



# BC817QB series

45 V, 500 mA NPN general-purpose transistors

Rev. 2 — 28 October 2020

Product data sheet

## 1. General description

NPN general-purpose transistor in an ultra small DFN1110D-3 (SOT8015) leadless Surface-Mounted Device (SMD) plastic package with side-wettable flanks.

Table 1. Product overview

Type number	Package			PNP complement
	Name	JEDEC	Version	
BC817-16QB	DFN1110D-3	MO340-BA	SOT8015	BC807-16QB
BC817-25QB				BC807-25QB
BC817-40QB				BC807-40QB

## 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

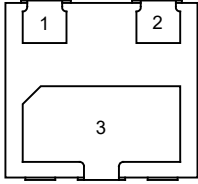
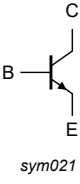
Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CE0}$	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					
	BC817-16QB	$V_{CE} = 1\text{ V}$ ; $I_C = 100\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	100	-	250
	BC817-25QB		[1]	160	-	400
	BC817-40QB		[1]	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>DFN1110D-3 (SOT8015)</p>	 <p>sym021</p>
2	E	emitter		
3	C	collector		

## 6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC817-16QB	DFN1110D-3	DFN1110D-3: plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body: 1.1 x 1.0 x 0.5 mm	SOT8015 (MO340-BA)
BC817-25QB			
BC817-40QB			

## 7. Marking

Table 5. Marking

Type number	Marking code
BC817-16QB	B3
BC817-25QB	B4
BC817-40QB	B5

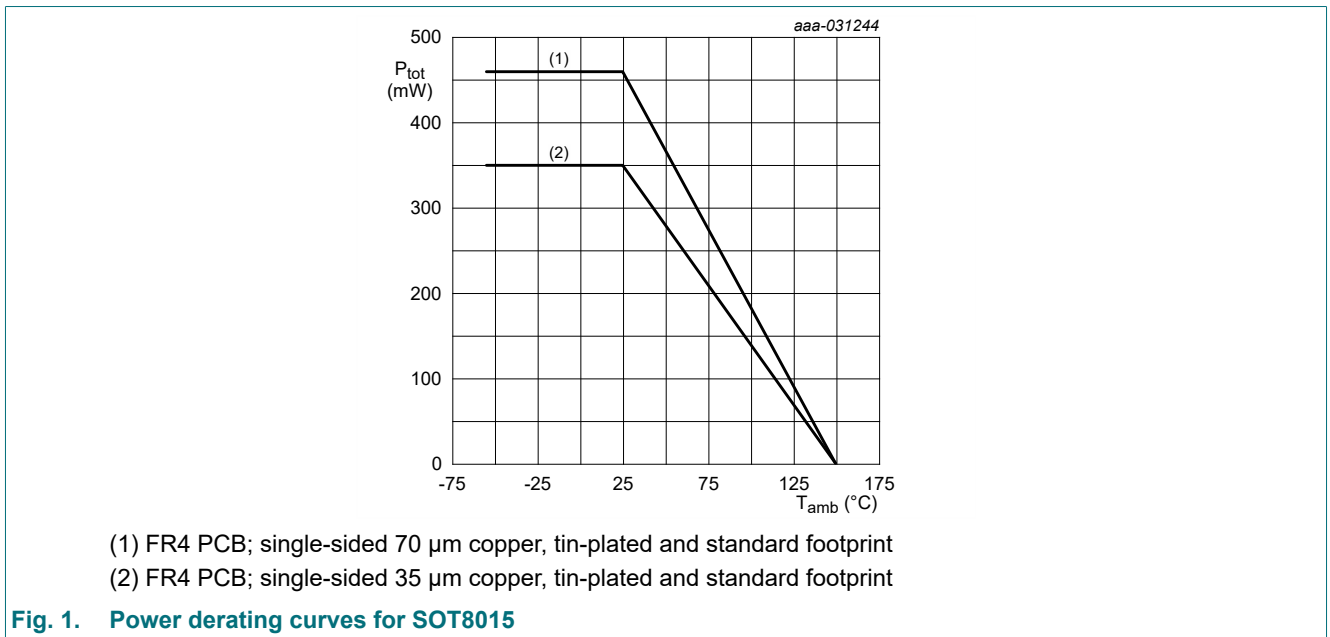
## 8. Limiting values

**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]	350	mW
			[2]	460	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  $\mu\text{m}$  copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided 70  $\mu\text{m}$  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; $T_{amb} = 25\text{ °C}$	[1]	-	-	358	K/W
			[2]	-	-	272	K/W

