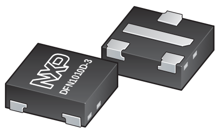


BC847XQA series

45 V, 100 mA NPN general-purpose transistors

Rev. 1 — 25 August 2015 Product data sheet

1. Product profile

1.1 General description

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	JEDEC	
BC847AQA	DFN1010D-3 (SOT1215)	-	-	BC857AQA
BC847BQA				BC857BQA
BC847CQA				BC857CQA

1.2 Features and benefits

- General-purpose transistors
- Three current gain selections
- Low package height of 0.37 mm
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- AEC-Q101 qualified

1.3 Applications

- General-purpose switching and amplification
- Mobile applications

1.4 Quick reference data

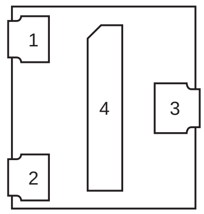
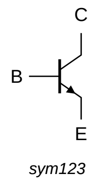
Table 2. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	45	V
I_C	collector current		-	-	100	mA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 2 mA				
	BC847AQA		110	-	220	
	BC847BQA		200	-	450	
	BC847CQA		420	-	800	

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base	 Transparent top view	
2	emitter		
3	collector		
4	collector		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC847AQA	DFN1010D-3	plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body: 1.1 × 1.0 × 0.37 mm	SOT1215
BC847BQA			
BC847CQA			

4. Marking

Table 5. Marking codes

Type number	Marking code
BC847AQA	00 10 01
BC847BQA	00 10 11
BC847CQA	00 11 01

4.1 Binary marking code description

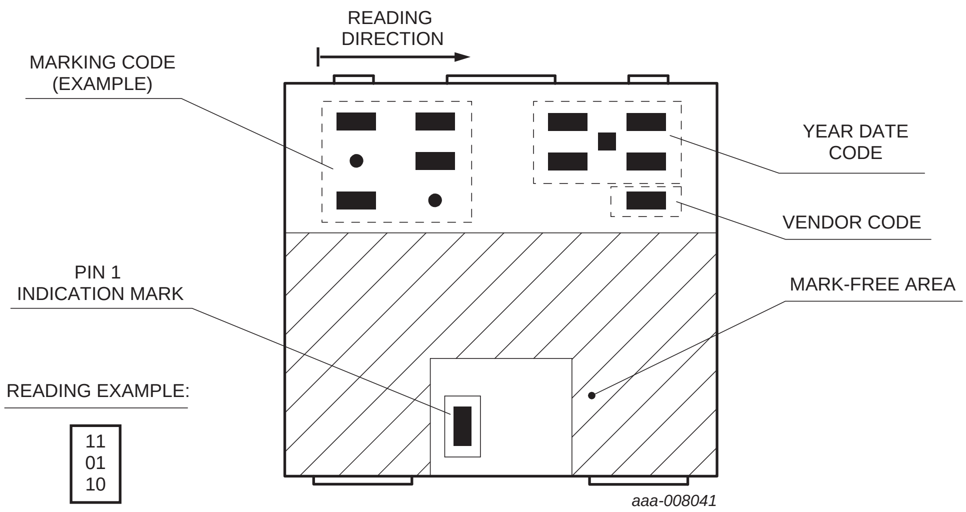


Fig 1. SOT1215 binary marking code description

5. Limiting values

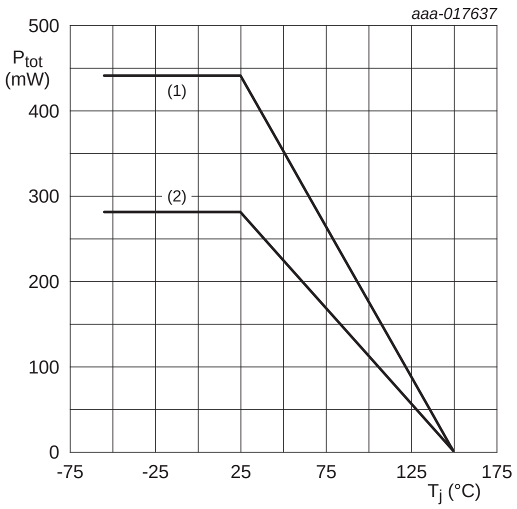
Table 6. Limiting values

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	-	6	V
I_C	collector current		-	100	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	200	mA
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms	-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C			
		[1]	-	280	mW
		[2]	-	440	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.



