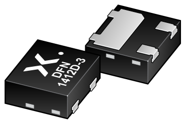


BC817QC series

45 V, 500 mA NPN general-purpose transistors

Rev. 1 — 12 May 2020 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	
BC817-16QC	DFN1412D-3	MO-340CA	SOT8009	BC807-16QC
BC817-25QC				BC807-25QC
BC817-40QC				BC807-40QC

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
- AEC-Q101 qualified

3. Applications

- General-purpose switching and amplification
- Space restricted applications

4. Quick reference data

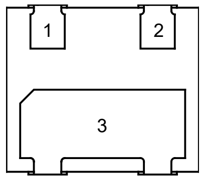
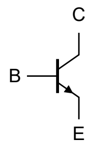
Table 2. Quick reference data

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						
	BC817-16QC	V_{CE} = 1 V; I_C = 100 mA T_{amb} = 25 °C	[1]	100	-	250	
	BC817-25QC		[1]	160	-	400	
	BC817-40QC		[1]	250	-	600	

[1] pulsed; t_p ≤ 300 µs; δ ≤ 0.02

5. Pinning information

Table 3. Pinning

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

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	**Description**	**Version**
BC817-16QC	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)
BC817-25QC			
BC817-40QC			

7. Marking

Table 5. Marking

Type number	Marking code
BC817-16QC	9M
BC817-25QC	9N
BC817-40QC	9P

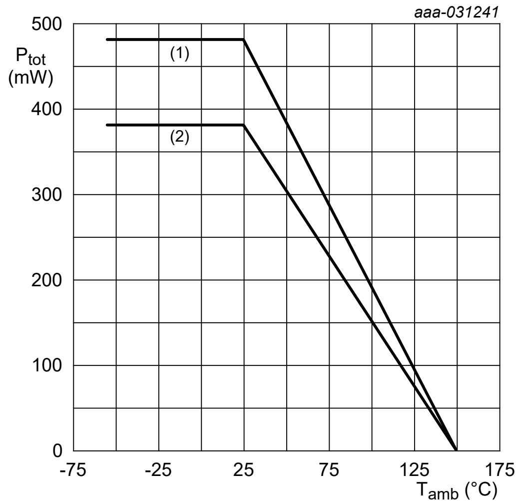
8. Limiting values

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]	-	380	mW
			[2]	-	480	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 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
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	40	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.

