

# BC817-25QA; BC817-40QA

45 V, 500 mA NPN general-purpose transistors

Rev. 1 — 3 September 2013

Product data sheet

## 1. Product profile

### 1.1 General description

500 mA NPN general-purpose transistors in a leadless ultra small DFN1010D-3 (SOT1215) Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

Table 1. Product overview

Type number	Package		PNP complement
	Nexperia	JEITA	
BC817-25QA	DFN1010D-3	-	BC807-25QA
BC817-40QA	(SOT1215)		BC807-40QA

### 1.2 Features and benefits

- General-purpose transistor
- Two current gain selections
- Low package height of 0.37 mm
- AEC-Q101 qualified

### 1.3 Applications

- General-purpose switching and amplification
- Mobile applications

### 1.4 Quick reference data

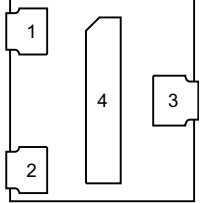
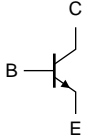
Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base	-	-	45	V
$I_C$	collector current		-	-	500	mA
$h_{FE}$	DC current gain	$V_{CE} = 1\text{ V}; I_C = 100\text{ mA}$	[1]			
	BC817-25QA		160	-	400	
	BC817-40QA		250	-	600	

[1] Pulse test:  $t_p \leq 300\ \mu\text{s}$ ;  $\delta \leq 0.02$ .

## 2. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 <p>Transparent top view</p>	 <p>sym123</p>
2	E	emitter		
3	C	collector		
4	C	collector		

## 3. Ordering information

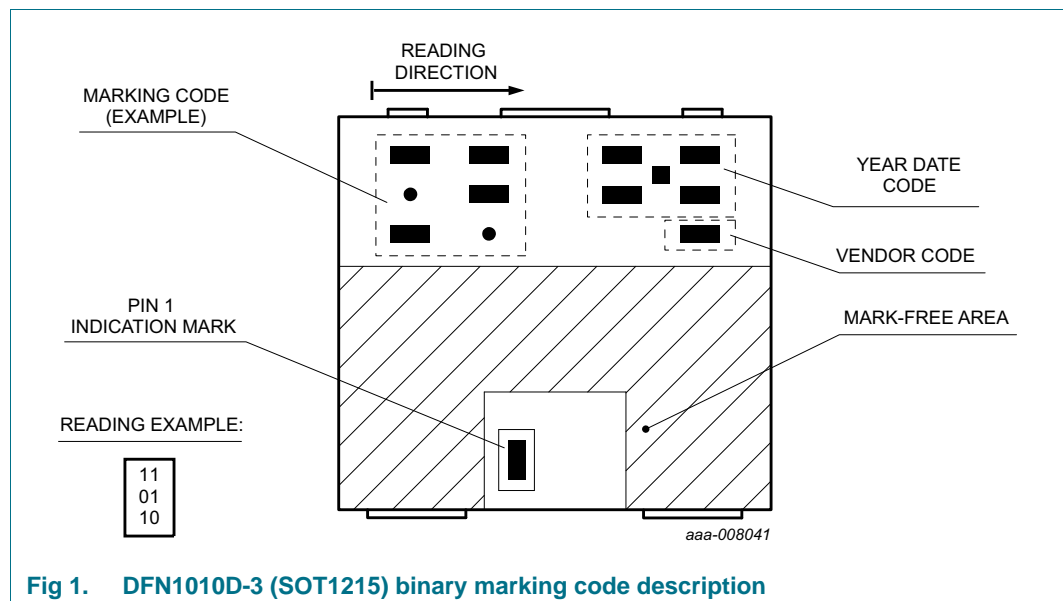
Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC817-25QA	DFN1010D-3	plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals;	SOT1215
BC817-40QA		body: 1.1 × 1.0 × 0.37 mm	

