

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
	NXP	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

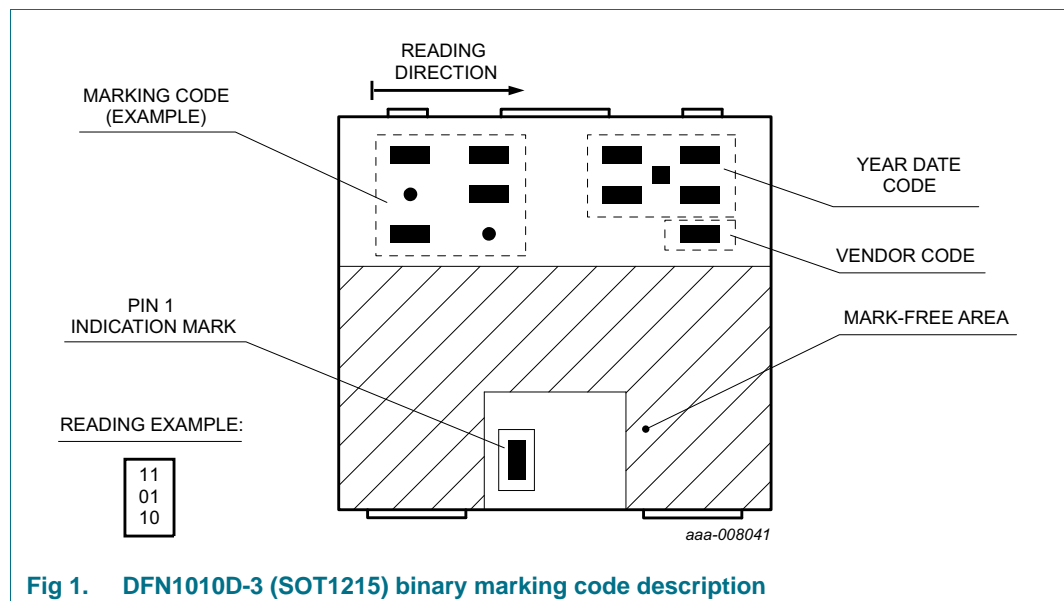
Table 4. Ordering information

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).

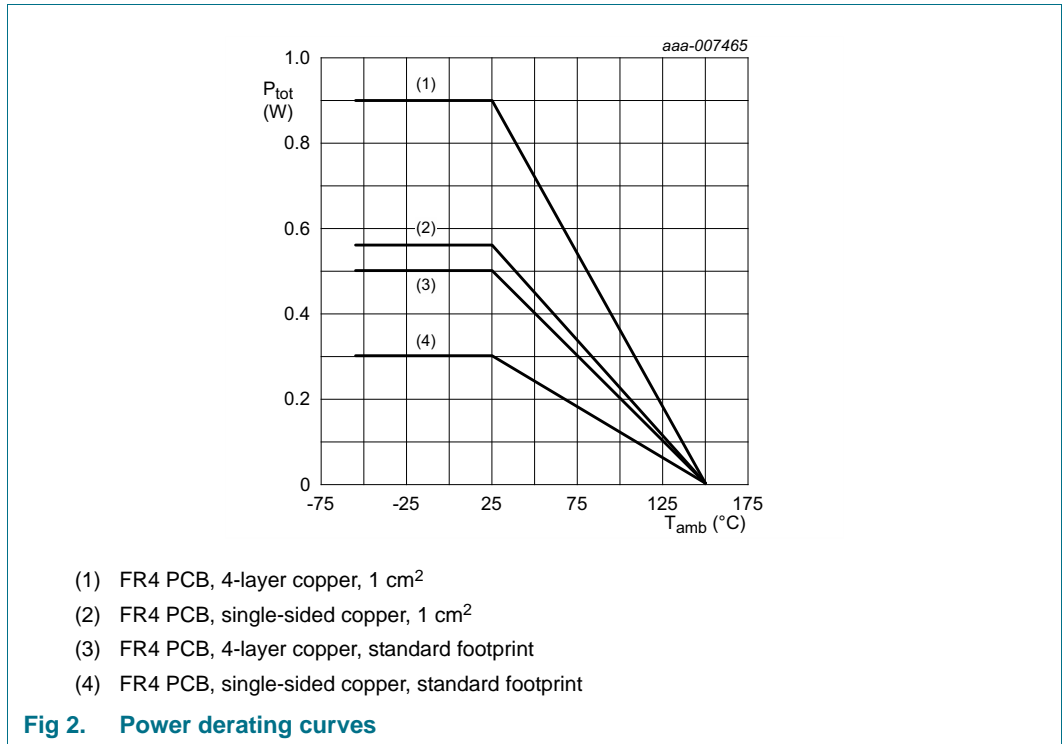
Symbol	Parameter	Conditions	Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter	-	50	V
V_{CEO}	collector-emitter voltage	open base	-	45	V
V_{EBO}	emitter-base voltage	open collector	-	5	V
I_C	collector current		-	500	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	1	A
I_{BM}	peak 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 cm².