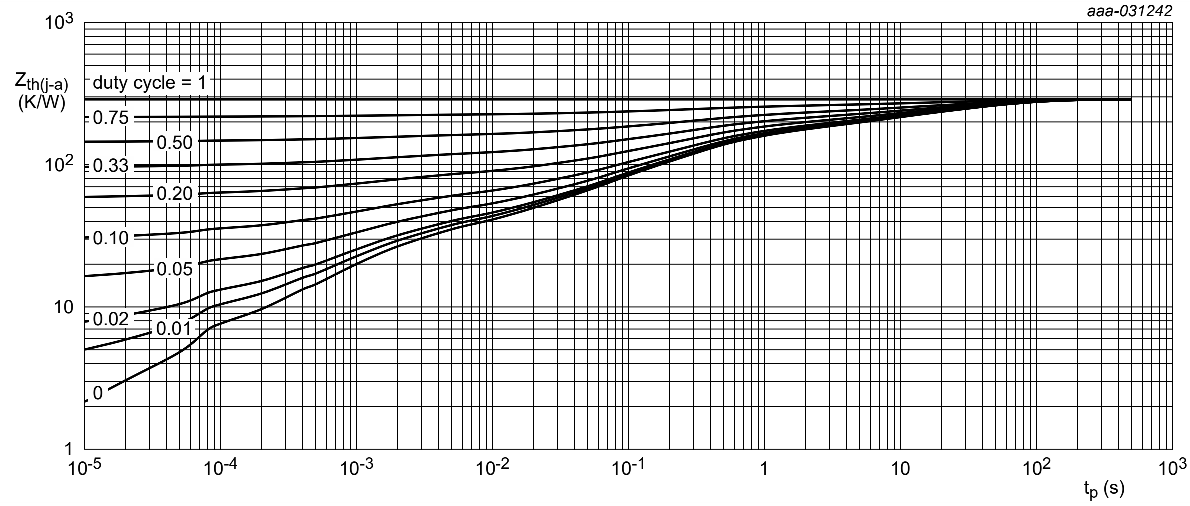


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

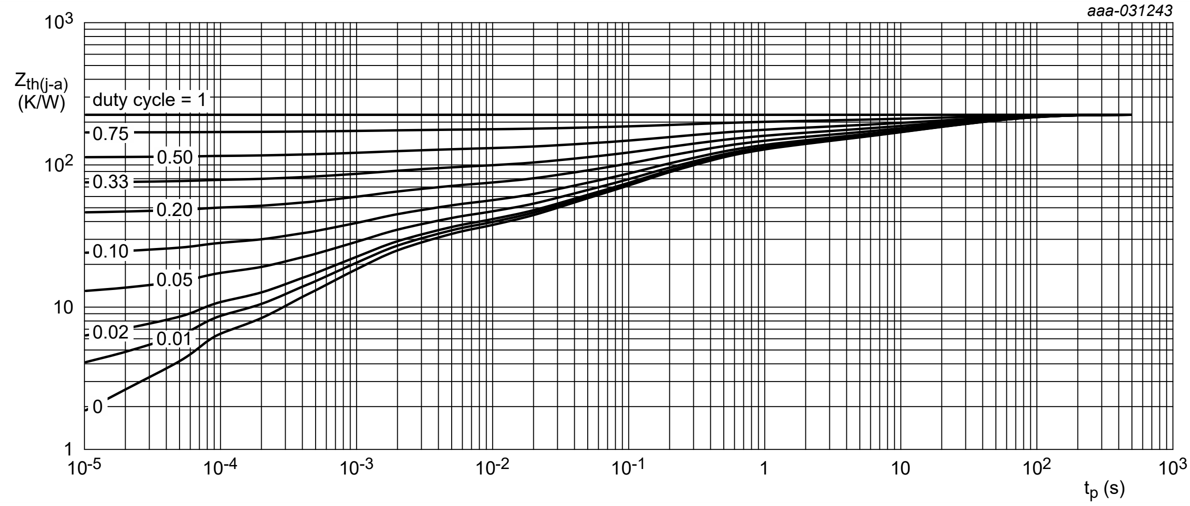


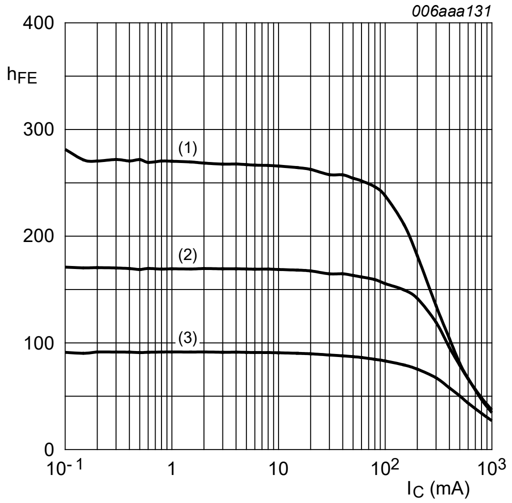
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 8. Characteristics