## 4. Marking

Table 5. Marking codes

Type number	Marking code
BC817-25QA	11 01 00
BC817-40QA	10 11 00



## 5. Limiting values

**Table 6. Limiting values**

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

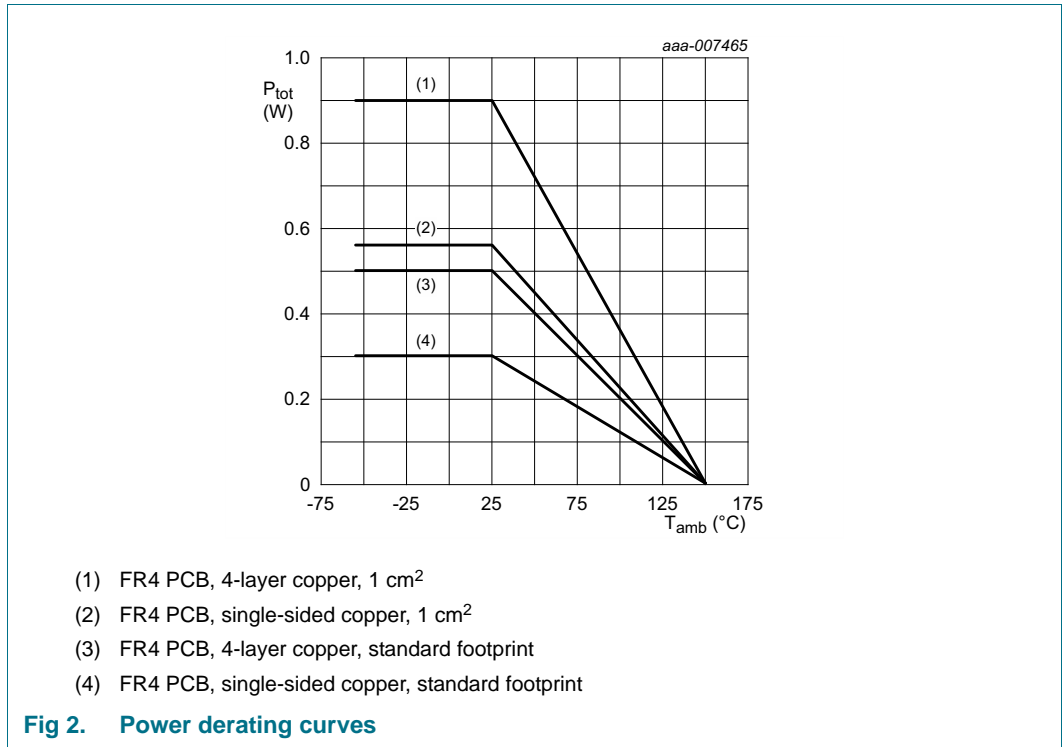
Symbol	Parameter	Conditions	Min	Max	Unit	
$V_{CBO}$	collector-base voltage	open emitter	-	50	V	
$V_{CEO}$	collector-emitter voltage	open base	-	45	V	
$V_{EBO}$	emitter-base voltage	open collector	-	5	V	
$I_C$	collector current		-	500	mA	
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	1	A	
$I_{BM}$	peak base current	single pulse; $t_p \leq 1$ ms	-	200	mA	
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	300	mW
			[2]	-	500	mW
			[3]	-	560	mW
			[4]	-	900	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 copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated mounting pad for collector 1 cm<sup>2</sup>.

[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated mounting pad for collector 1 cm<sup>2</sup>.



## 6. Thermal characteristics

**Table 7. Thermal characteristics**

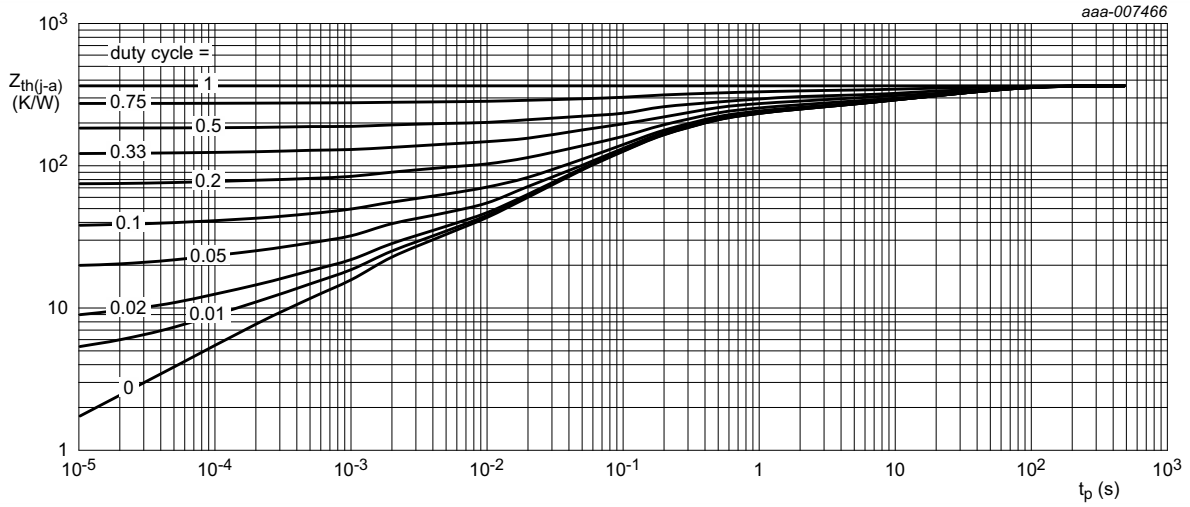
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	-	417	K/W
			[2]	-	-	250	K/W
			[3]	-	-	223	K/W
			[4]	-	-	139	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.

