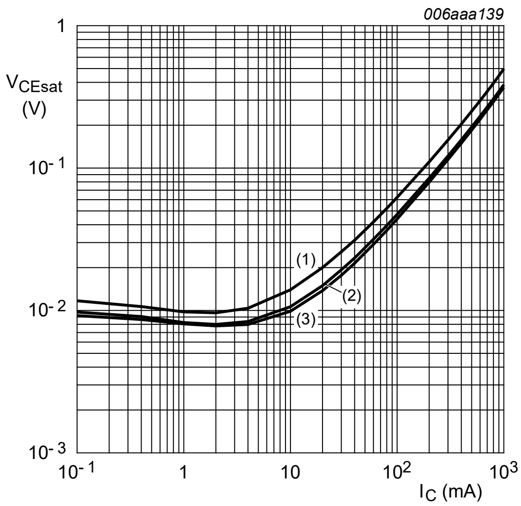
IC/IB = 10

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig. 14. BC817-40QCH-Q: Base-emitter saturation voltage as a function of collector current; typical values



IC/IB = 10

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 15. BC817-40QCH-Q: Collector-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

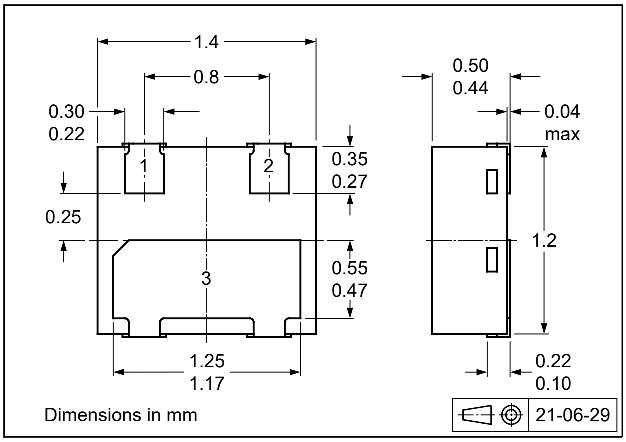


Fig. 16. Package outline DFN1412D-3 (SOT8009)

13. Soldering

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

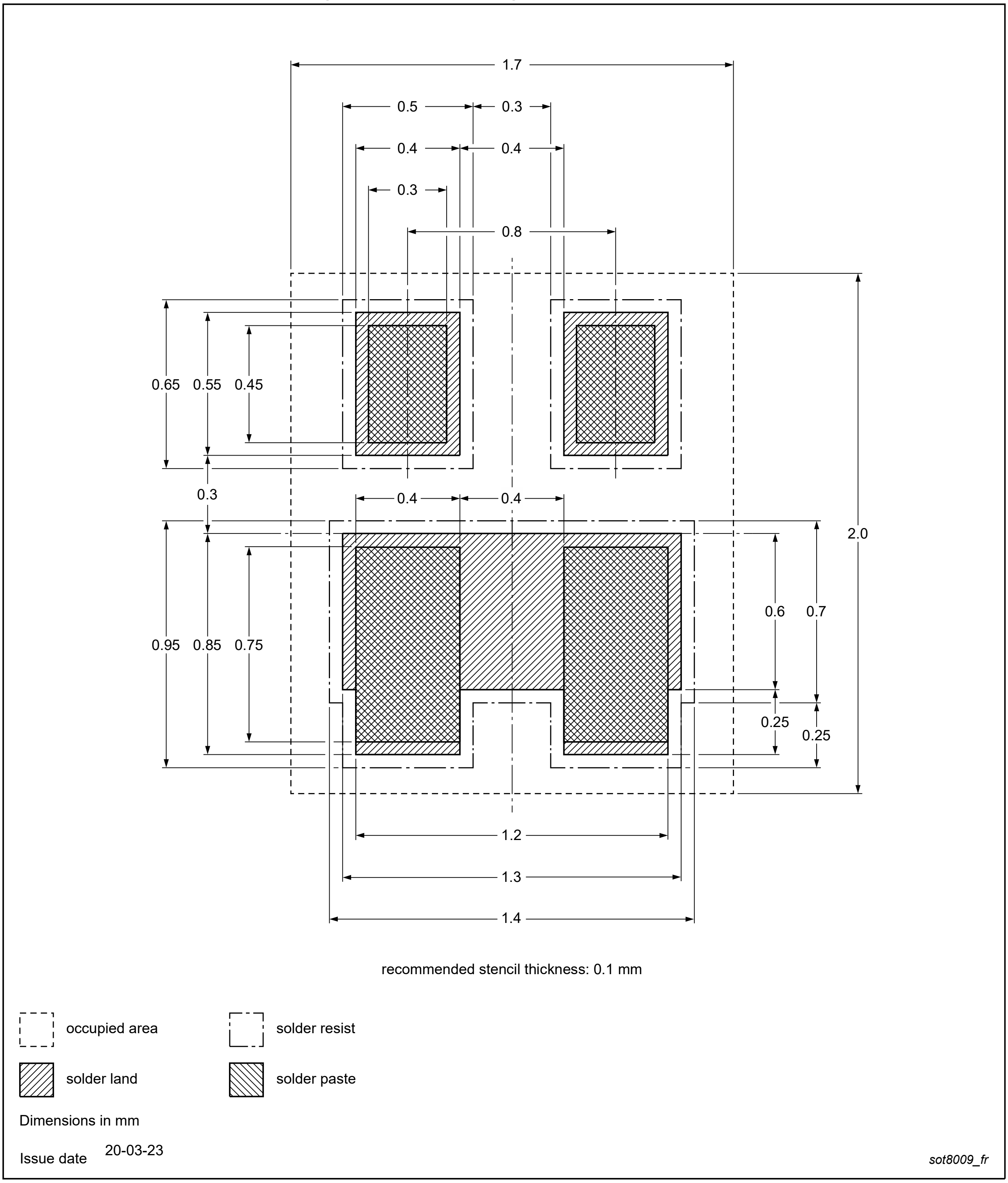


Fig. 17. Reflow soldering footprint for DFN1412D-3 (SOT8009)

14. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC817QCH-Q_SER v.1	20220125	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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Contents

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Date of release: 25 January 2022