- [1] Device mounted on an FR4 PCB, single-sided 35  $\mu\text{m}$  copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided 70  $\mu\text{m}$  copper, tin-plated and standard footprint.

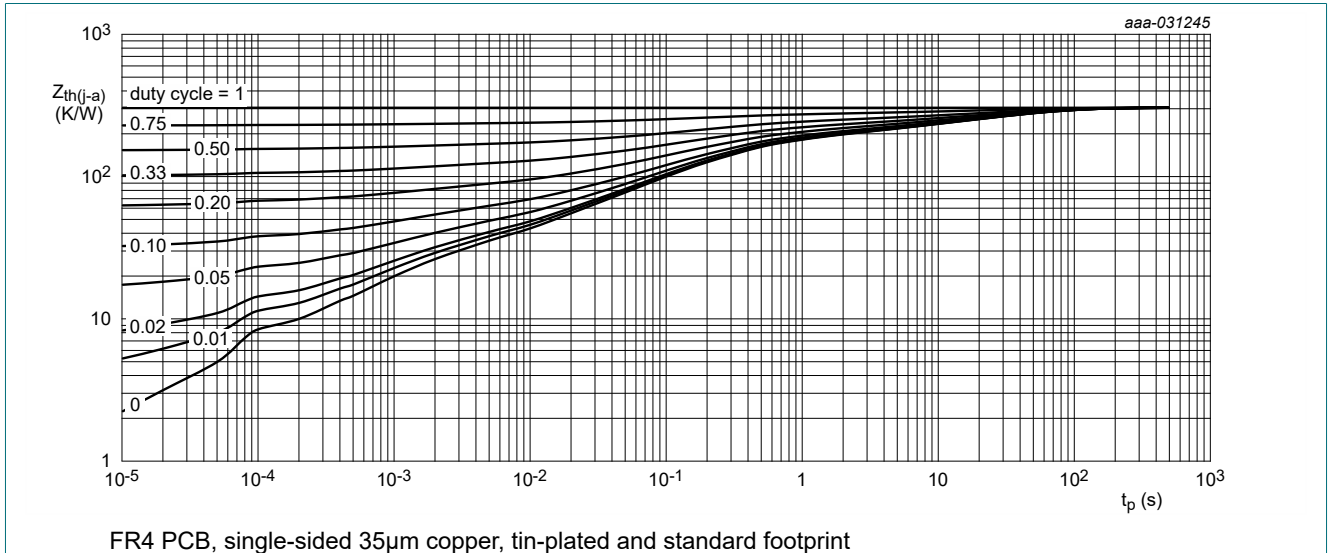


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

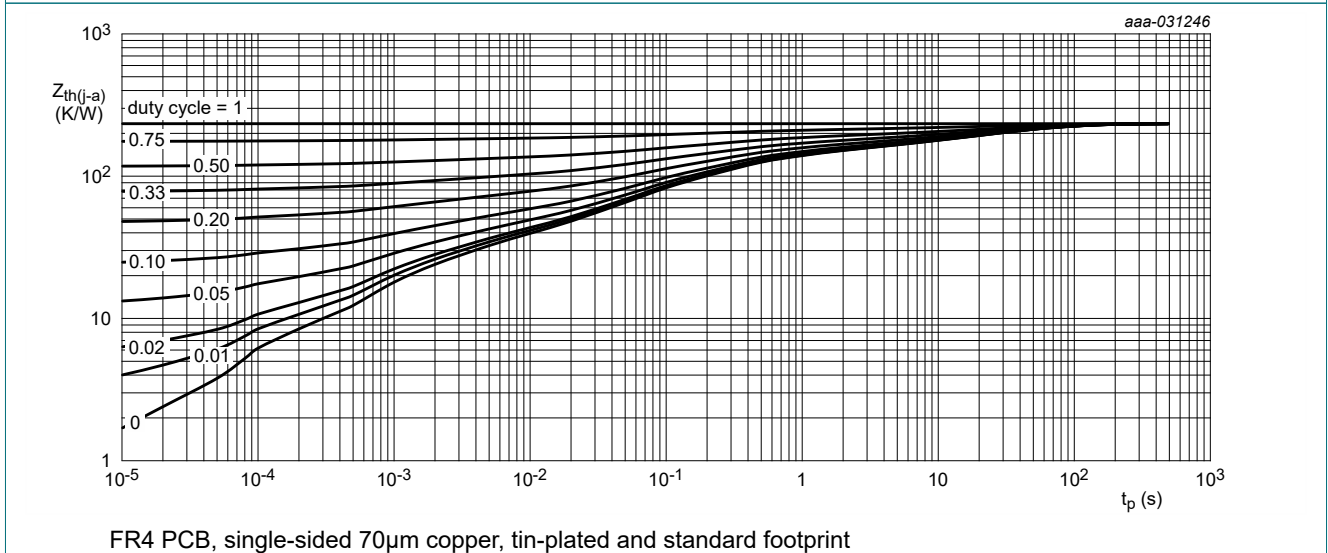


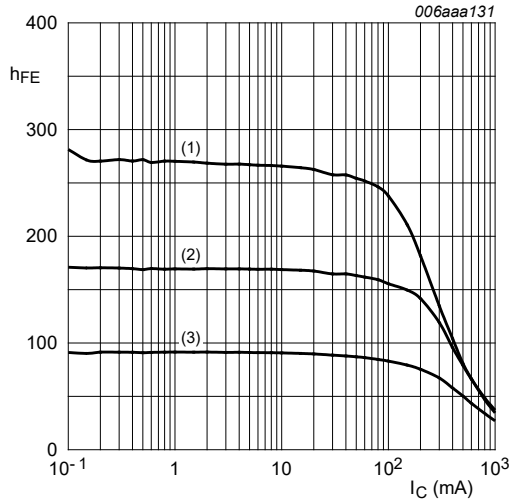
Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 8. Characteristics

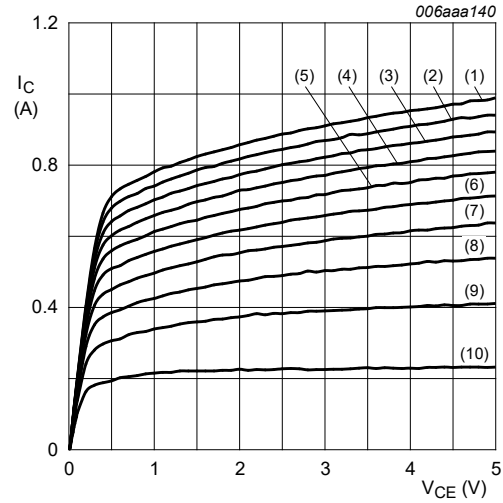
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100 \mu\text{A}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	50	-		V	
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 10 \text{ mA}; I_E = 0 \text{ A}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	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	$\mu\text{A}$	
$I_{EBO}$	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						
	BC817-16QB	$V_{CE} = 1 \text{ V}; I_C = 100 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	100	-	250	
	BC817-25QB		[1]	160	-	400	
	BC817-40QB		[1]	250	-	600	
		$V_{CE} = 1 \text{ V}; I_C = 500 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		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]	-	-	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;  $t_p \leq 300 \mu\text{s}$ ;  $\delta \leq 0.02$