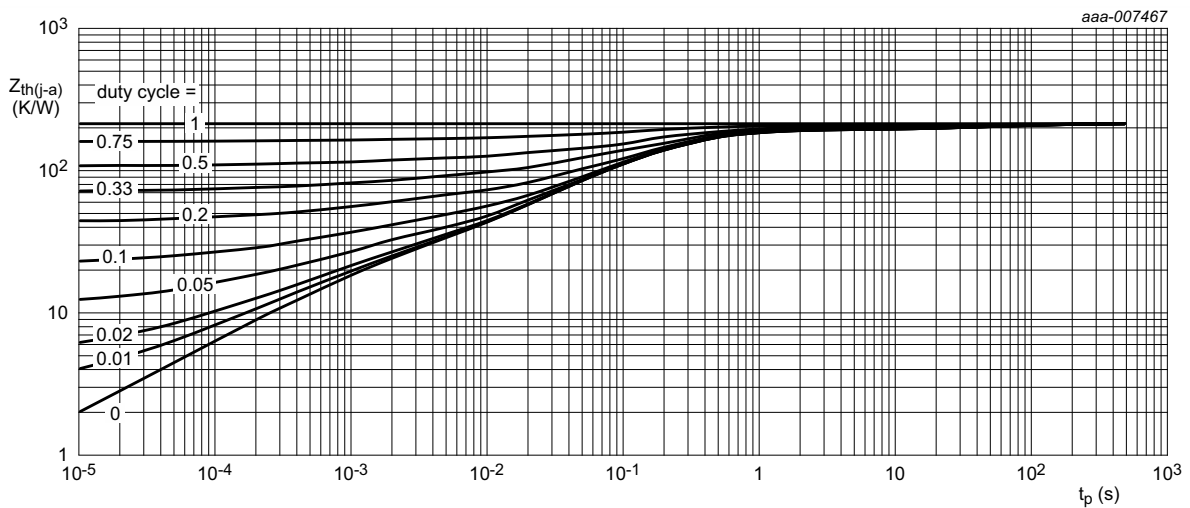
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated mounting pad for collector 1 cm<sup>2</sup>.

[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated mounting pad for collector 1 cm<sup>2</sup>.



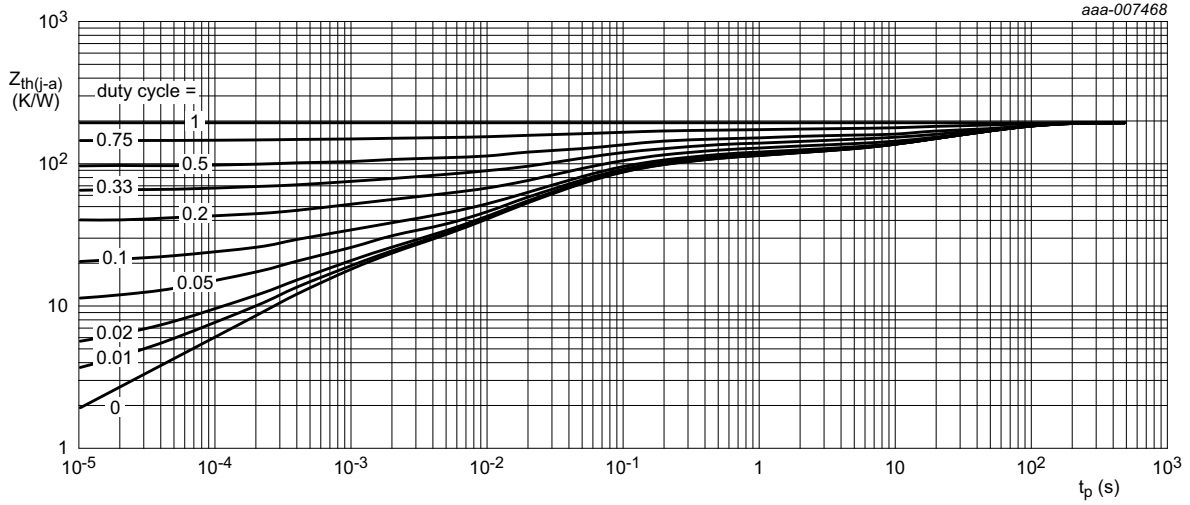
FR4 PCB, single-sided copper, standard footprint