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



6. Thermal characteristics

Table 7. Thermal characteristics

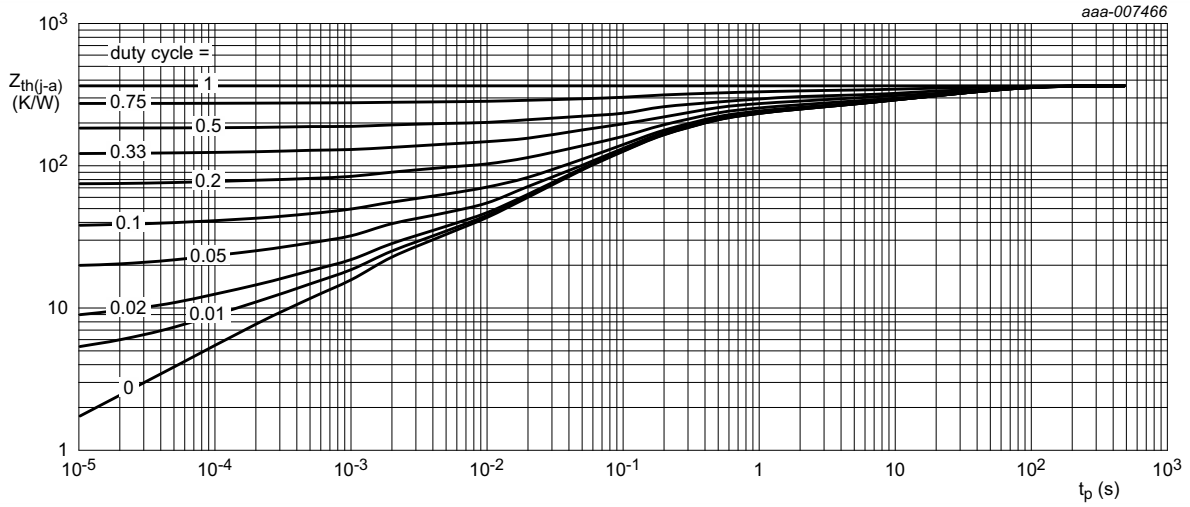
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	-	417	K/W
			[2]	-	-	250	K/W
			[3]	-	-	223	K/W
			[4]	-	-	139	K/W

[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.

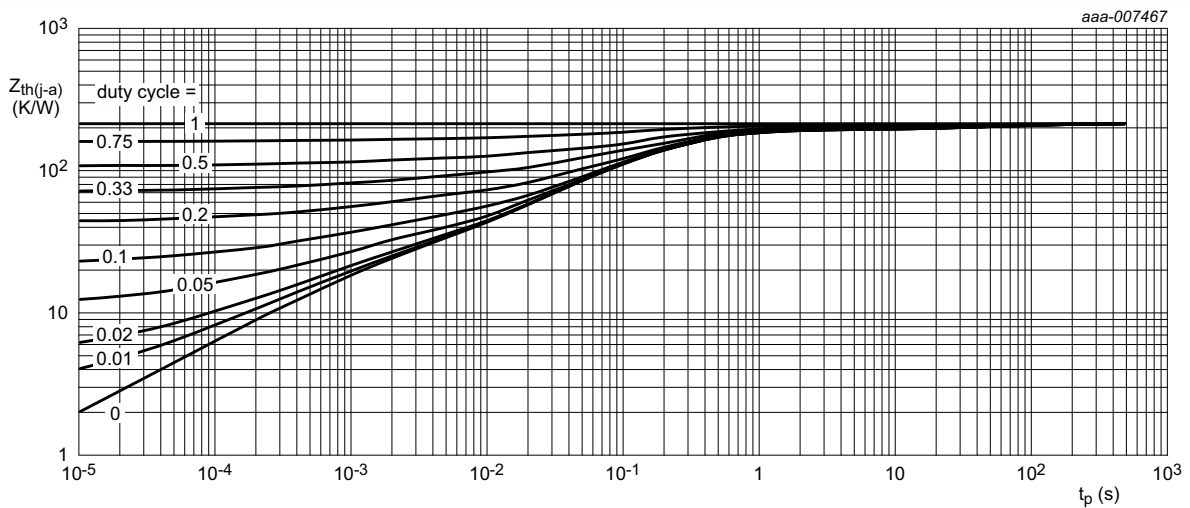
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated mounting pad for collector 1 cm².

