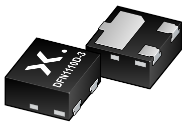


BC857xQB-Q series

45 V, 100 mA PNP general-purpose transistor

Rev. 4 — 20 September 2021 **Product data sheet**

1. General description

PNP 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		NPN complement:
	Nexperia	JEDEC	
BC857AQB-Q	SOT8015	MO-340BA	BC847AQB-Q
BC857BQB-Q			BC847BQB-Q
BC857CQB-Q			BC847CQB-Q

2. Features and benefits

- High power dissipation capability
- Suitable for Automatic Optical Inspection (AOI) of solder joint
- Smaller footprint compared to conventional leaded SMD packages
- Low package height of 0.5 mm
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- General-purpose switching and amplification
- Space restricted applications

4. Quick reference data

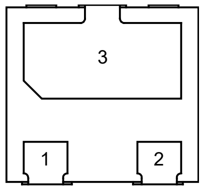
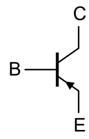
Table 2. Quick reference data

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
I_{CM}	peak collector current	single pulse; t_p ≤ 1 ms	-	-	-200	mA
h_{FE}	DC current gain					
	BC857AQB	V_{CE} = -5 V; I_C = -2 mA	125	-	250	
	BC857BQB		220	-	475	
	BC857CQB		420	-	800	

5. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Transparent top view	
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC857AQB-Q	DFN1110D-3	plastic leadless extremely thin small outline package with side-wettable flanks (SWF); 3 terminals; 0.65 mm pitch; body: 1.1 mm x 1.0 mm x 0.48 mm	SOT8015
BC857BQB-Q			
BC857CQB-Q			

7. Marking

Table 5. Marking

Type number	Marking code
BC857AQB-Q	A5
BC857BQB-Q	A6
BC857CQB-Q	A7

8. Limiting values

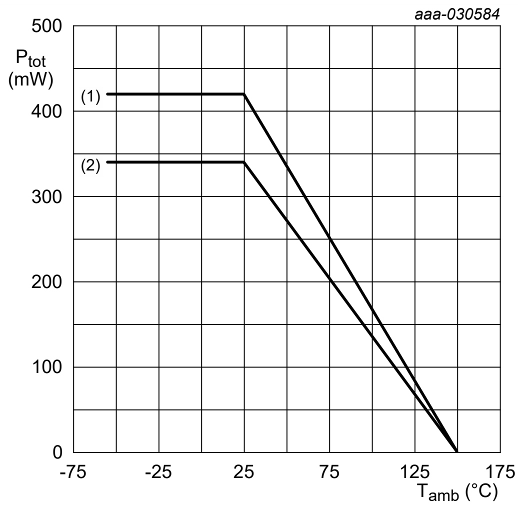
Table 6. Limiting values

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

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

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 ≤ 1 ms		-	-200	mA
I_{BM}	peak base current	single pulse; t_p ≤ 1 ms		-	-100	mA
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[1]	-	340	mW
			[2]	-	420	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; 35 µm copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB; single-sided; 70 µm copper; tin-plated and standard footprint.



(1) FR4 PCB; single-sided; 70 µm copper, standard footprint
(2) FR4 PCB; single-sided; 35 µm copper, standard footprint

Fig. 1. Power derating curves DFN1110D-3 (SOT8015)

