



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

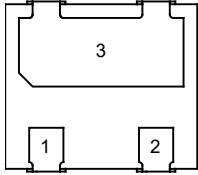
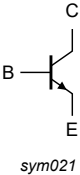
Table 2. Quick reference data

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

[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	 <p>Transparent top view DFN1412D-3 (SOT8009)</p>	 <p>sym021</p>
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		Version
	Name	Description	
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

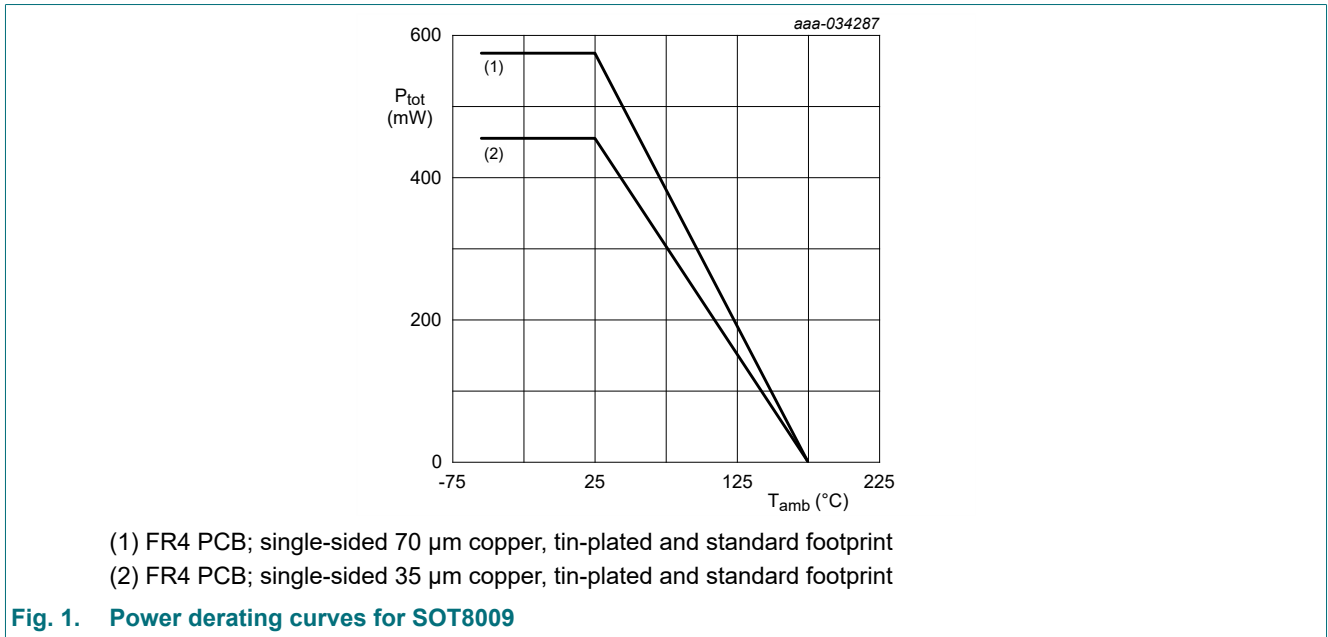
Table 6. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter; $T_{amb} = 25\text{ °C}$	-	50	V
V_{CEO}	collector-emitter voltage	open base; $T_{amb} = 25\text{ °C}$	-	45	V
V_{EBO}	emitter-base voltage	open collector; $T_{amb} = 25\text{ °C}$	-	5	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	$T_{amb} \leq 25\text{ °C}$	[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.