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



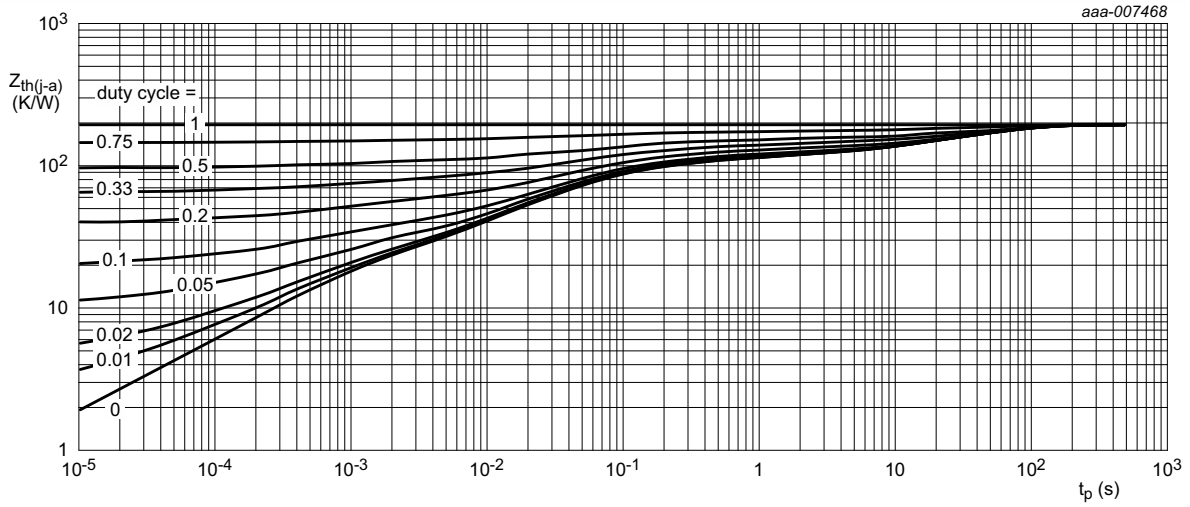
FR4 PCB, single-sided copper, standard footprint

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



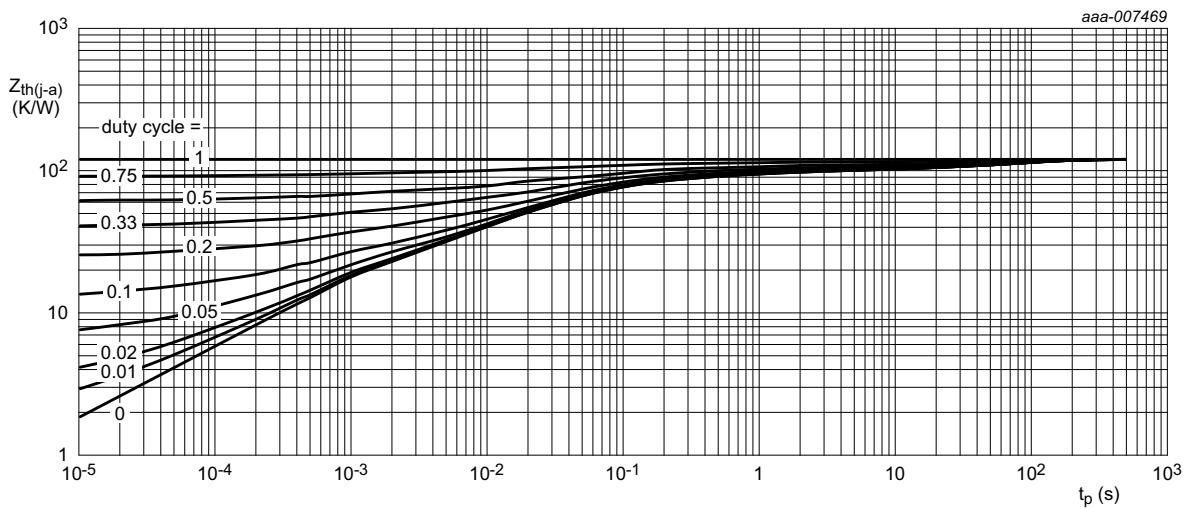
FR4 PCB, 4-layer copper, standard footprint