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



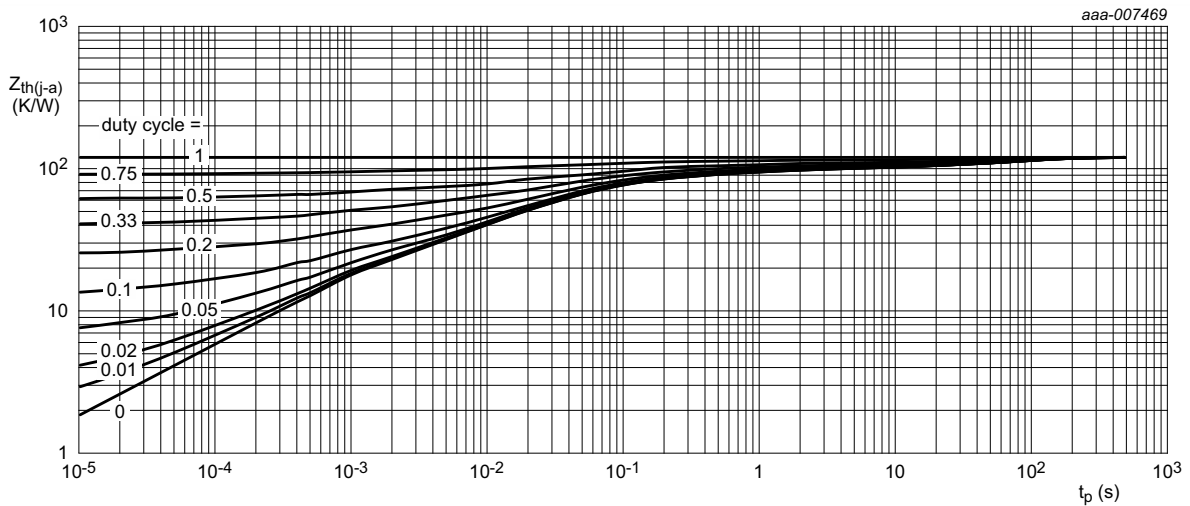
FR4 PCB, 4-layer copper, standard footprint

**Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**



FR4 PCB, single-sided copper,  $1\text{ cm}^2$

**Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**



FR4 PCB, 4-layer copper,  $1\text{ cm}^2$

**Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

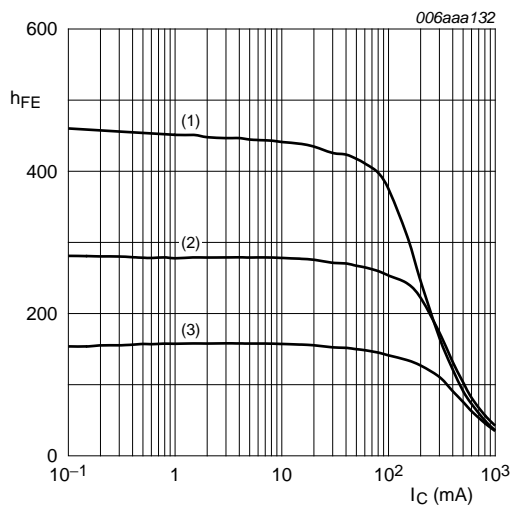
## 7. Characteristics

**Table 8. Characteristics**

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

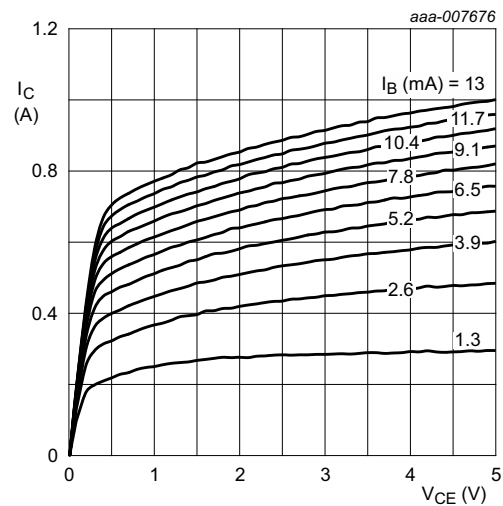
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 20\text{ V}; I_E = 0\text{ A}$	-	-	100	nA
		$V_{CB} = 20\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$	-	-	5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	-	-	100	nA
$h_{FE}$	DC current gain	$V_{CE} = 1\text{ V}; I_C = 100\text{ mA}$	[1]	-	-	-
		BC817-25QA	160	-	400	
		BC817-40QA	250	-	600	
$h_{FE}$	DC current gain	$V_{CE} = 1\text{ V}; I_C = 500\text{ mA}$	[1]	40	-	-
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	[1]	-	-	700 mV
$V_{BE}$	base-emitter voltage	$I_C = 500\text{ mA}; V_{CE} = 1\text{ V}$	[1]	-	-	1.2 V
$C_c$	collector capacitance	$V_{CB} = 10\text{ V}; I_E = I_C = 0\text{ A}; f = 1\text{ MHz}$	-	3	-	pF
$f_T$	transition frequency	$V_{CE} = 5\text{ V}; I_C = 10\text{ mA}; f = 100\text{ MHz}$	100	-	-	MHz

[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ .



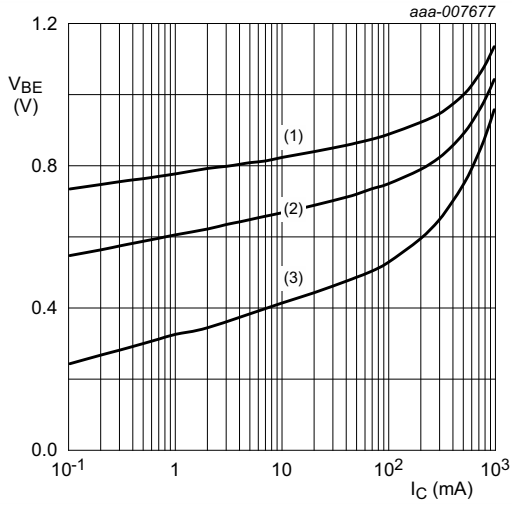
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

**Fig 7. BC817-25QA: DC current gain as a function of collector current; typical values**



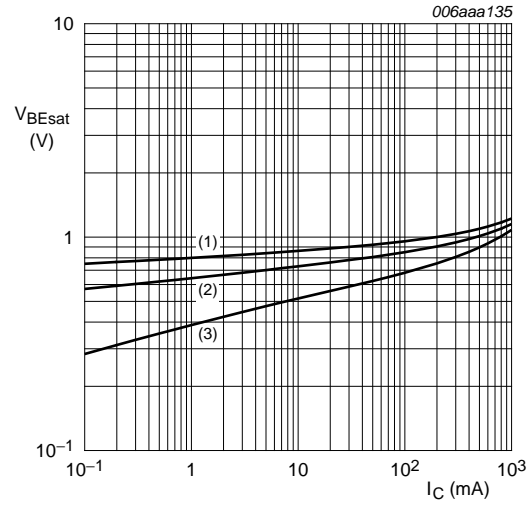
$T_{amb} = 25\text{ °C}$

**Fig 8. BC817-25QA: Collector current as a function of collector-emitter voltage; typical values**



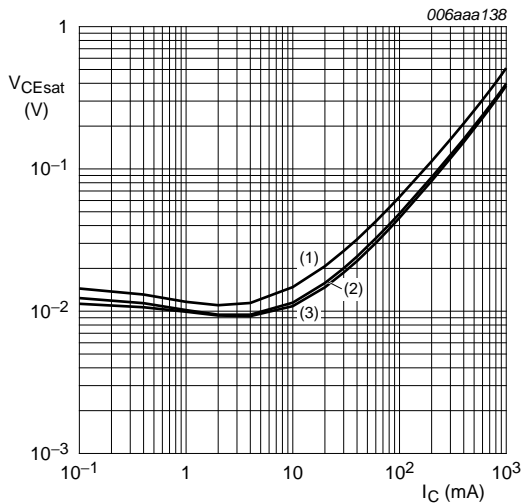
- $V_{CE} = 1\text{ V}$
- (1)  $T_{amb} = -55\text{ °C}$
  - (2)  $T_{amb} = 25\text{ °C}$
  - (3)  $T_{amb} = 100\text{ °C}$