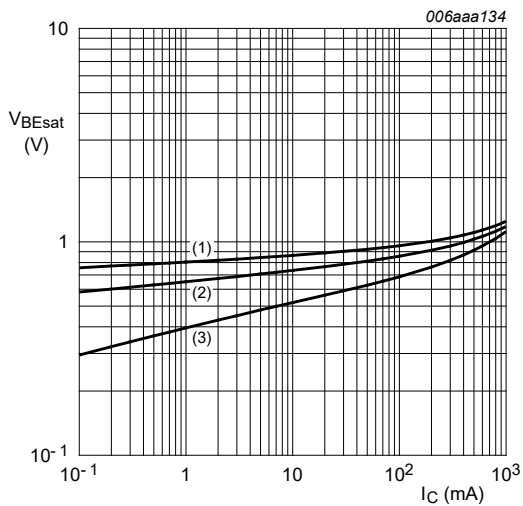
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



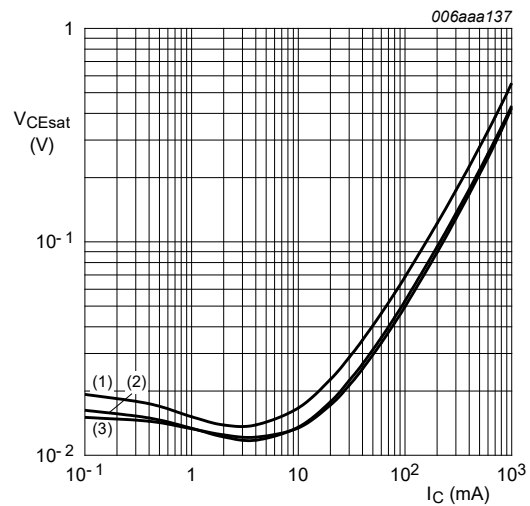
$T_{amb} = 25\text{ °C}$   
 (1)  $I_B = 16.0\text{ mA}$   
 (2)  $I_B = 14.4\text{ mA}$   
 (3)  $I_B = 12.8\text{ mA}$   
 (4)  $I_B = 11.2\text{ mA}$   
 (5)  $I_B = 9.6\text{ mA}$   
 (6)  $I_B = 8.0\text{ mA}$   
 (7)  $I_B = 6.4\text{ mA}$   
 (8)  $I_B = 4.8\text{ mA}$   
 (9)  $I_B = 3.2\text{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

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



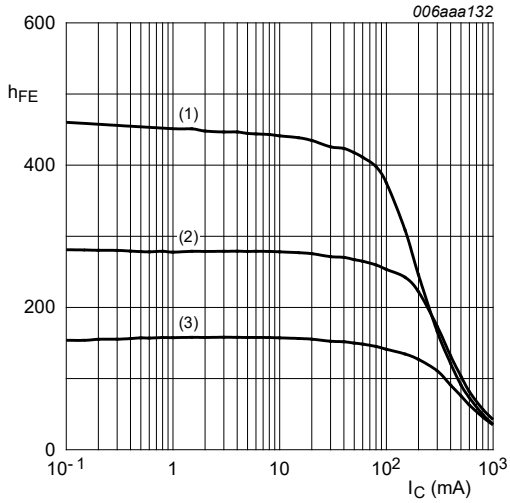
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

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



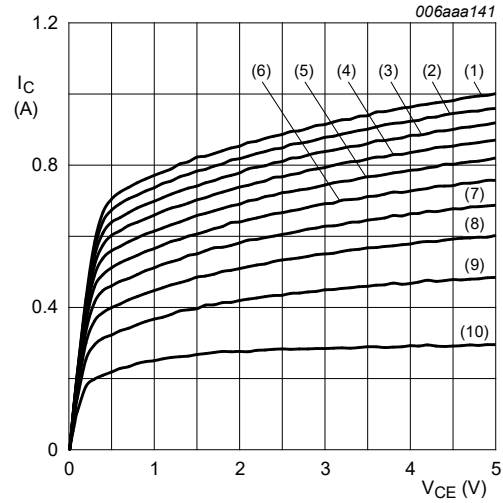
$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