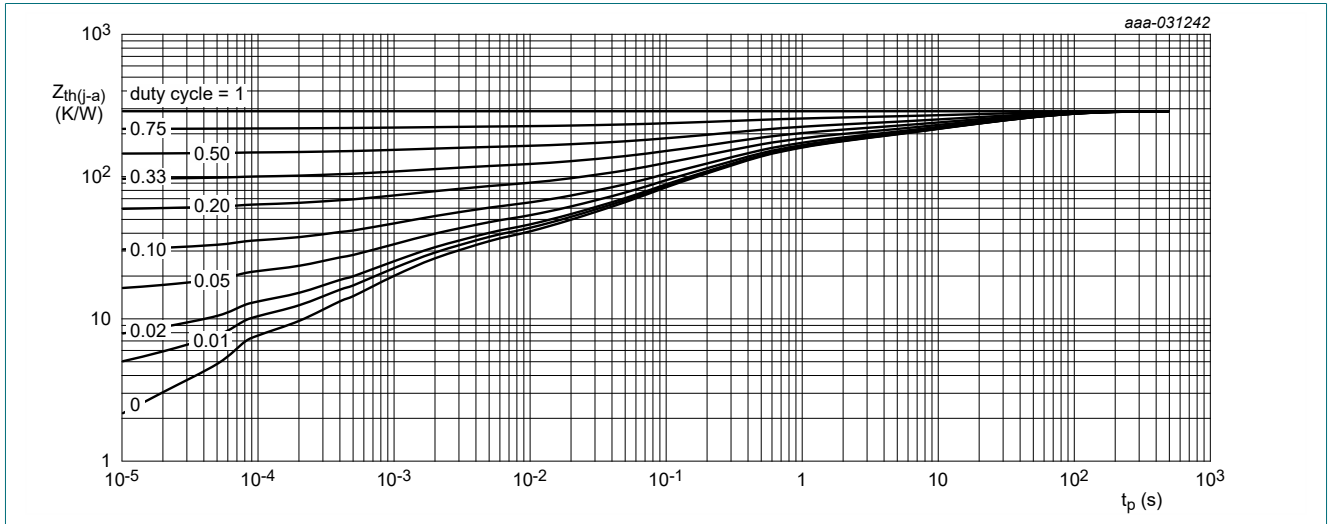


9. Thermal characteristics

Table 7. Thermal characteristics

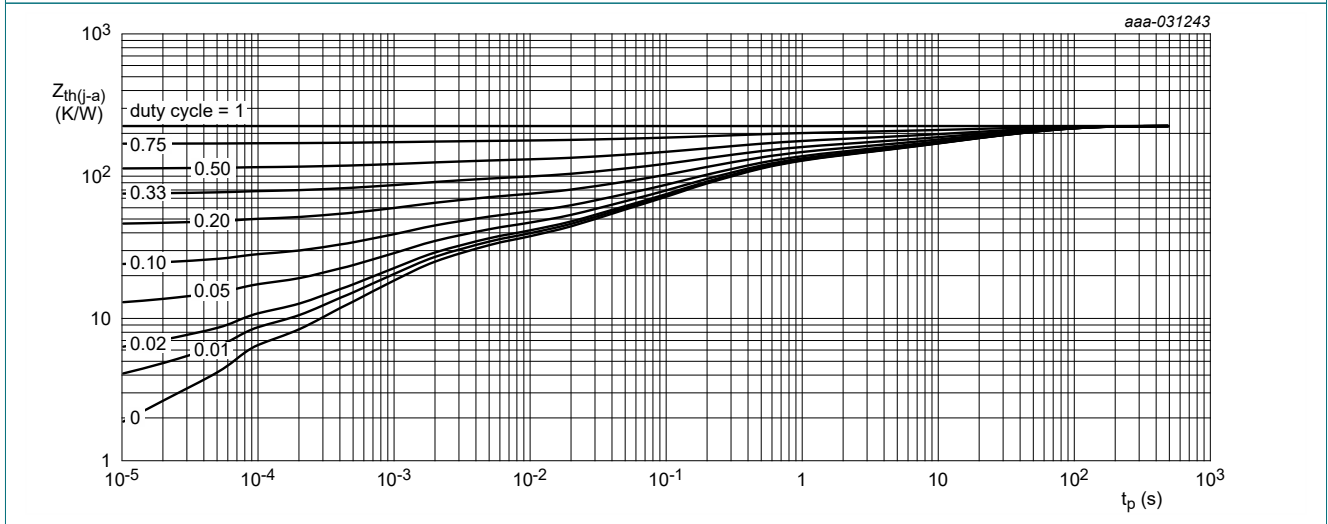
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air;	[1]	-	-	329	K/W
		$T_{amb} = 25\text{ °C}$	[2]	-	-	261	K/W