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



FR4 PCB, single-sided copper, 1 cm²

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



FR4 PCB, 4-layer copper, 1 cm²

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

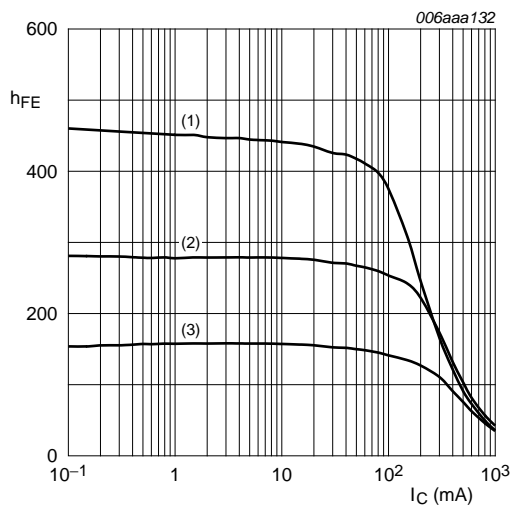
7. Characteristics

Table 8. Characteristics

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

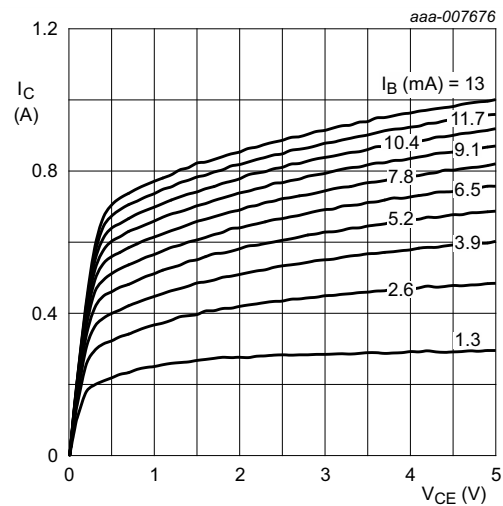
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = 20\text{ V}; I_E = 0\text{ A}$	-	-	100	nA
		$V_{CB} = 20\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	-	-	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: $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$.



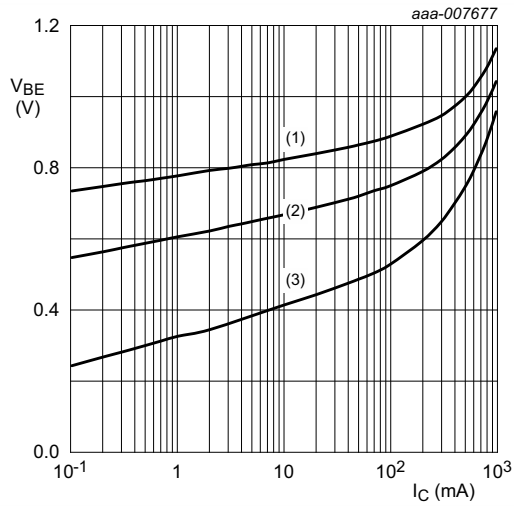
$V_{CE} = 1\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