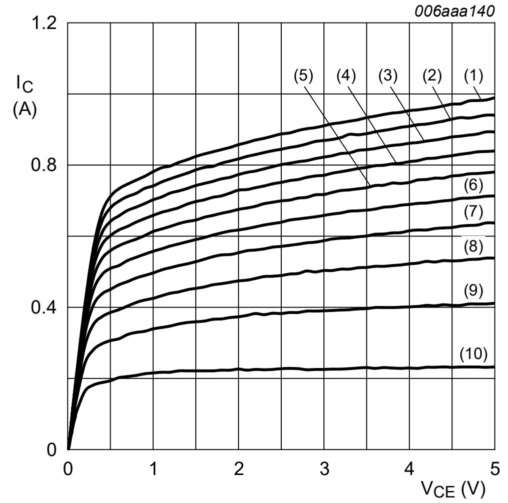
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 100 µA; I_E = 0 A; T_{amb} = 25 °C		50	-		V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 10 mA; I_E = 0 A; T_{amb} = 25 °C		45	-		V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 100 µA; 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						
	BC817-16QC	V_{CE} = 1 V; I_C = 100 mA; T_{amb} = 25 °C	[1]	100	-	250	
	BC817-25QC	V_{CE} = 1 V; I_C = 100 mA; T_{amb} = 25 °C	[1]	160	-	400	
	BC817-40QC	V_{CE} = 1 V; I_C = 100 mA; T_{amb} = 25 °C	[1]	250	-	600	
		V_{CE} = 1 V; I_C = 500 mA; T_{amb} = 25 °C		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]	-	-	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



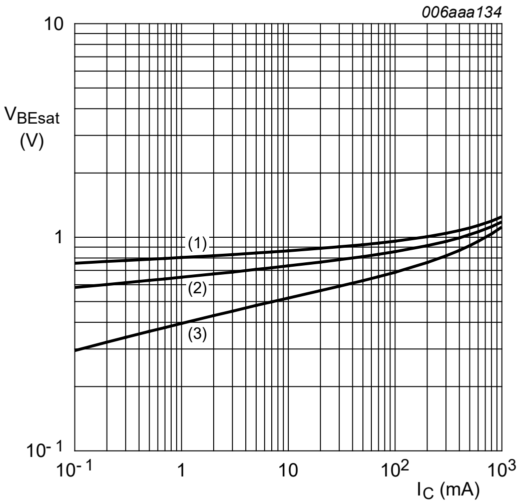
V_{CE} = 1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



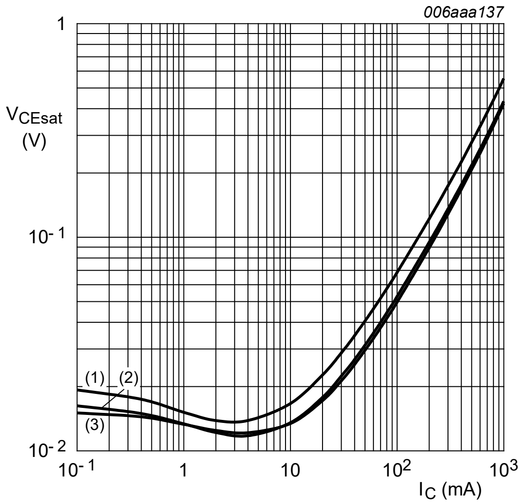
T_{amb} = 25 °C
(1) I_B = 16.0 mA
(2) I_B = 14.4 mA
(3) I_B = 12.8 mA
(4) I_B = 11.2 mA
(5) I_B = 9.6 mA
(6) I_B = 8.0 mA
(7) I_B = 6.4 mA
(8) I_B = 4.8 mA
(9) I_B = 3.2 mA
(10) I_B = 1.6 mA

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



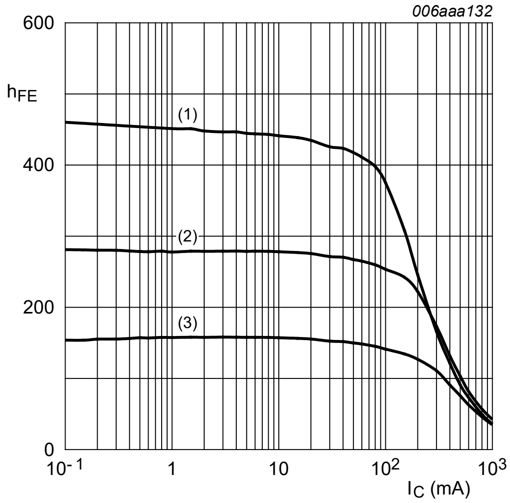
IC/IB = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