(1) FR4 PCB, 4-layer copper, standard footprint

(2) FR4 PCB, standard footprint

Fig 2. Power derating curves

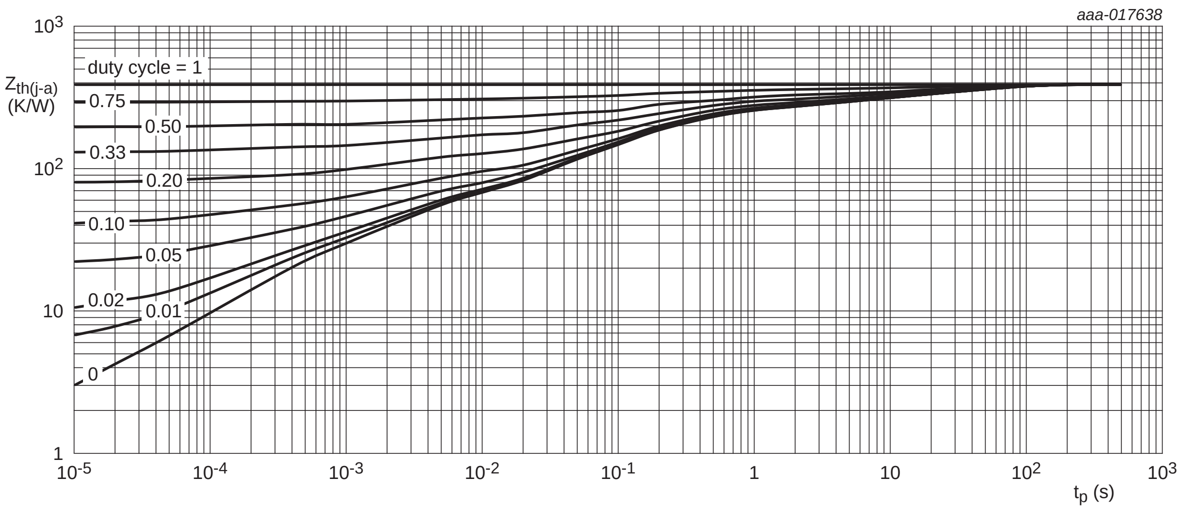
6. Thermal characteristics

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]			446	K/W
			[2]	-	-	284	K/W

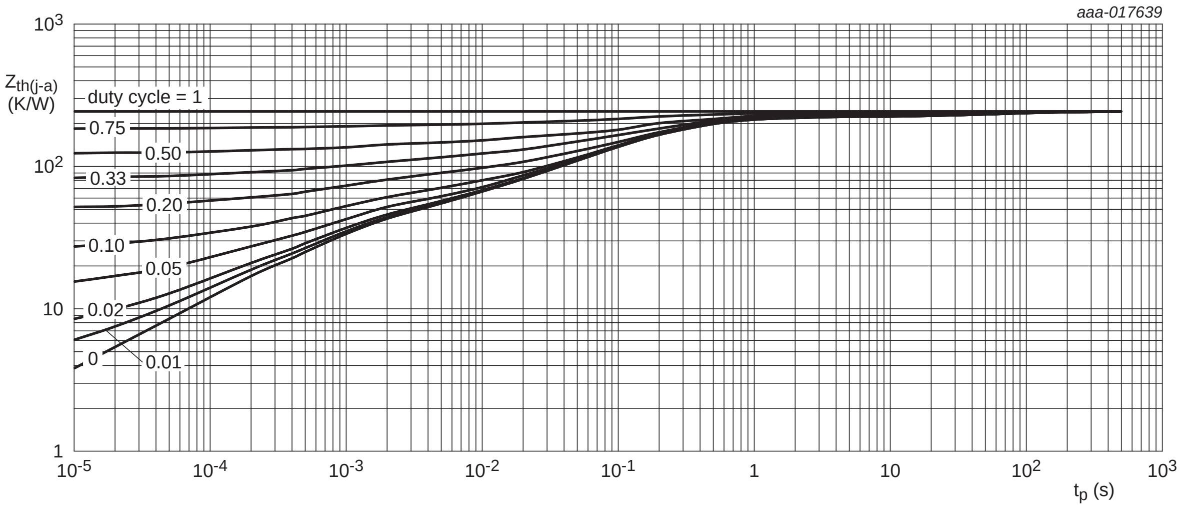
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