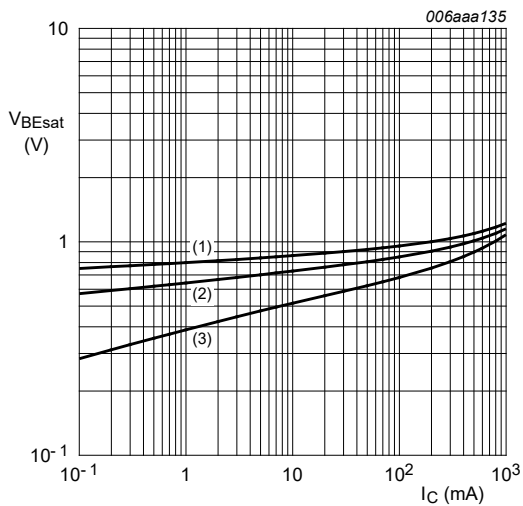
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



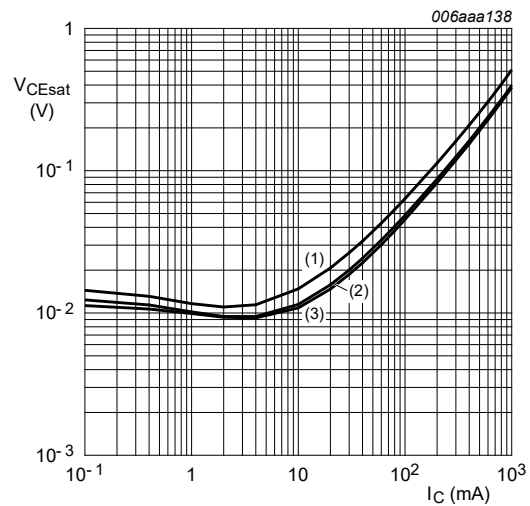
$T_{amb} = 25\text{ °C}$   
 (1)  $I_B = 13.0\text{ mA}$   
 (2)  $I_B = 11.7\text{ mA}$   
 (3)  $I_B = 10.4\text{ mA}$   
 (4)  $I_B = 9.1\text{ mA}$   
 (5)  $I_B = 7.8\text{ mA}$   
 (6)  $I_B = 6.5\text{ mA}$   
 (7)  $I_B = 5.2\text{ mA}$   
 (8)  $I_B = 3.9\text{ mA}$   
 (9)  $I_B = 2.6\text{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

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



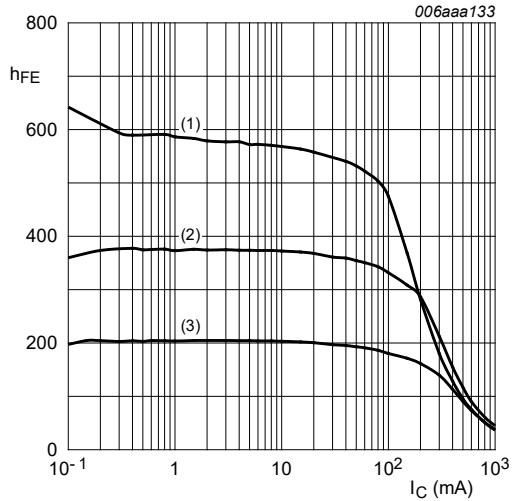
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

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



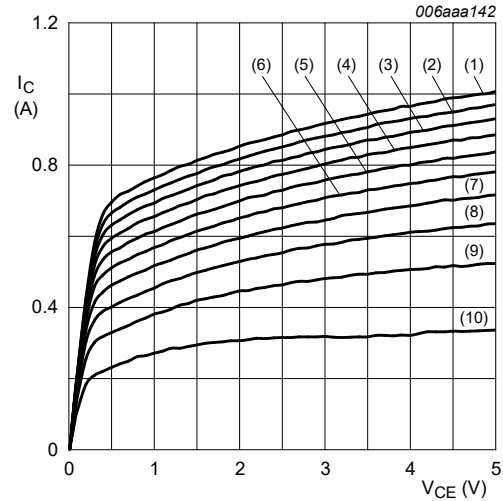
$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