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

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

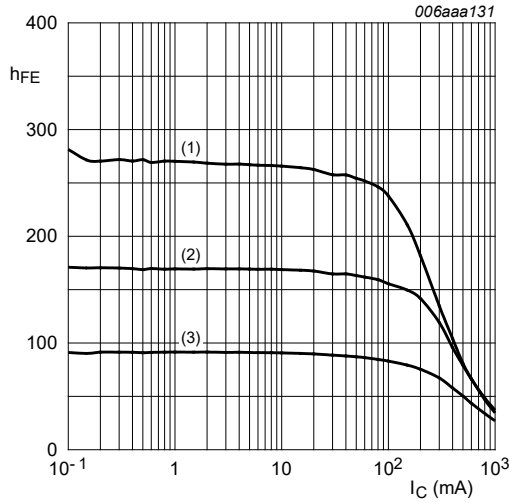
10. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100 \mu\text{A}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	50	-		V	
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 10 \text{ mA}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	45	-		V	
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 100 \mu\text{A}; I_C = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	5	-		V	
I_{CBO}	collector-base cut-off current	$V_{CB} = 20 \text{ V}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	100	nA	
		$V_{CB} = 20 \text{ V}; I_E = 0 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	-	-	5	μA	
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5 \text{ V}; I_C = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	100	nA	
h_{FE}	DC current gain						
	BC817-16QCH-Q	$V_{CE} = 1 \text{ V}; I_C = 100 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	100	-	250	
	BC817-25QCH-Q			160	-	400	
	BC817-40QCH-Q			250	-	600	
	$V_{CE} = 1 \text{ V}; I_C = 500 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	40	-	-		
V_{CEsat}	collector-emitter saturation voltage	$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	-	-	700	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] [2]	-	-	1.2	V
f_T	transition frequency	$V_{CE} = 5 \text{ V}; I_C = 10 \text{ mA}; f = 100 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	100	-	-	MHz	
C_c	collector capacitance	$V_{CB} = 10 \text{ V}; I_E = i_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	3	-	pF	

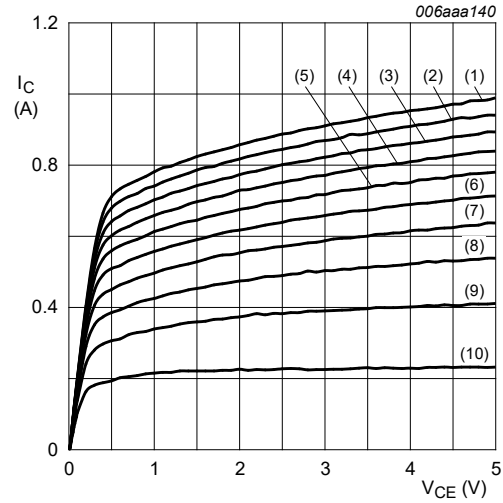
[1] pulsed; $t_p \leq 300 \mu\text{s}$; $\delta \leq 0.02$