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



FR4 PCB, single-sided copper, tin-plated and standard footprint

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



FR4 PCB, 4-layer copper, tin-plated and standard footprint.

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

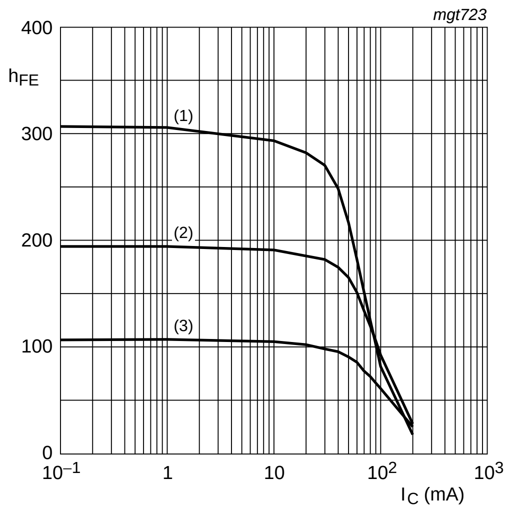
7. Characteristics

Table 8. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 30 V; I_E = 0 A	-	-	15	nA
		V_{CB} = 30 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	-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 2 mA				
	BC847AQA		110	-	220	
	BC847BQA		200	-	450	
	BC847CQA		420	-	800	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA	-	90	200	mV
		I_C = 100 mA; I_B = 5 mA [1]	-	200	400	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 10 mA; I_B = 0.5 mA	-	700	-	mV
		I_C = 100 mA; I_B = 5 mA [1]	-	900	-	mV
V_{BE}	base-emitter voltage	I_C = 2 mA; V_{CE} = 5 V	580	660	700	mV
		I_C = 10 mA; V_{CE} = 5 V	-	-	770	mV
f_T	transition frequency	V_{CE} = 5 V; I_C = 10 mA; f = 100 MHz	100	-	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = i_e = 0 A; f = 1 MHz	-	-	1.5	pF
C_e	emitter capacitance	V_{EB} = 0.5 V; I_C = i_c = 0 A; f = 1 MHz	-	11	-	pF
NF	noise figure	I_C = 200 µA; V_{CE} = 5 V; R_S = 2 kΩ; f = 1 kHz; B = 200 Hz	-	2	10	dB

[1] Pulse test: $t_p \leq 300$ µs; $\delta = 0.02$.



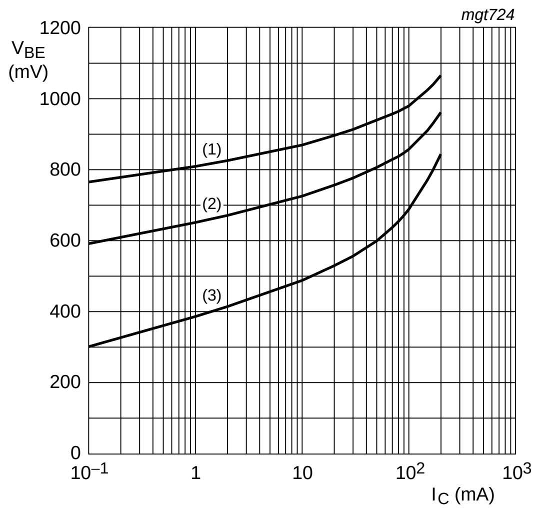
V_{CE} = 5 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 5. BC847AQA: DC current gain as a function of collector current; typical values