**Fig 9. BC817-25QA: Base-emitter voltage as a function of collector current; typical values**



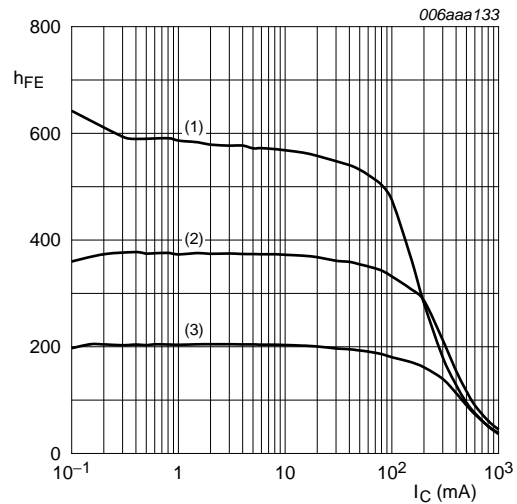
- $I_C/I_B = 10$
- (1)  $T_{amb} = -55\text{ °C}$
  - (2)  $T_{amb} = 25\text{ °C}$
  - (3)  $T_{amb} = 100\text{ °C}$

**Fig 10. BC817-25QA: Base-emitter saturation voltage 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)  $T_{amb} = 100\text{ °C}$

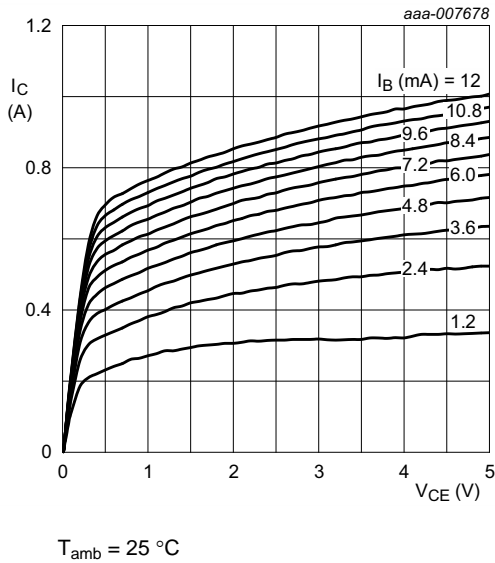
**Fig 11. BC817-25QA: Collector-emitter saturation voltage as a function of collector current; typical values**



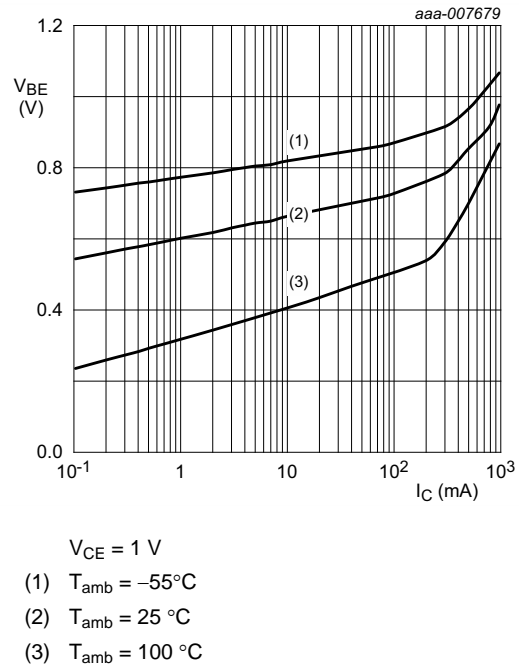
- $V_{CE} = 1\text{ V}$
- (1)  $T_{amb} = 100\text{ °C}$
  - (2)  $T_{amb} = 25\text{ °C}$
  - (3)  $T_{amb} = -55\text{ °C}$