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



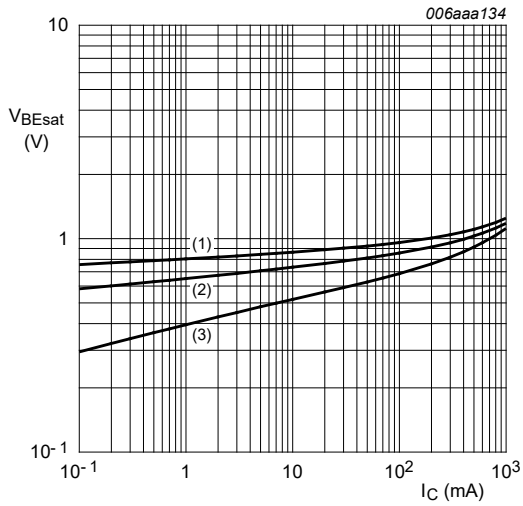
$V_{CE} = 1\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



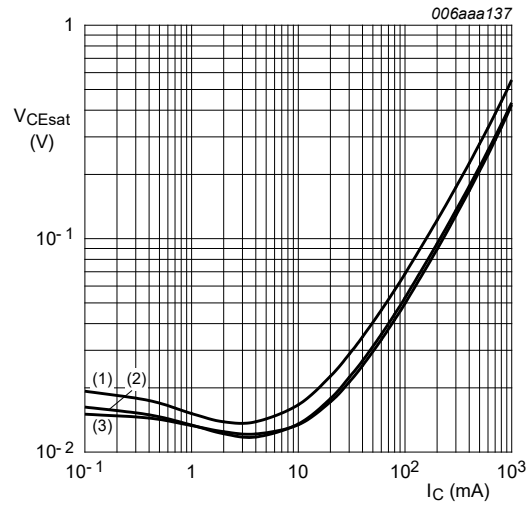
$T_{amb} = 25\text{ °C}$
 (1) $I_B = 16.0\text{ mA}$
 (2) $I_B = 14.4\text{ mA}$
 (3) $I_B = 12.8\text{ mA}$
 (4) $I_B = 11.2\text{ mA}$
 (5) $I_B = 9.6\text{ mA}$
 (6) $I_B = 8.0\text{ mA}$
 (7) $I_B = 6.4\text{ mA}$
 (8) $I_B = 4.8\text{ mA}$
 (9) $I_B = 3.2\text{ mA}$
 (10) $I_B = 1.6\text{ mA}$

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



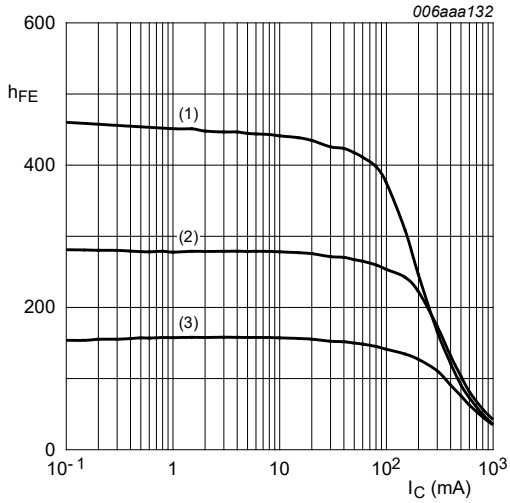
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



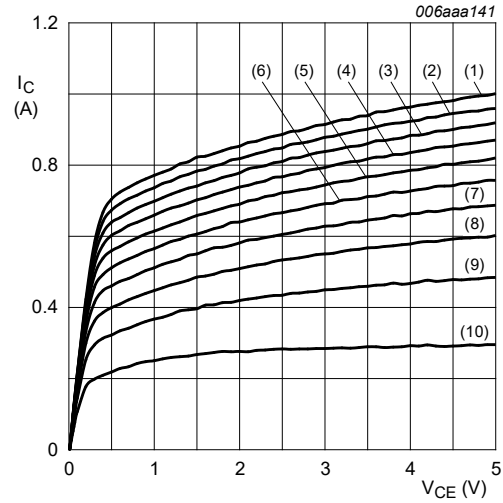
$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