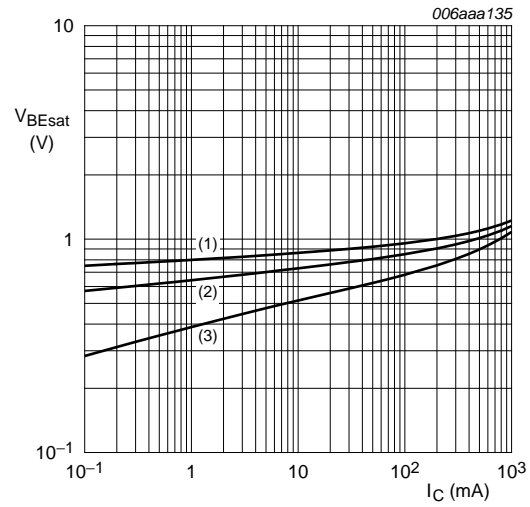
$T_{amb} = 25\text{ }^{\circ}\text{C}$

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



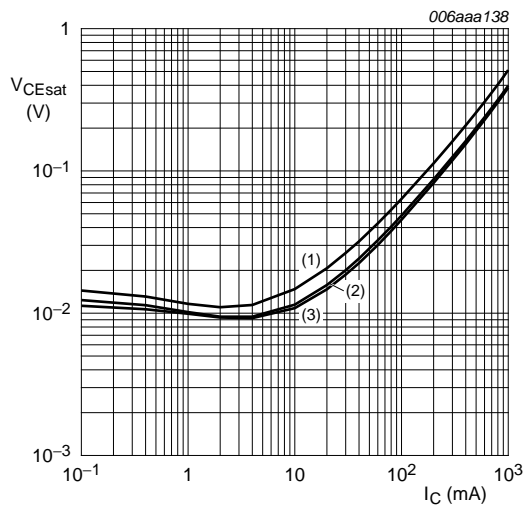
- $V_{CE} = 1\text{ V}$
- (1) $T_{amb} = -55^\circ\text{C}$
 - (2) $T_{amb} = 25^\circ\text{C}$
 - (3) $T_{amb} = 100^\circ\text{C}$

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



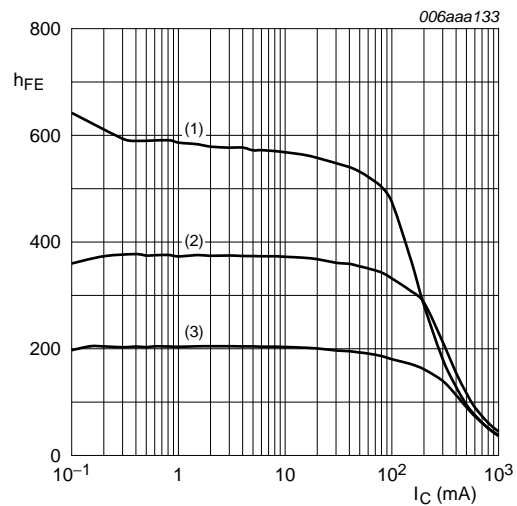
- $I_C/I_B = 10$
- (1) $T_{amb} = -55^\circ\text{C}$
 - (2) $T_{amb} = 25^\circ\text{C}$
 - (3) $T_{amb} = 100^\circ\text{C}$

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



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

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



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

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

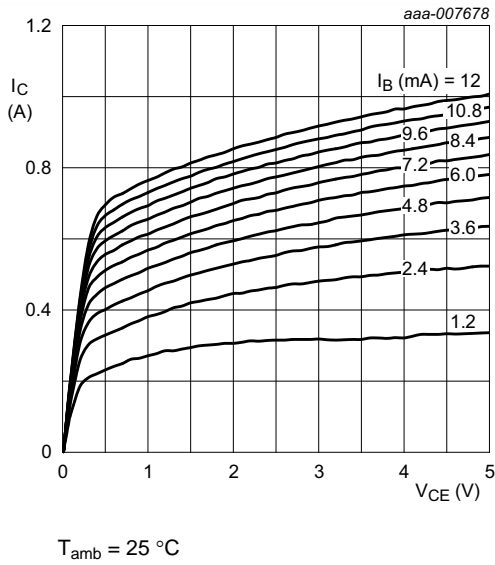


Fig 13. BC817-40QA: Collector current as a function of collector-emitter voltage; typical values

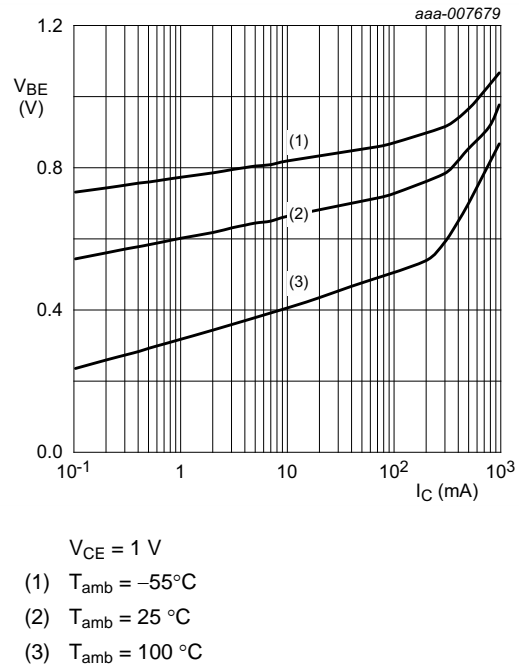


Fig 14. BC817-40QA: Base-emitter voltage as a function of collector current; typical values

