

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	ype 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	Тур	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	45	V
I _C	collector current		-	-	500	mA
h _{FE}	DC current gain	$V_{CE} = 1 \text{ V}; I_{C} = 100 \text{ mA}$	<u>[1]</u>			
	BC817-25QA		160	-	400	
	BC817-40QA		250	-	600	

[1] Pulse test: $t_p \le 300 \ \mu s; \ \delta \le 0.02.$



2. Pinning information

Table 3. Pinning

Table 3.	Fillining	9		
Pin	Symbol	Description	Simplified outline	Graphic symbol
1	В	base		
2	Е	emitter		C I
3	С	collector		В
4	С	collector	2 4 3	E sym123
			Transparent top view	

3. Ordering information

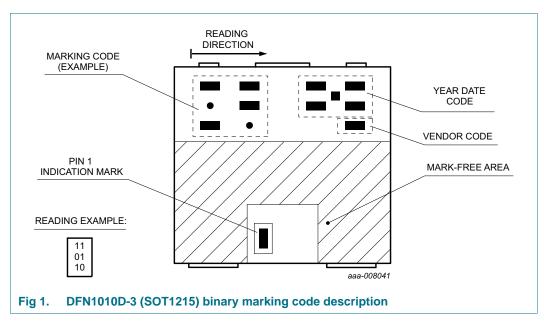
Table 4. Ordering information

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

4. Marking

Table 5. Marking codes

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



BC817-25QA_40QA

5. Limiting values

Table 6. Limiting values

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

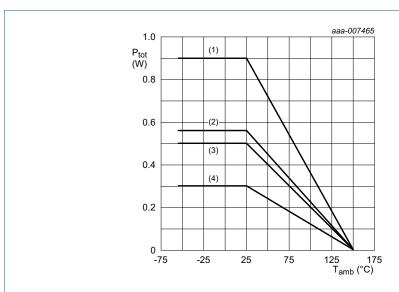
		• • •	,		
Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	50	V
V_{CEO}	collector-emitter voltage	open base	-	45	V
V_{EBO}	emitter-base voltage	open collector	-	5	V
I _C	collector current		-	500	mA
I _{CM}	peak collector current	single pulse; $t_p \le 1 \text{ ms}$	-	1	Α
I _{BM}	peak base current	single pulse; $t_p \le 1 \text{ ms}$	-	200	mA
P _{tot}	total power dissipation	$T_{amb} \le 25 ^{\circ}C$			
			[1] -	300	mW
			[2] _	500	mW
			[3]	560	mW
			[4]	900	mW
Tj	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 cm².

^[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated mounting pad for collector 1 cm².



- (1) FR4 PCB, 4-layer copper, 1 cm²
- (2) FR4 PCB, single-sided copper, 1 cm²
- (3) FR4 PCB, 4-layer copper, standard footprint
- (4) FR4 PCB, single-sided copper, standard footprint

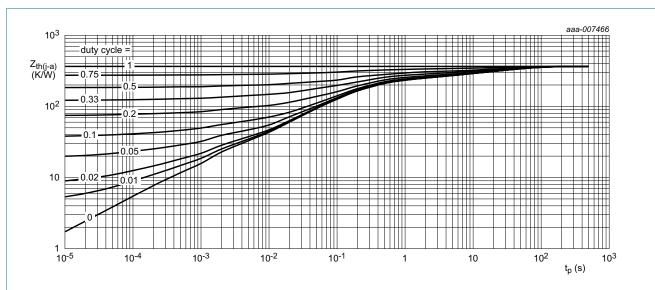
Fig 2. Power derating curves

6. Thermal characteristics

Table 7. Thermal characteristics

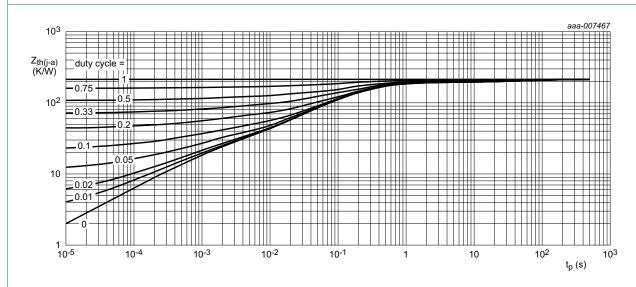
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
$R_{\text{th(j-a)}}$	thermal resistance from junction to ambient	in free air				
			[1] _	-	417	K/W
			[2] _	-	250	K/W
			[3]	-	223	K/W
			[4] _	-	139	K/W