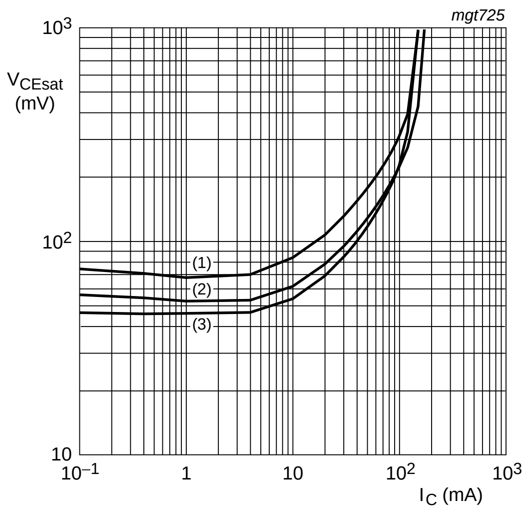
V_{CE} = 5 V

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 6. BC847AQA: Base-emitter voltage as a function of collector current; typical values



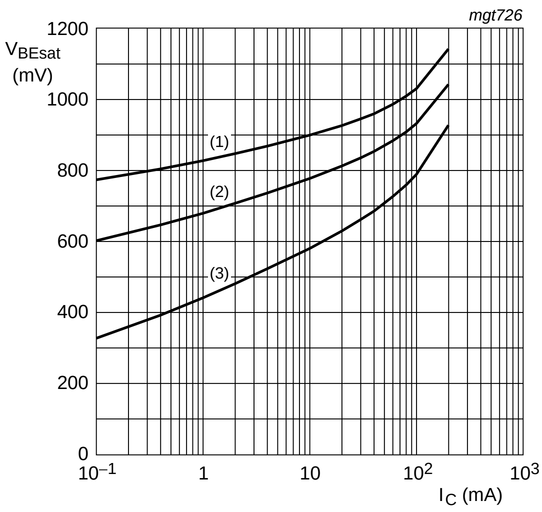
I_C/I_B = 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 7. BC847AQA: Collector-emitter saturation voltage as a function of collector current; typical values



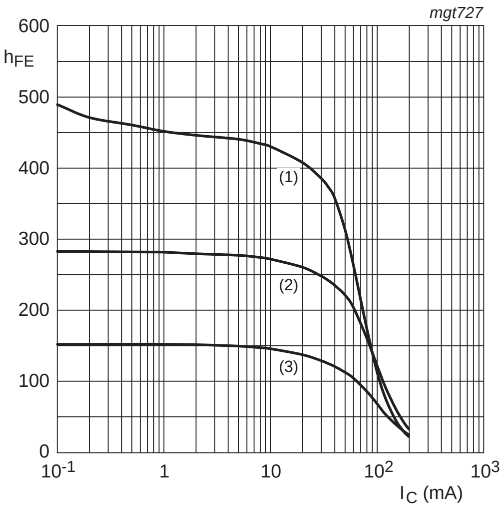
I_C/I_B = 10

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 8. BC847AQA: Base-emitter saturation voltage as a function of collector current; typical values



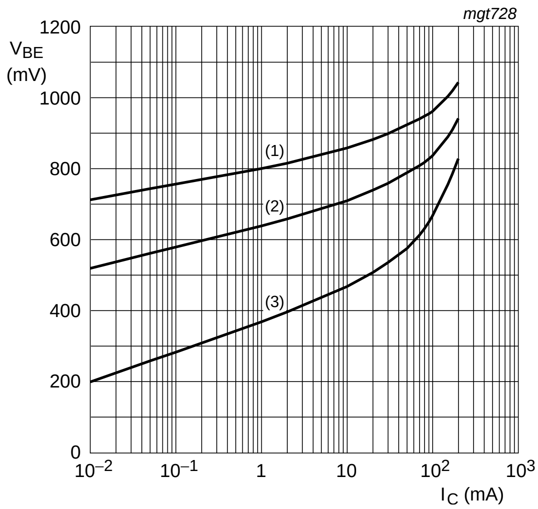
V_{CE} = 5 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 9. BC847BQA: DC current gain as a function of collector current; typical values