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



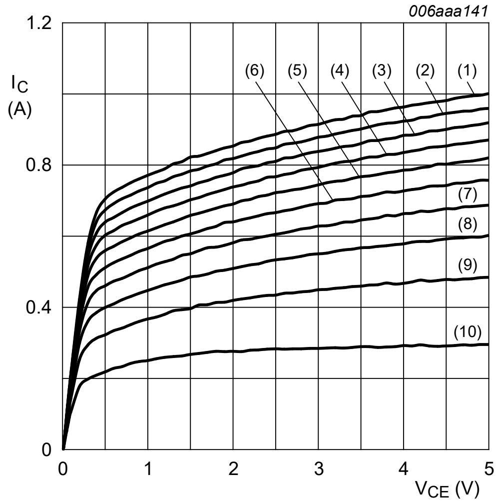
IC/IB = 10
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



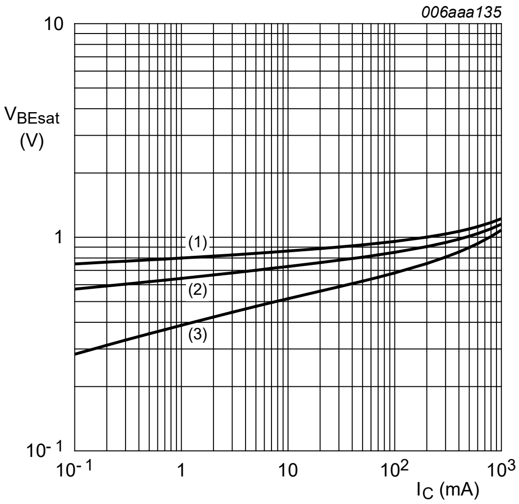
V_{CE} = 1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



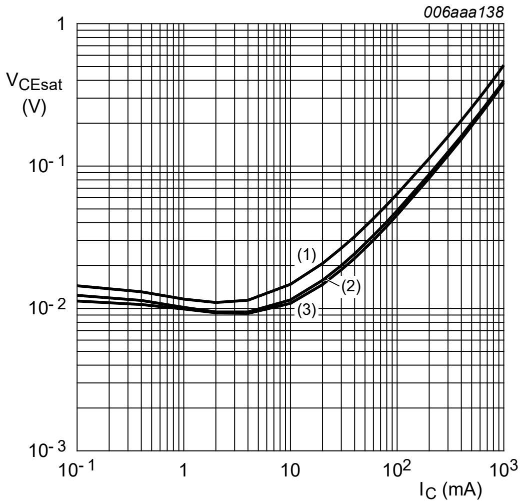
T_{amb} = 25 °C
(1) I_B = 13.0 mA
(2) I_B = 11.7 mA
(3) I_B = 10.4 mA
(4) I_B = 9.1 mA
(5) I_B = 7.8 mA
(6) I_B = 6.5 mA
(7) I_B = 5.2 mA
(8) I_B = 3.9 mA
(9) I_B = 2.6 mA
(10) I_B = 1.3 mA

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



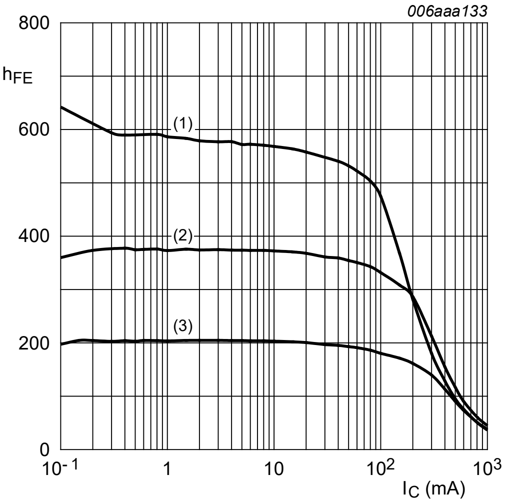
IC/IB = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