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

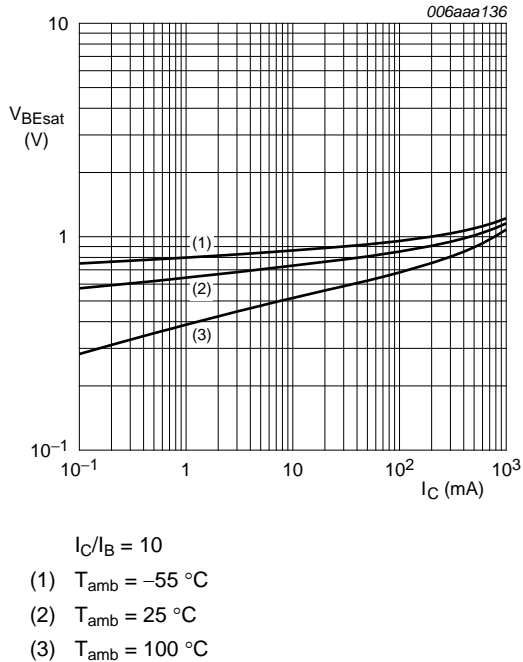




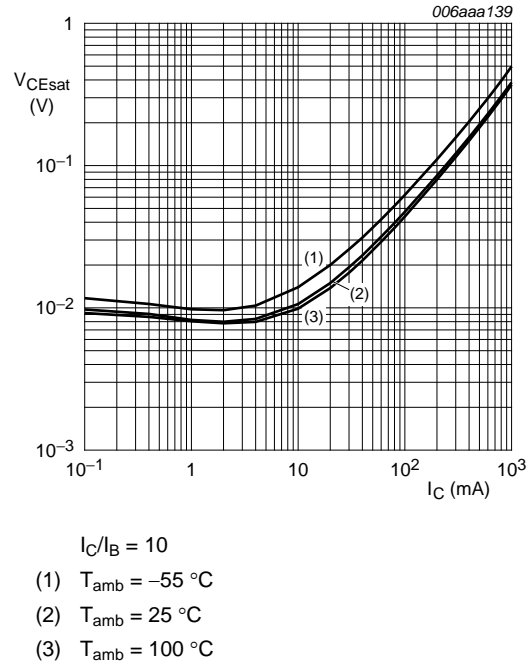
**Fig 13. BC817-40QA: Collector current as a function of collector-emitter voltage; typical values**



**Fig 14. BC817-40QA: Base-emitter voltage as a function of collector current; typical values**



**Fig 15. BC817-40QA: Base-emitter saturation voltage as a function of collector current; typical values**



**Fig 16. BC817-40QA: Collector-emitter saturation voltage as a function of collector current; typical values**

## 8. Test information

### 8.1 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.

## 9. Package outline

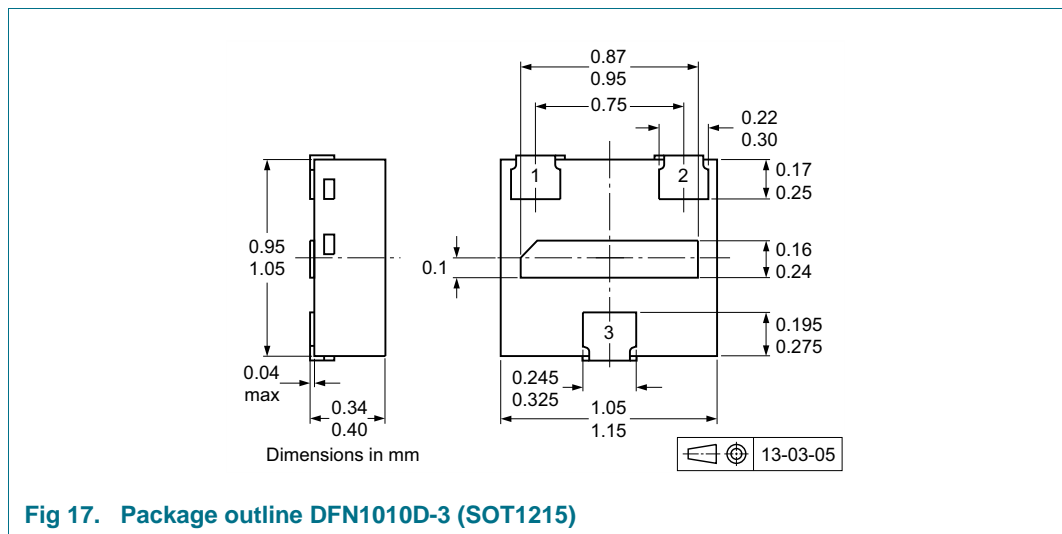


Fig 17. Package outline DFN1010D-3 (SOT1215)