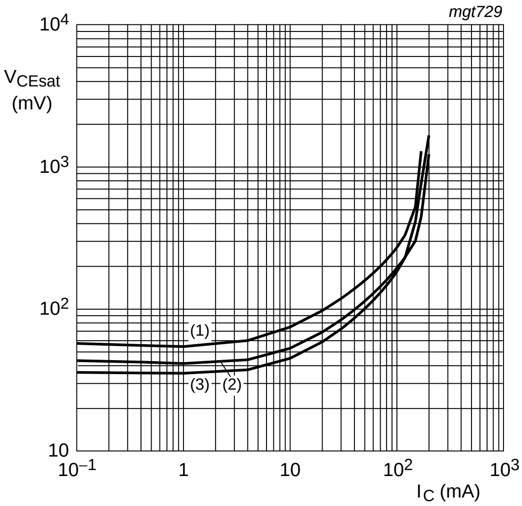
V_{CE} = 5 V

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 10. BC847BQA: Base-emitter voltage as a function of collector current; typical values



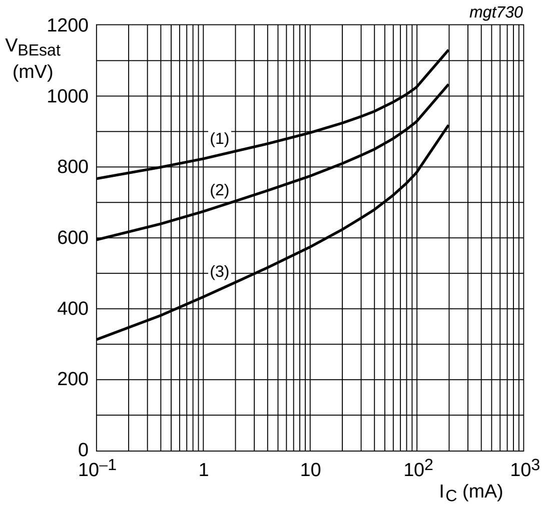
I_C/I_B = 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 11. BC847BQA: Collector-emitter saturation voltage as a function of collector current; typical values



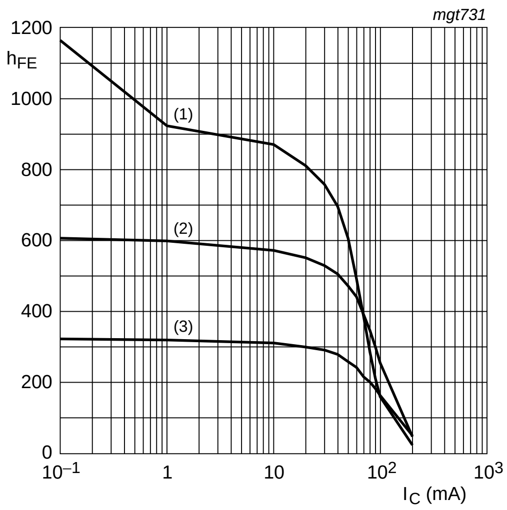
I_C/I_B = 10

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 12. BC847BQA: Base-emitter saturation voltage as a function of collector current; typical values



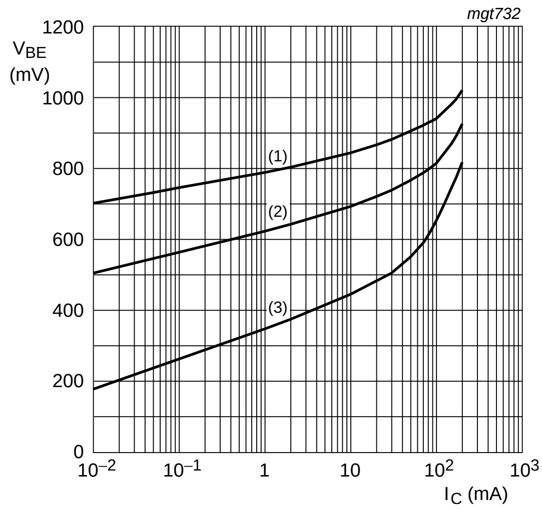
V_{CE} = 5 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = –55 °C