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



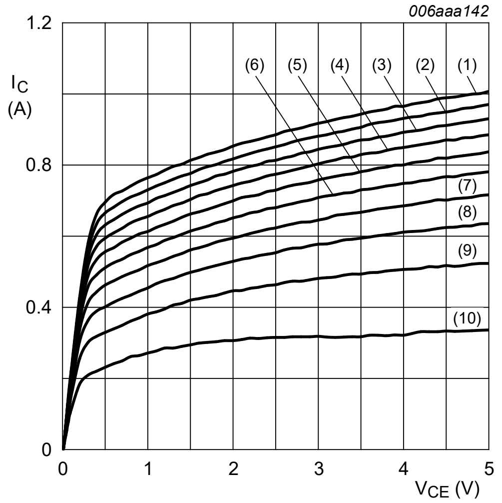
IC/IB = 10
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



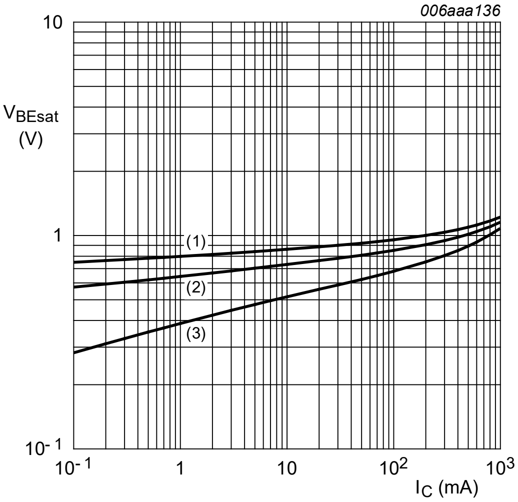
V_{CE} = 1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



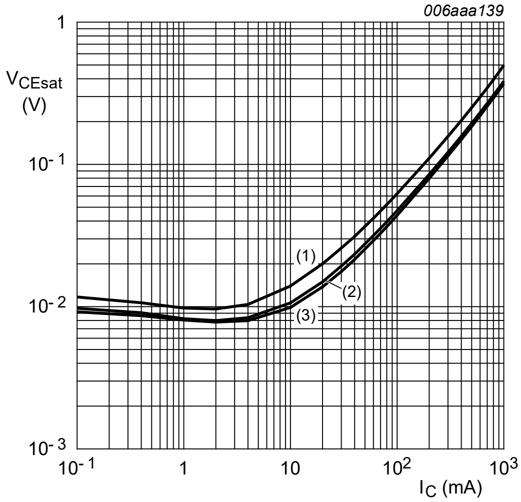
T_{amb} = 25 °C
(1) I_B = 12.0 mA
(2) I_B = 10.8 mA
(3) I_B = 9.6 mA
(4) I_B = 8.4 mA
(5) I_B = 7.2 mA
(6) I_B = 6.0 mA
(7) I_B = 4.8 mA
(8) I_B = 3.6 mA
(9) I_B = 2.4 mA
(10) I_B = 1.2 mA

Fig. 13. BC817-40QC: 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. BC817-40QC: 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. BC817-40QC: Collector-emitter saturation voltage as a function of collector current; typical values