- [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 cm².
- [4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated mounting pad for collector 1 cm².



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

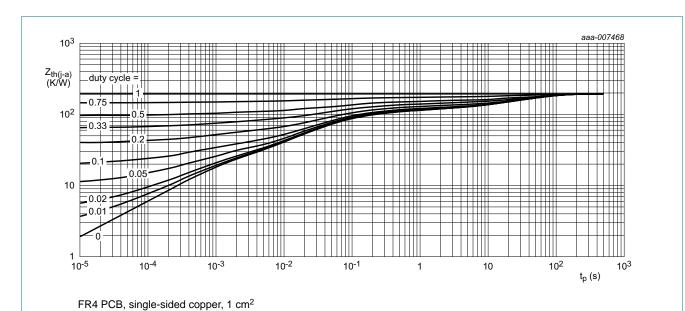


Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

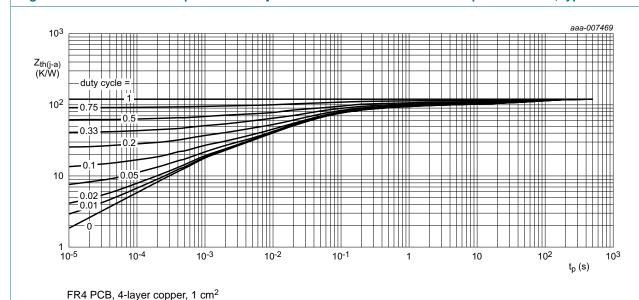


Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

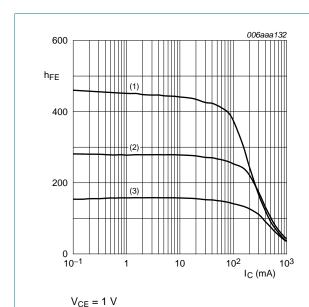
7. Characteristics

Table 8. Characteristics

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

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
I _{CBO}	collector-base	$V_{CB} = 20 \text{ V}; I_{E} = 0 \text{ A}$		-	-	100	nΑ
	cut-off current	$V_{CB} = 20 \text{ V; } I_E = 0 \text{ A;}$ $T_j = 150 ^{\circ}\text{C}$		-	-	5	μА
I _{EBO}	emitter-base cut-off current	$V_{EB} = 5 \text{ V}; I_{C} = 0 \text{ A}$		-	-	100	nA
h _{FE}	DC current gain	$V_{CE} = 1 \text{ V}; I_{C} = 100 \text{ mA}$	<u>[1]</u>				
	BC817-25QA			160	-	400	
	BC817-40QA			250	-	600	
h _{FE}	DC current gain	$V_{CE} = 1 \text{ V}; I_{C} = 500 \text{ mA}$	<u>[1]</u>	40	-	-	
V _{CEsat}	collector-emitter saturation voltage	$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}$	<u>[1]</u>	-	-	700	mV
V_{BE}	base-emitter voltage	$I_C = 500 \text{ mA}; V_{CE} = 1 \text{ V}$	<u>[1]</u>	-	-	1.2	V
C _c	collector capacitance	$V_{CB} = 10 \text{ V}; I_E = i_e = 0 \text{ A};$ f = 1 MHz		-	3	-	pF
f _T	transition frequency	$V_{CE} = 5 \text{ V}; I_{C} = 10 \text{ mA};$ f = 100 MHz		100	-	-	MHz