Fig 13. BC847CQA: DC current gain as a function of collector current; typical values



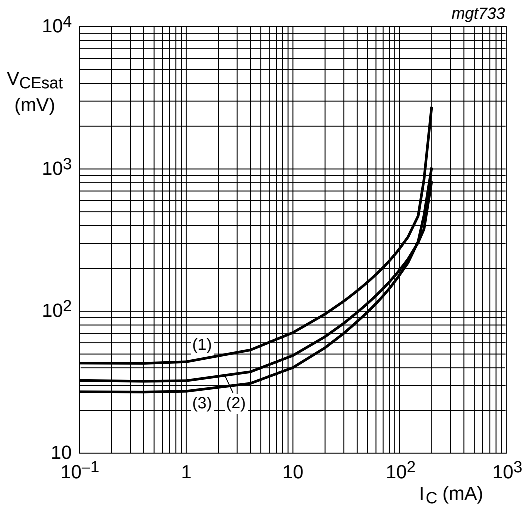
V_{CE} = 5 V

(1) T_{amb} = –55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 14. BC847CQA: Base-emitter voltage as a function of collector current; typical values



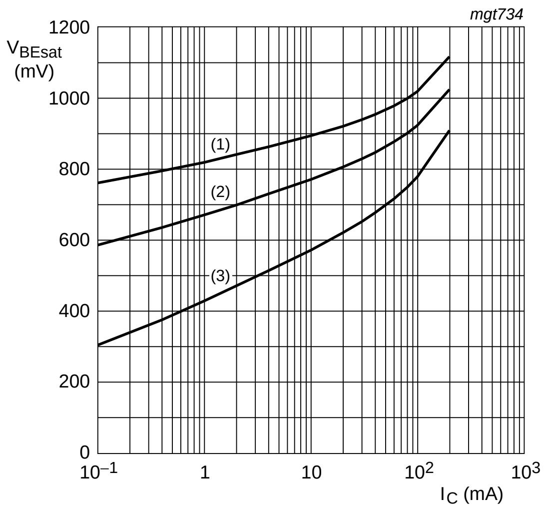
I_C/I_B = 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = –55 °C

Fig 15. BC847CQA: Collector-emitter saturation voltage as a function of collector current; typical values



I_C/I_B = 10

(1) T_{amb} = –55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 16. BC847CQA: Base-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

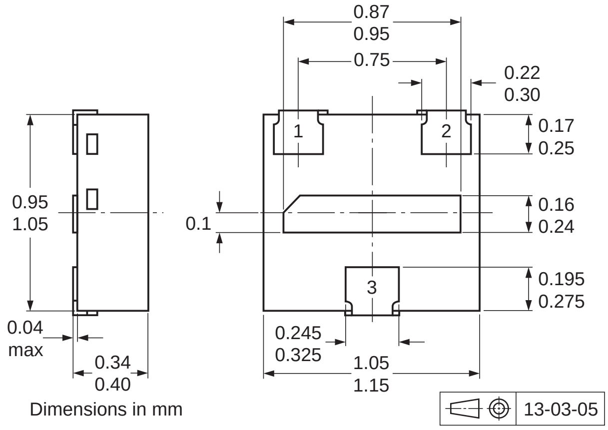


Fig 17. Package outline DFN1010D-3 (SOT1215)