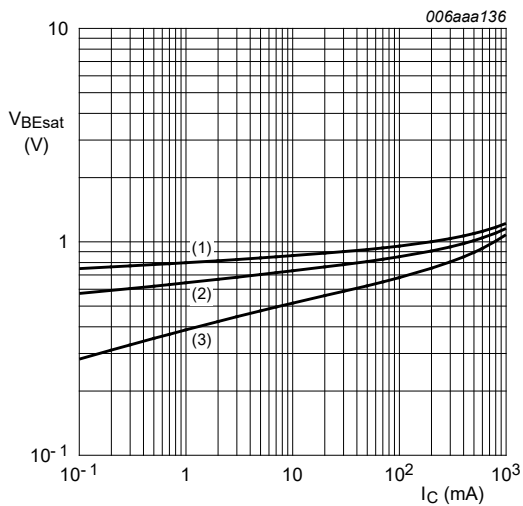
$V_{CE} = 1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



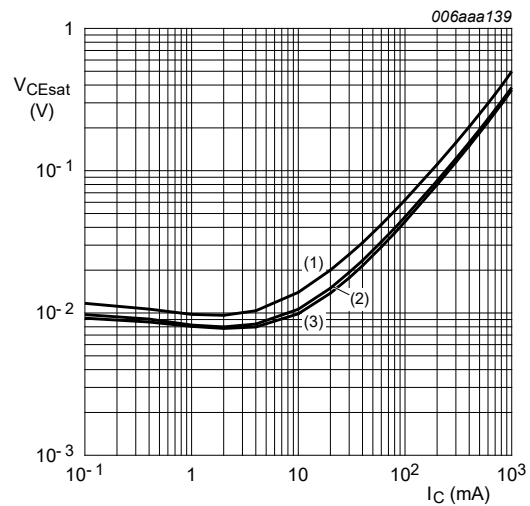
$T_{amb} = 25\text{ °C}$   
 (1)  $I_B = 12.0\text{ mA}$   
 (2)  $I_B = 10.8\text{ mA}$   
 (3)  $I_B = 9.6\text{ mA}$   
 (4)  $I_B = 8.4\text{ mA}$   
 (5)  $I_B = 7.2\text{ mA}$   
 (6)  $I_B = 6.0\text{ mA}$   
 (7)  $I_B = 4.8\text{ mA}$   
 (8)  $I_B = 3.6\text{ mA}$   
 (9)  $I_B = 2.4\text{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