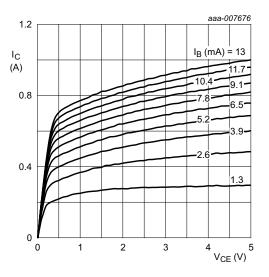
[1] Pulse test: $t_p \le 300~\mu s;~\delta \le 0.02.$





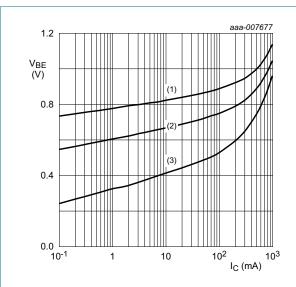
- (1) $T_{amb} = 100 \, ^{\circ}C$
- (2) $T_{amb} = 25 \, ^{\circ}C$
- (3) $T_{amb} = -55 \,^{\circ}C$

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



T_{amb} = 25 °C

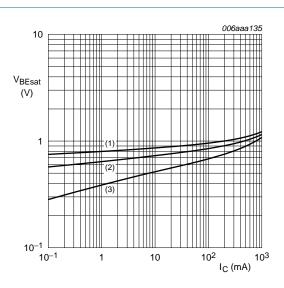
Fig 8. BC817-25QA: Collector current as a function of collector-emitter voltage; typical values



$$V_{CE} = 1 V$$

- (1) $T_{amb} = -55^{\circ}C$
- (2) $T_{amb} = 25 \, ^{\circ}C$
- (3) $T_{amb} = 100 \, ^{\circ}C$

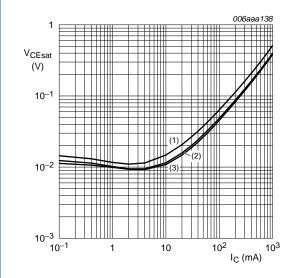
Fig 9. BC817-25QA: Base-emitter voltage as a function of collector current; typical values



$$I_{\rm C}/I_{\rm B} = 10$$

- (1) $T_{amb} = -55 \, ^{\circ}C$
- (2) $T_{amb} = 25 \, ^{\circ}C$
- (3) $T_{amb} = 100 \, ^{\circ}C$

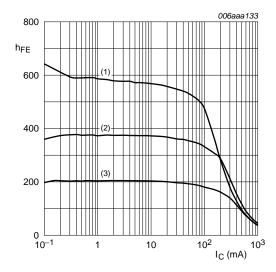
Fig 10. BC817-25QA: Base-emitter saturation voltage as a function of collector current; typical values





- (1) $T_{amb} = -55^{\circ}C$
- (2) $T_{amb} = 25 \, ^{\circ}C$
- (3) $T_{amb} = 100 \, ^{\circ}C$

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



$$V_{CE} = 1 V$$

- (1) $T_{amb} = 100 \, ^{\circ}C$
- (2) $T_{amb} = 25 \, ^{\circ}C$
- (3) $T_{amb} = -55 \, ^{\circ}C$

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

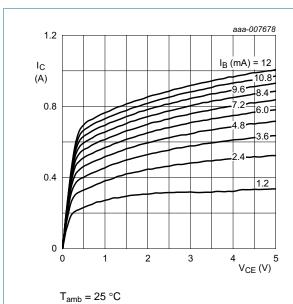
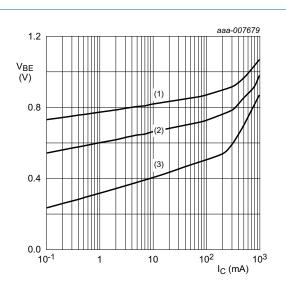


Fig 13. BC817-40QA: Collector current as a function of collector-emitter voltage; typical values