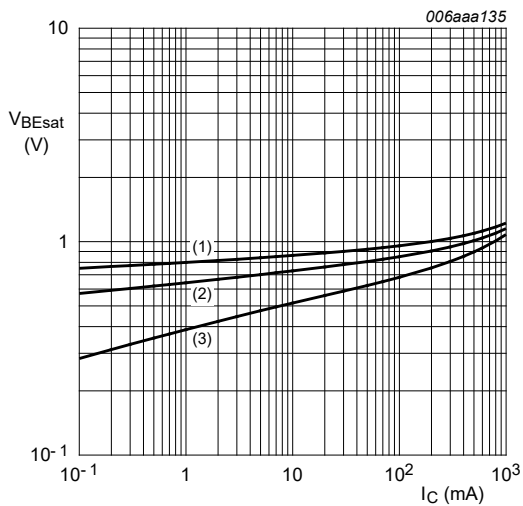
$V_{CE} = 1\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



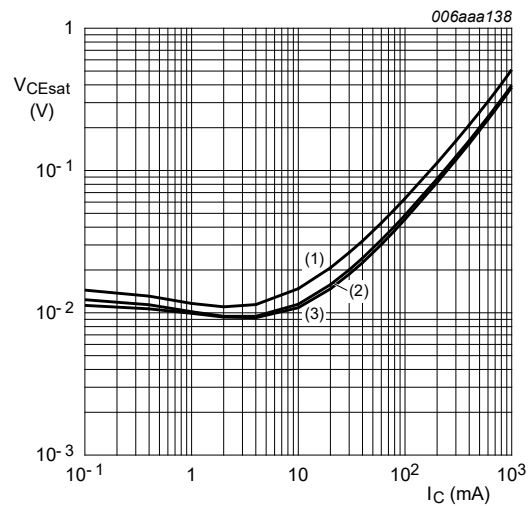
$T_{amb} = 25\text{ °C}$
 (1) $I_B = 13.0\text{ mA}$
 (2) $I_B = 11.7\text{ mA}$
 (3) $I_B = 10.4\text{ mA}$
 (4) $I_B = 9.1\text{ mA}$
 (5) $I_B = 7.8\text{ mA}$
 (6) $I_B = 6.5\text{ mA}$
 (7) $I_B = 5.2\text{ mA}$
 (8) $I_B = 3.9\text{ mA}$
 (9) $I_B = 2.6\text{ mA}$
 (10) $I_B = 1.3\text{ mA}$

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



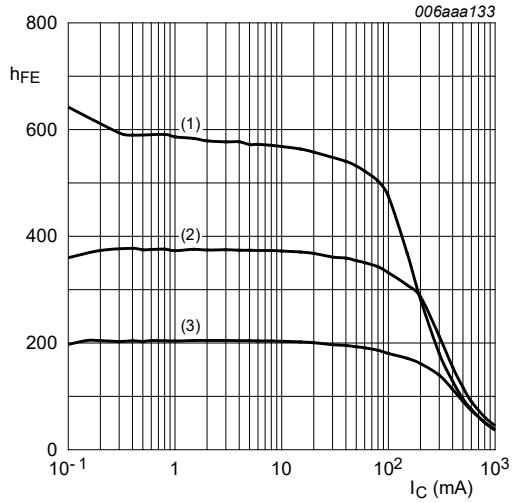
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



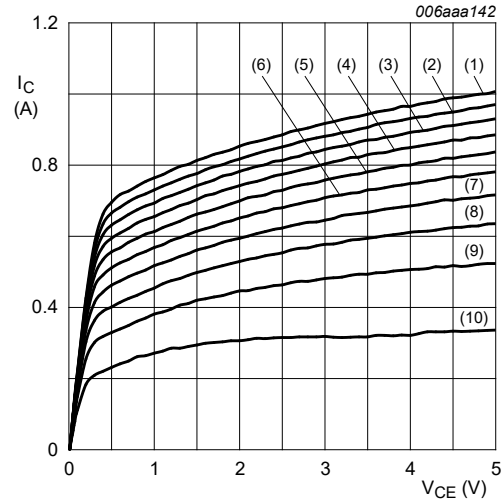
$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