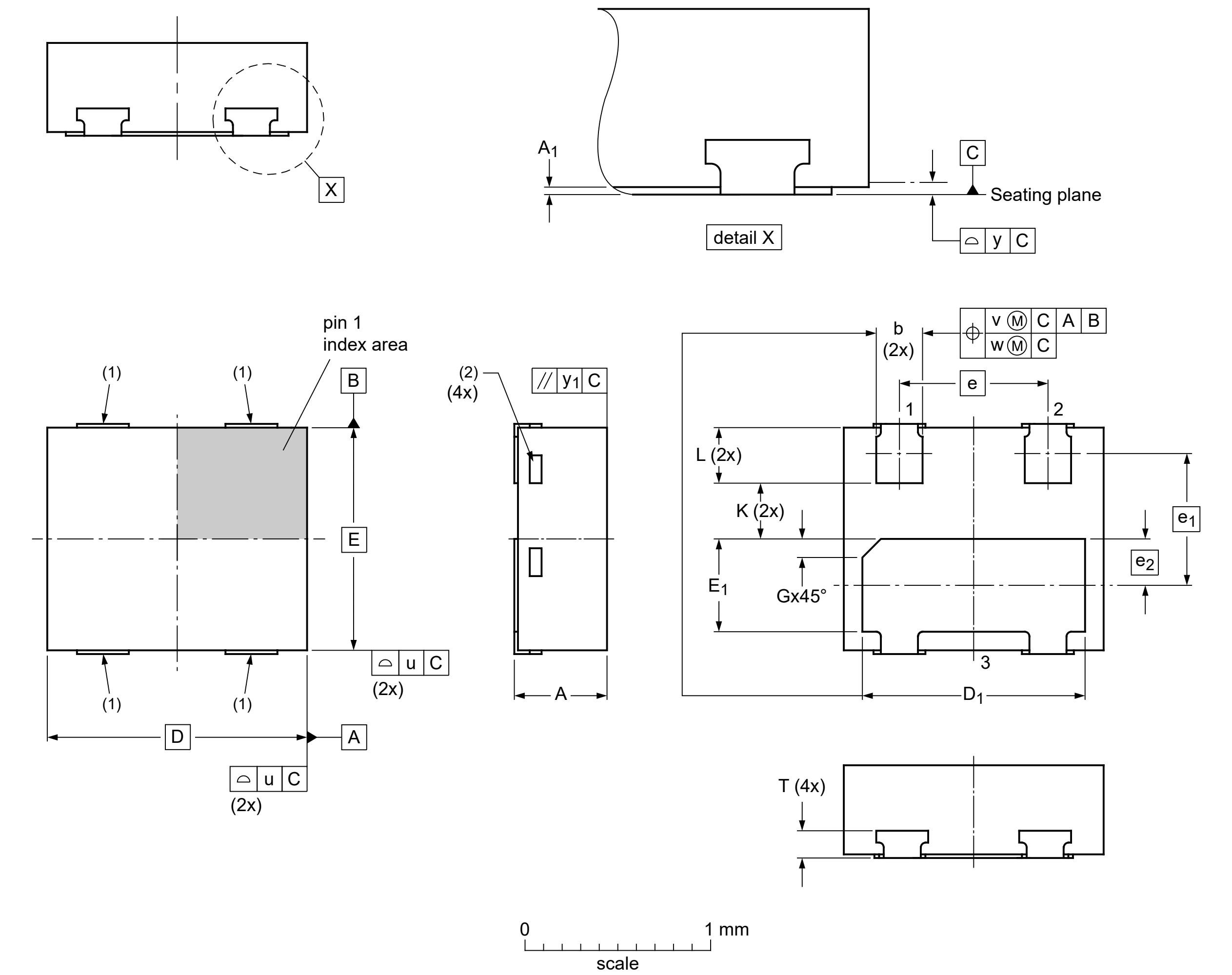
11. Test information

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

DFN1412D-3: plastic, leadless extremely thin small outline package with side-wettable flanks (SWF); 3 terminals; 0.8 mm pitch; 1.4 mm x 1.2 mm x 0.48 mm body **SOT8009**



Dimensions (mm are the original dimensions)

Unit		A	A_1	b	D	D_1	E	E_1	e	e_1	e_2	G	K	L	T	u	v	w	y	y1
	max	0.50	0.04	0.30		1.25		0.55						0.35	0.22					
mm	nom	0.47		0.25	1.4	1.20	1.2	0.50	0.8	0.71	0.26	0.09 (ref)		0.30	0.16	0.05	0.1	0.05	0.05	0.05
	min	0.44		0.22		1.17		0.47					0.25	0.27	0.10					

Note
1. Side Wettable Flank, protrusion max. 0.02 mm.
2. Visible depend upon used manufacturing technology.
Dimension A and T are including plating thickness.

sot8009_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT8009		MO-340CA				~~19-12-04~~ 19-12-06