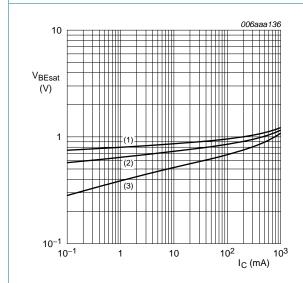
$$V_{CE} = 1 V$$

(1)
$$T_{amb} = -55^{\circ}C$$

(2)
$$T_{amb} = 25 \, ^{\circ}C$$

(3)
$$T_{amb} = 100 \, ^{\circ}C$$

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



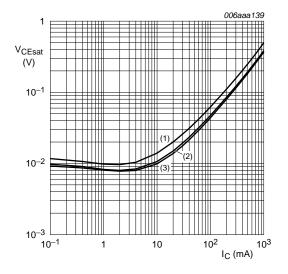


(1)
$$T_{amb} = -55 \, ^{\circ}C$$

(2)
$$T_{amb} = 25 \, ^{\circ}C$$

(3) $T_{amb} = 100 \, ^{\circ}C$

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



$$I_{\rm C}/I_{\rm B} = 10$$

(1)
$$T_{amb} = -55 \, ^{\circ}C$$

(2)
$$T_{amb} = 25 \, ^{\circ}C$$

(3)
$$T_{amb} = 100 \, ^{\circ}C$$

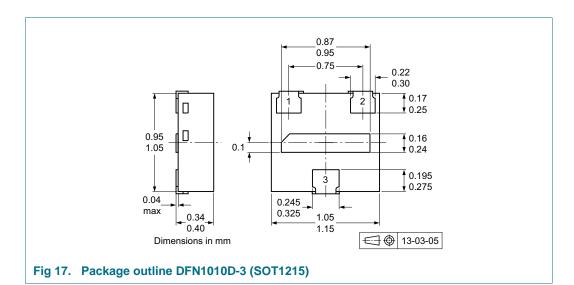
Fig 16. BC817-40QA: Collector-emitter saturation voltage as a function of collector current; typical values

8. Test information

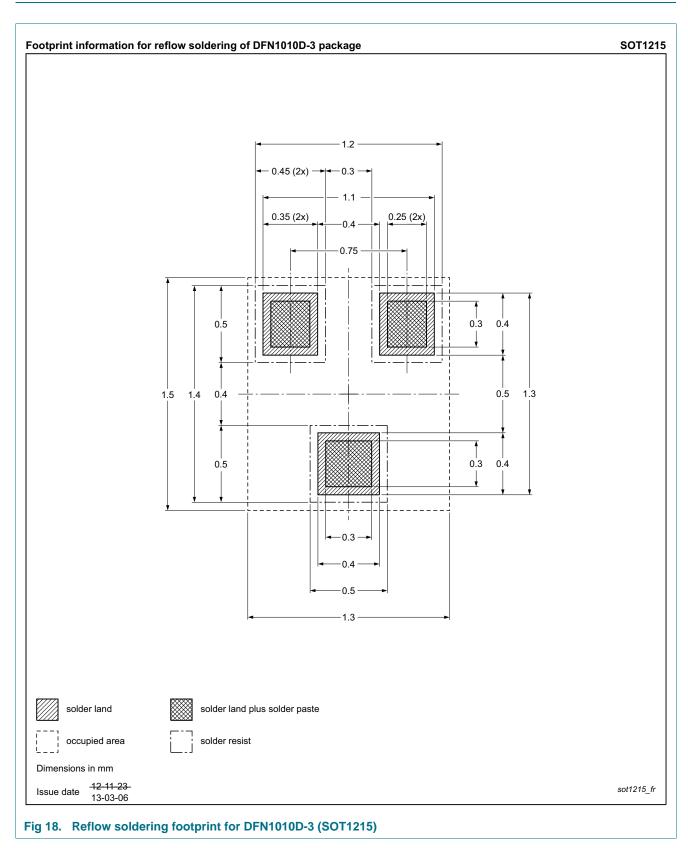
8.1 Quality information

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



10. Soldering



BC817-25QA_40QA

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[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 more information, please visit: http://www.nexperia.com

For sales office addresses, please send an email to: salesaddresses@nexperia.com

14. Contents

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