10. Soldering

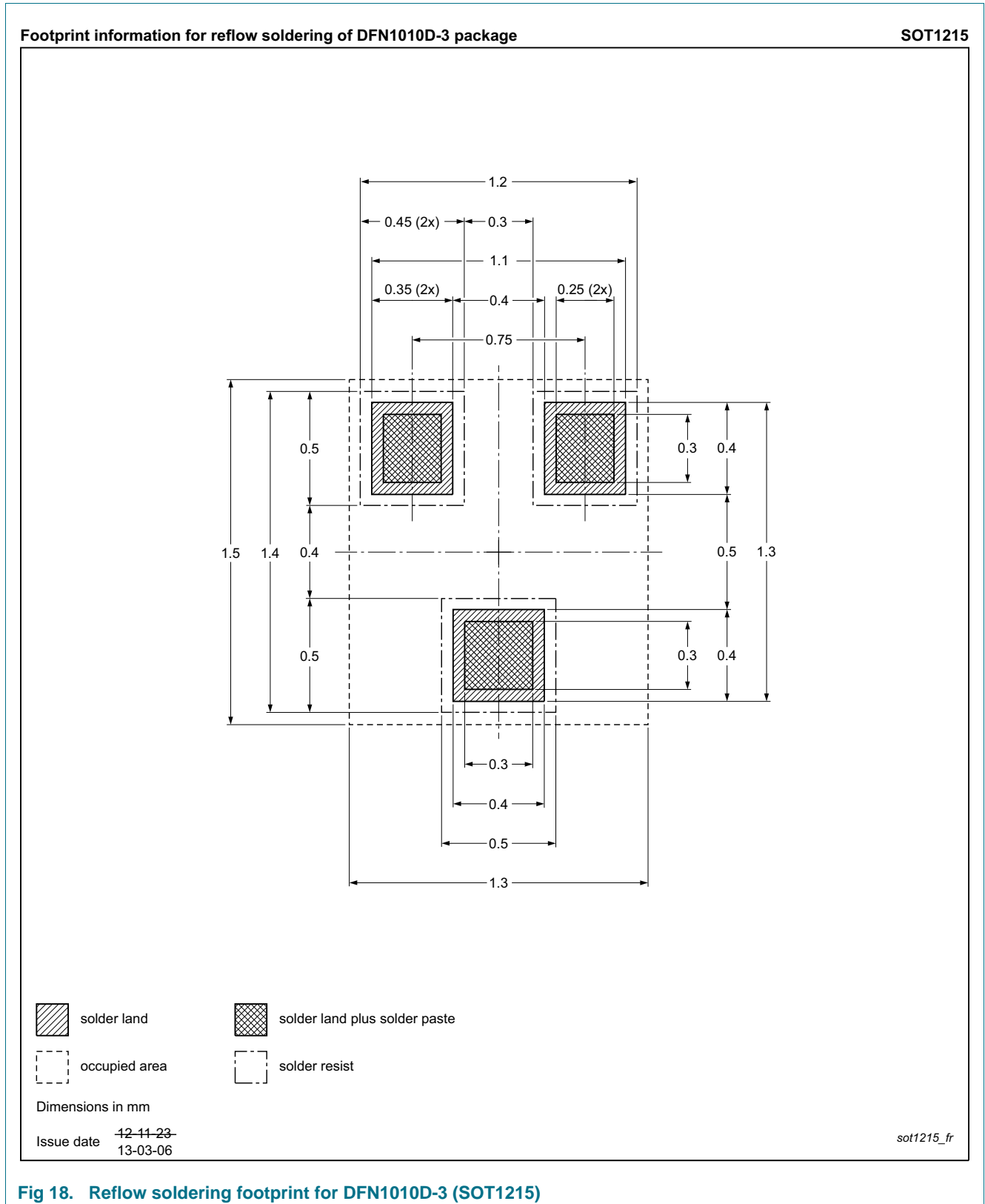


Fig 18. Reflow soldering footprint for DFN1010D-3 (SOT1215)

## 11. Revision history

**Table 9.** Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC817-25QA_40QA v.1	20130903	Product data sheet	-	-

## 12. Legal information

### 12.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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