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

13. Soldering

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

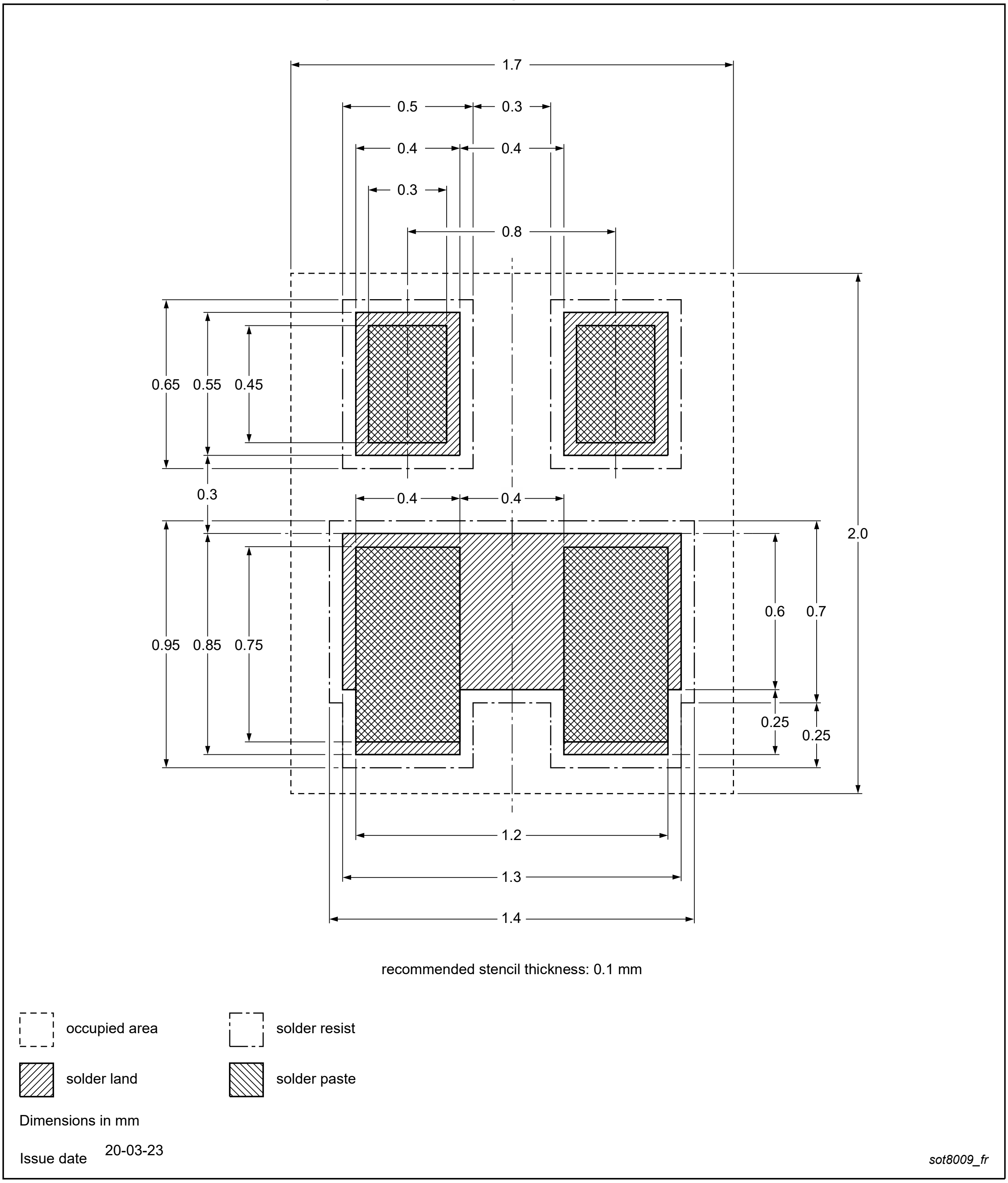


Fig. 17. Reflow soldering footprint for SOT8009 (DFN1412D-3)

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC817QC_SER v.1	20200512	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: 12 May 2020