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



## 11. Test information

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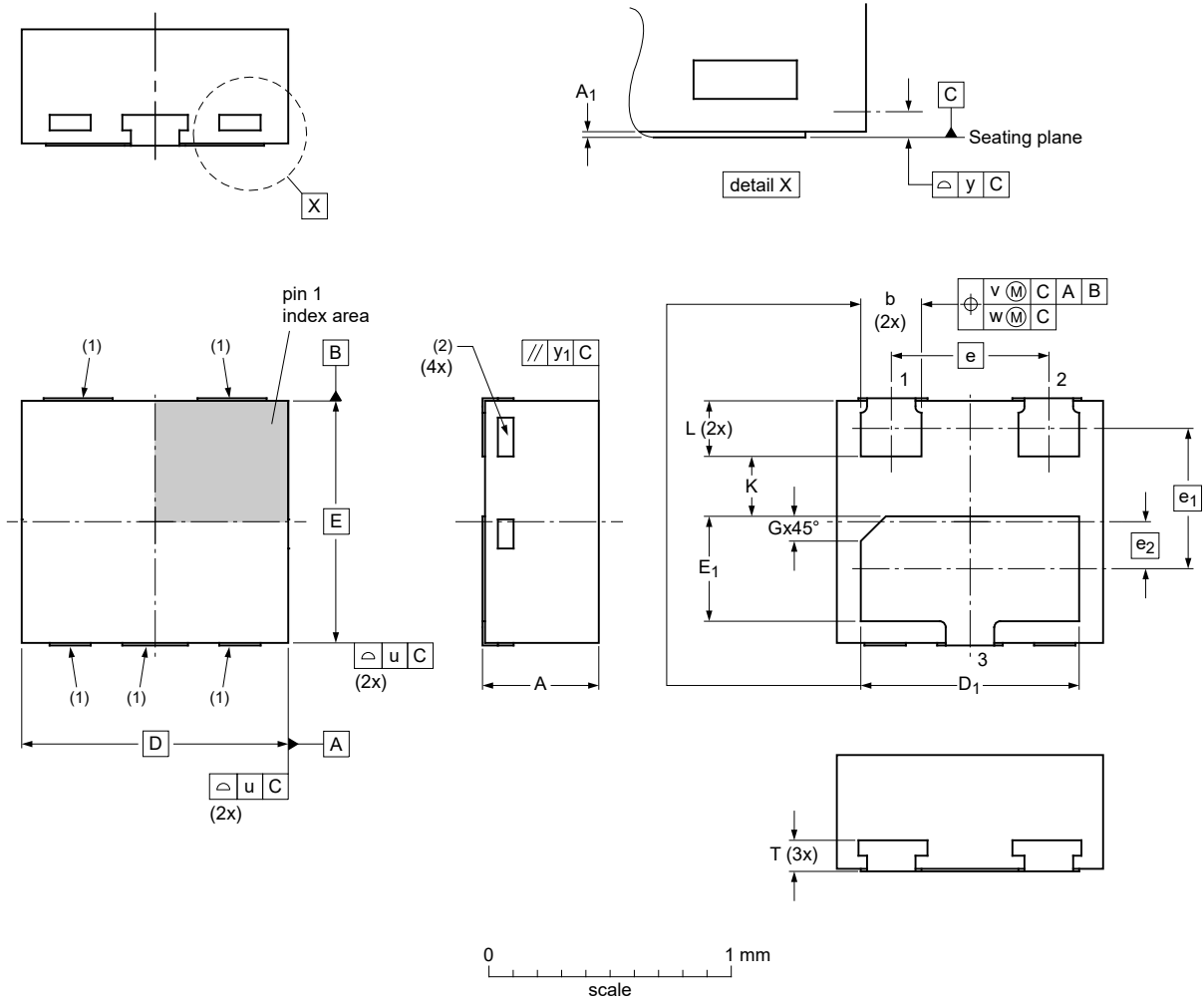
### 11.1. Quality information

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

DFN1110D-3: plastic, leadless extremely thin small outline package with side-wettable flanks (SWF); 3 terminals; 0.65 mm pitch; 1.1 mm x 1 mm x 0.48 mm body

SOT8015



Dimensions (mm are the original dimensions)

Unit	A	A <sub>1</sub>	b	D	D <sub>1</sub>	E	E <sub>1</sub>	e	e <sub>1</sub>	e <sub>2</sub>	G	K	L	T	u	v	w	y	y <sub>1</sub>
max	0.50	0.040	0.30		0.95		0.48						0.27	0.22					
nom	0.47	0.020	0.25	1.1	0.90	1	0.43	0.65	0.58	0.19	0.09 (ref)		0.23	0.16	0.05	0.1	0.05	0.05	0.05
min	0.44	0.005	0.22		0.87		0.40					0.2	0.20	0.10					