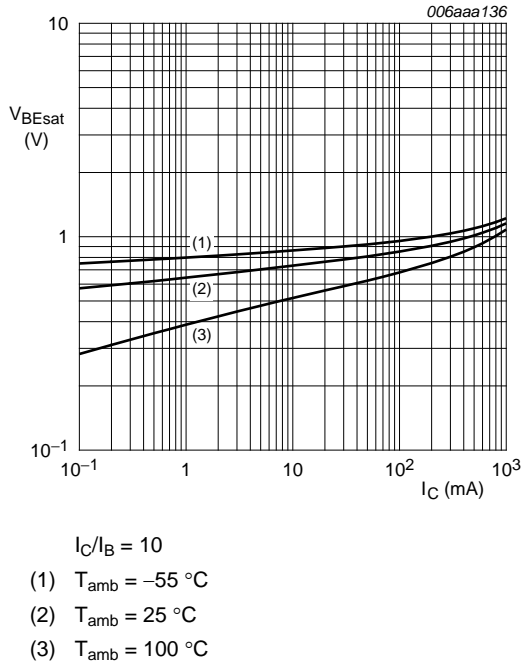


Fig 15. BC817-40QA: Base-emitter saturation voltage as a function of collector current; typical values

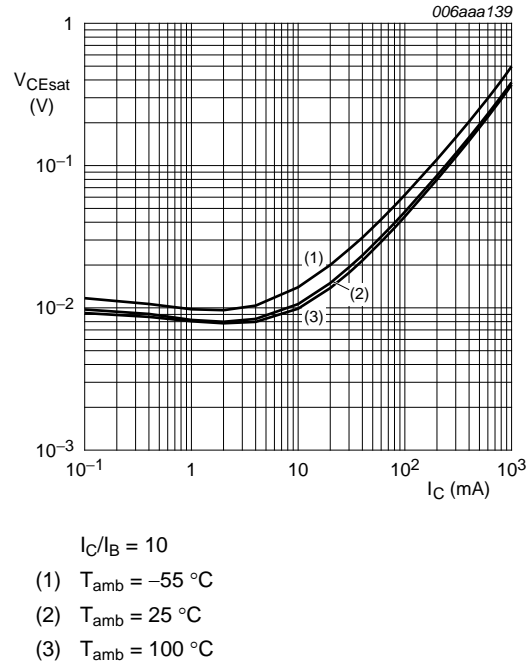


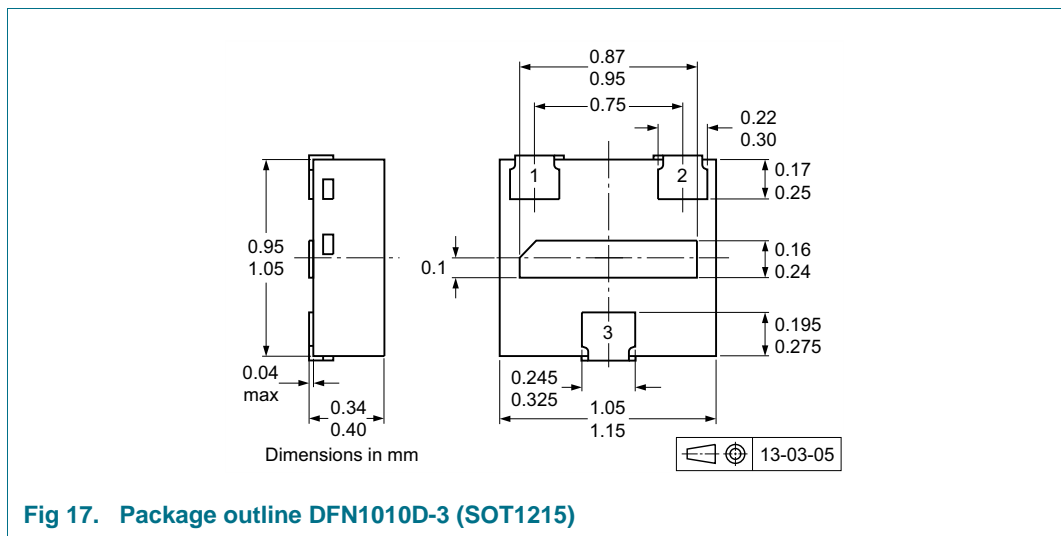
Fig 16. BC817-40QA: Collector-emitter saturation voltage as a function of collector current; typical values

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



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.
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Product [short] data sheet	Production	This document contains the product specification.

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[2] The term 'short data sheet' is explained in section "Definitions".

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