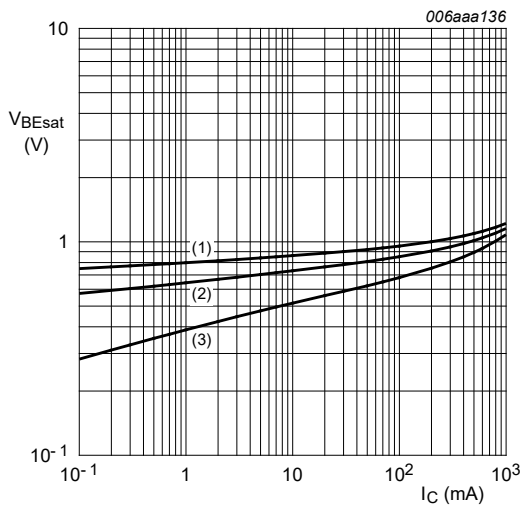
$V_{CE} = 1\text{ V}$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



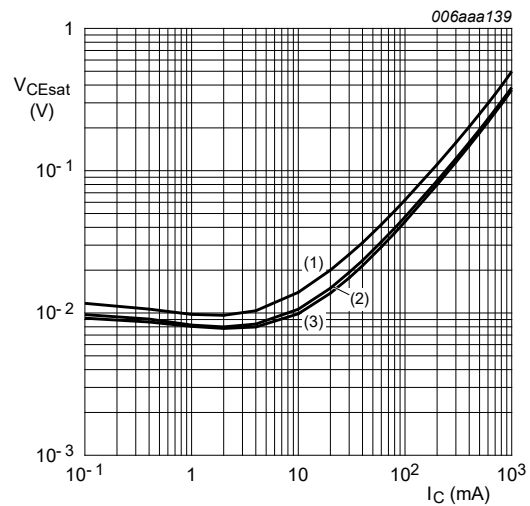
$T_{amb} = 25\text{ °C}$
 (1) $I_B = 12.0\text{ mA}$
 (2) $I_B = 10.8\text{ mA}$
 (3) $I_B = 9.6\text{ mA}$
 (4) $I_B = 8.4\text{ mA}$
 (5) $I_B = 7.2\text{ mA}$
 (6) $I_B = 6.0\text{ mA}$
 (7) $I_B = 4.8\text{ mA}$
 (8) $I_B = 3.6\text{ mA}$
 (9) $I_B = 2.4\text{ mA}$
 (10) $I_B = 1.2\text{ mA}$

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



$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



$I_C/I_B = 10$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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

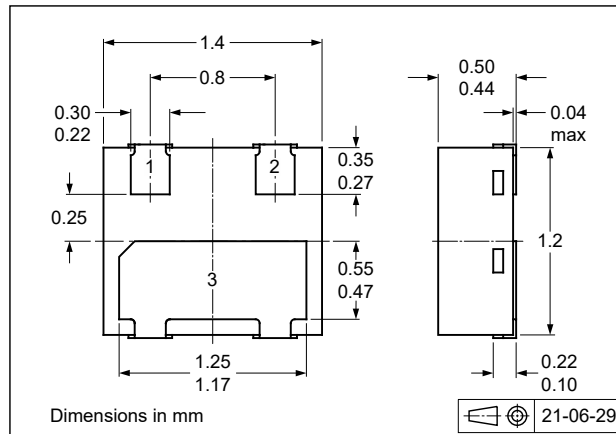


Fig. 16. Package outline DFN1412D-3 (SOT8009)