10. Soldering

Footprint information for reflow soldering of DFN1010D-3 package **SOT1215**

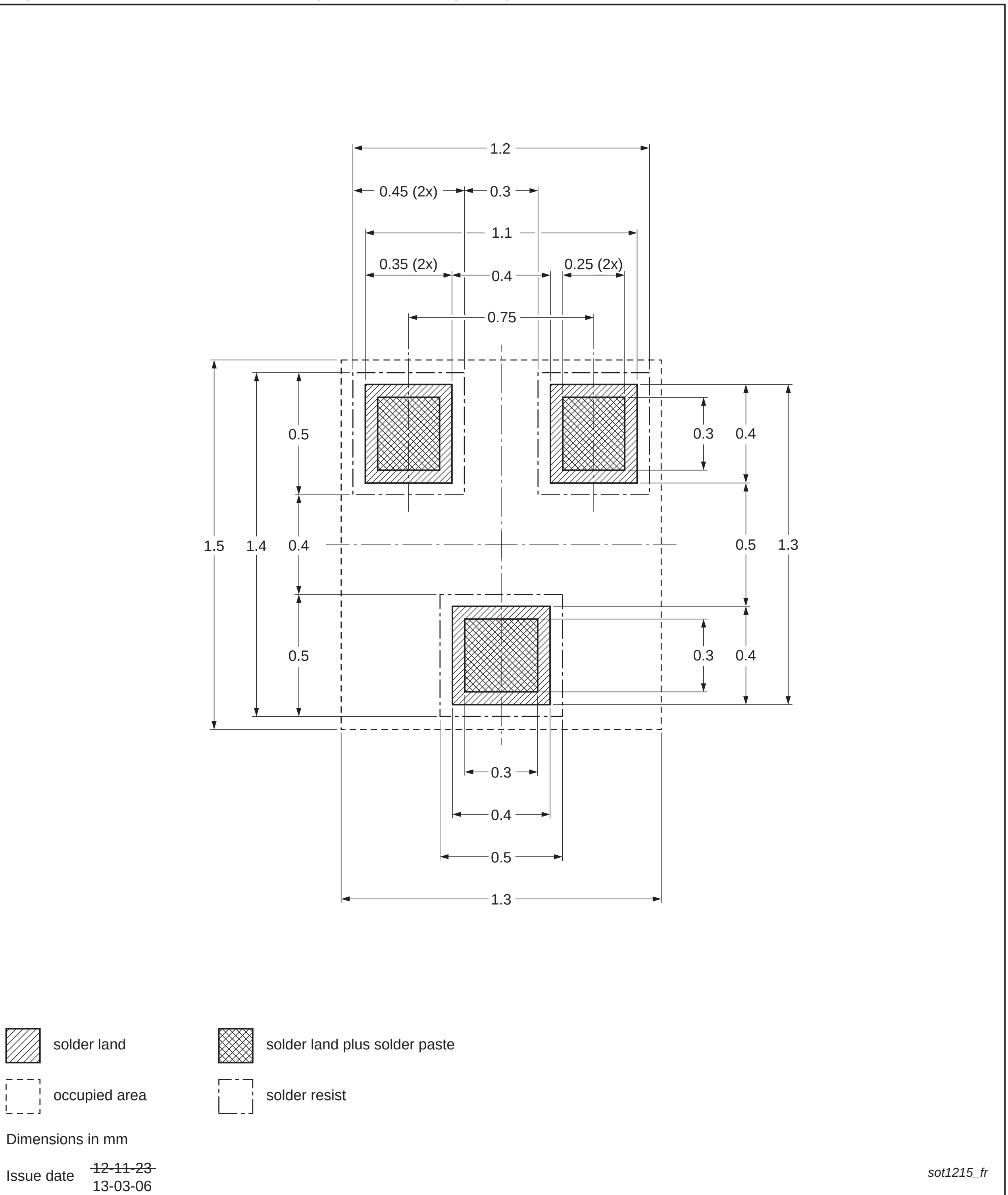


Fig 18. Reflow soldering footprint DFN1010D-3 (SOT1215)

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC847XQA_SER v.1	20150825	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".

[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 URL http://www.nxp.com.

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Date of release: 25 August 2015

Document identifier: BC847XQA_SER