Note

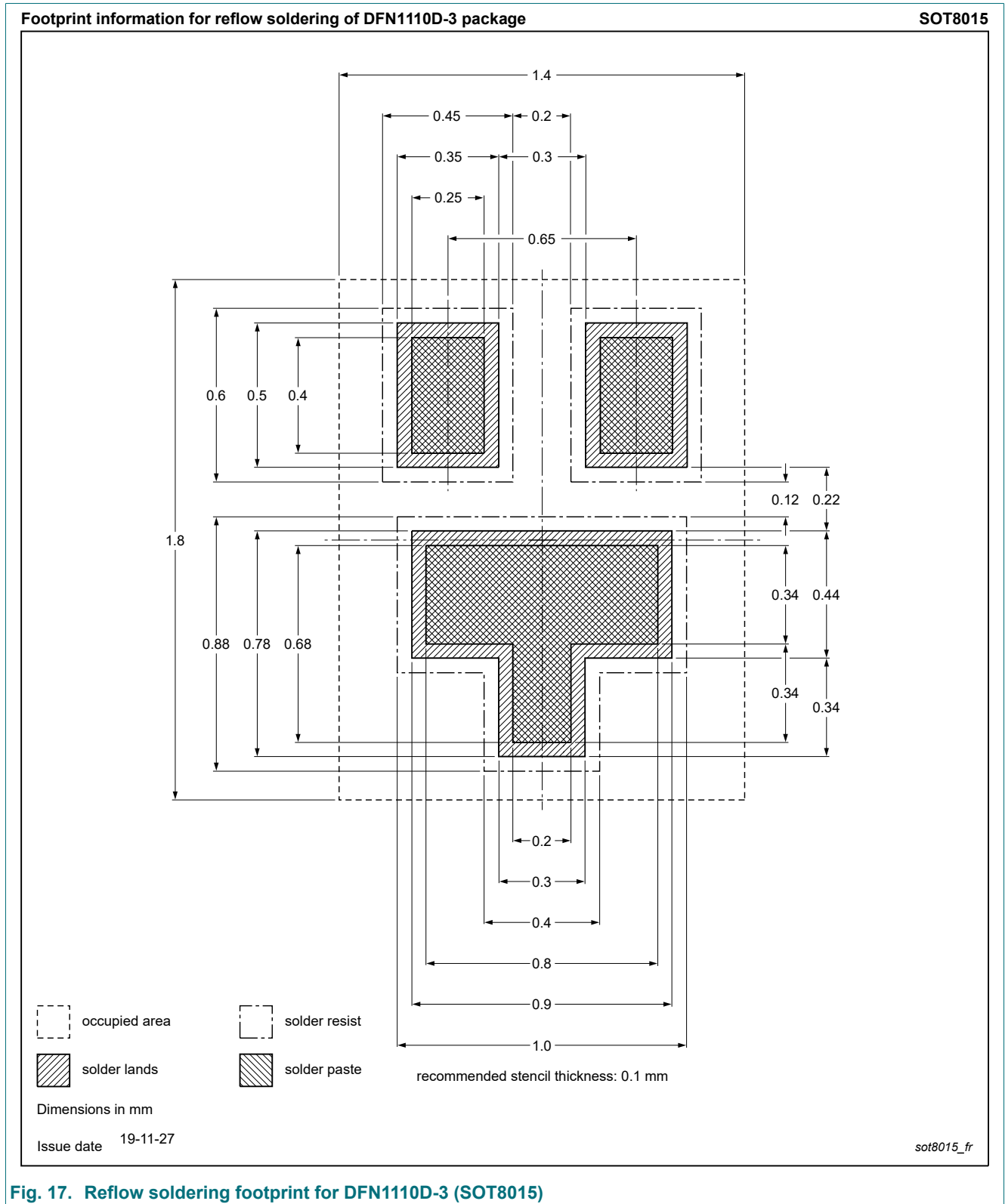
- Side Wettable Flank, protrusion max. 0.02 mm.
  - Visible depend upon used manufacturing technology.
- Dimension A and T are including plating thickness.

sot8015\_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT8015		MO-340BA				19-12-02 19-12-04

Fig. 16. Package outline DFN1110D-3 (SOT8015)

### 13. Soldering



**Fig. 17. Reflow soldering footprint for DFN1110D-3 (SOT8015)**

## 14. Revision history

**Table 9. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC817QB_SER v.2	20201028	Product data sheet	-	BC817QB_SER v.1
Modifications:	• Thermal characteristics: $R_{th(j-sp)}$ removed			
BC817QB_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".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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Date of release: 28 October 2020

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