13. Soldering

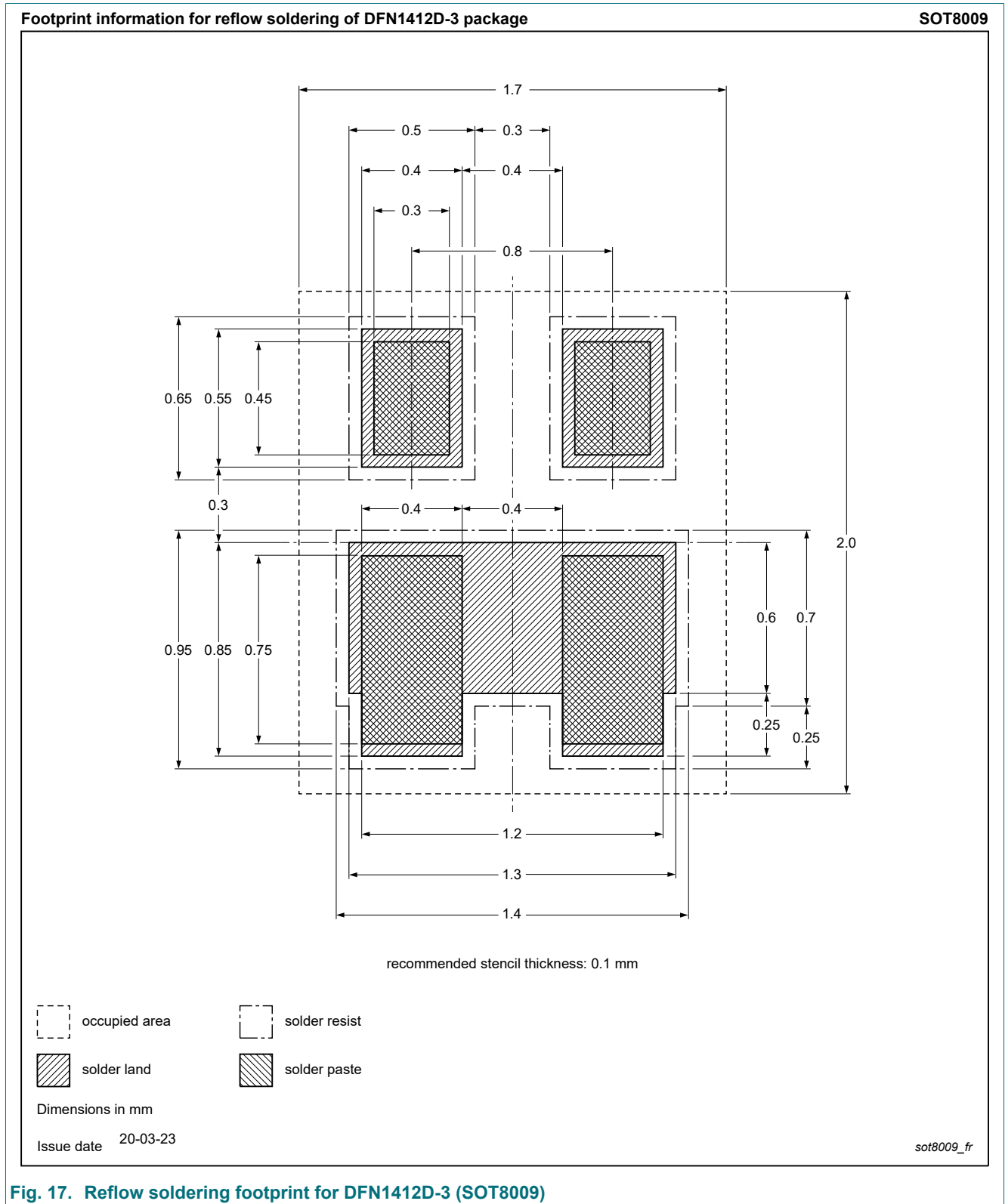


Fig. 17. Reflow soldering footprint for DFN1412D-3 (SOT8009)

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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