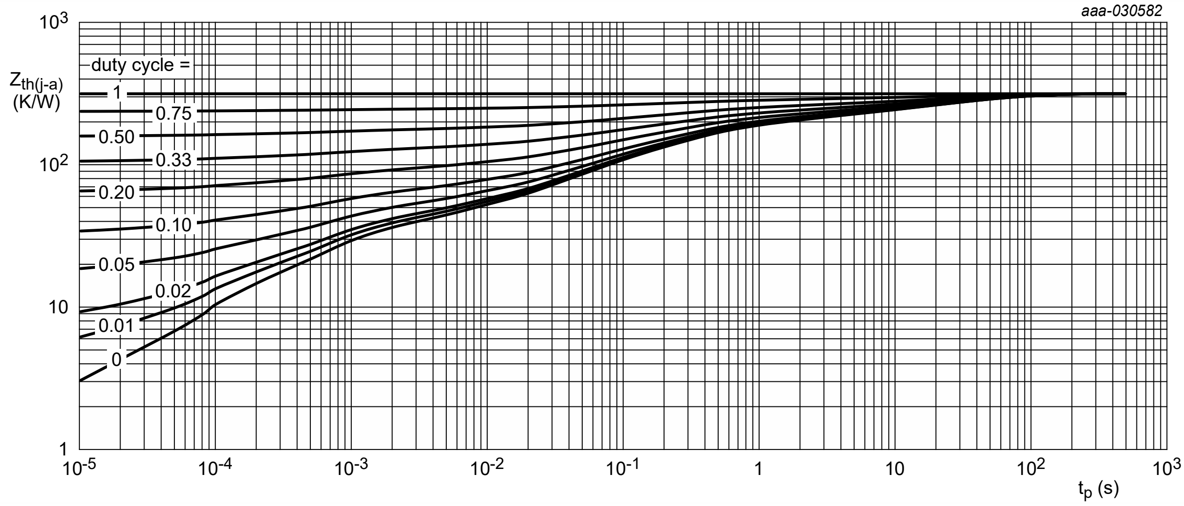
9. Thermal characteristics

Table 7. Thermal characteristics

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

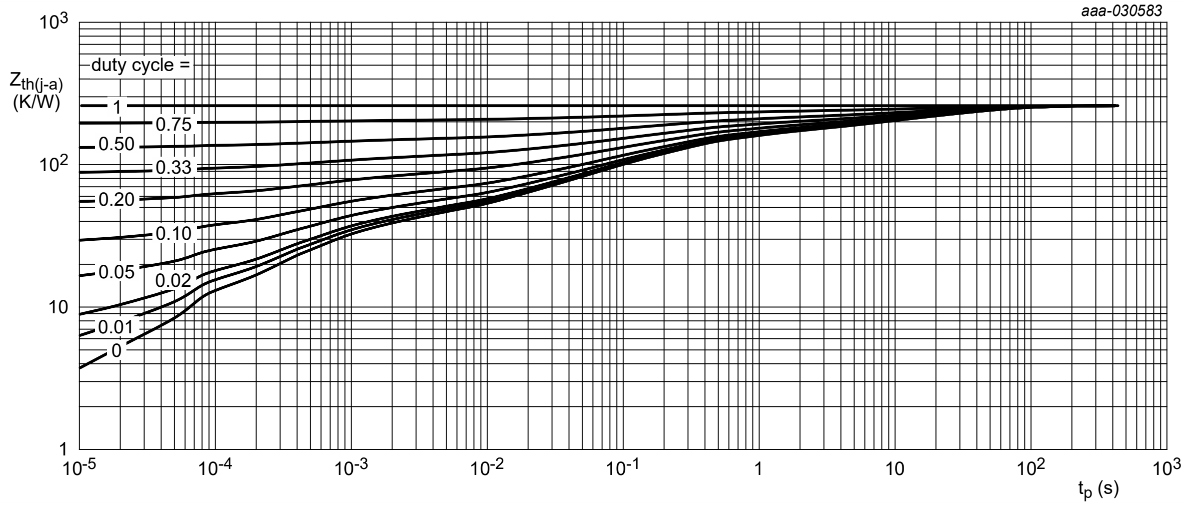
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	368	K/W
			[2]	-	-	298	K/W

[1] Device mounted on an FR4 PCB; single-sided; 35 µm copper; tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB; single-sided; 70 µm copper; tin-plated and standard footprint.



FR4 PCB; single-sided; 35 µm copper, standard footprint

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



FR4 PCB; single-sided; 70 µm copper, standard footprint

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

10. Characteristics

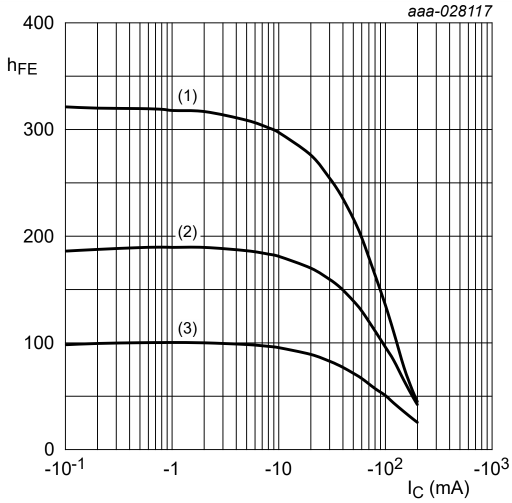
Table 8. Characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = -100 µA; I_E = 0 A		-50	-	-	V
$V_{(BR)CES}$	collector-emitter peak voltage	I_C = -2 mA; I_E = 0 A		-45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = -100 µA; I_C = 0 A		-6	-	-	V
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						
	BC857AQB-Q	V_{CE} = -5 V; I_C = -2 mA		125	-	250	
	BC857BQB-Q			220	-	475	
	BC857CQB-Q			420	-	800	
V_{CEsat}	collector-emitter saturation voltage	I_C = -10 mA; I_B = -0.5 mA		-	-	-300	mV
		I_C = -100 mA; I_B = -5 mA	[1]	-	-	-650	mV
V_{BE}	base-emitter voltage	V_{CE} = -5 V ; I_C = -2 mA	[2]	-600	-	-750	mV
		V_{CE} = -5 V ; I_C = -10 mA	[2]	-	-	-820	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]	-	-850	-	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		-	2	-	pF
C_e	emitter capacitance	V_{EB} = -0.5 V; I_C = i_c = 0 A; f = 1 MHz		-	10	-	pF
NF	noise figure	V_{CE} = -5 V; I_C = -200 µA; R_S = 2 kΩ; f = 1 kHz; B = 200 Hz		-	-	10	dB

[1] pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$

[2] V_{BE} decreases by about 2 mV/K with increasing temperature.



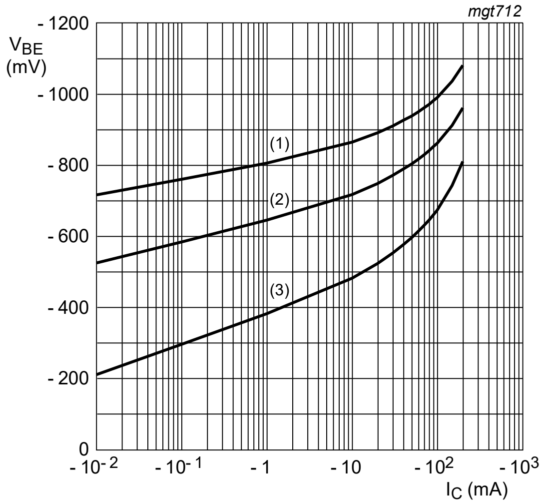
V_{CE} = -5 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 4. BC857AQB-Q: DC current gain as a function of collector current; typical values



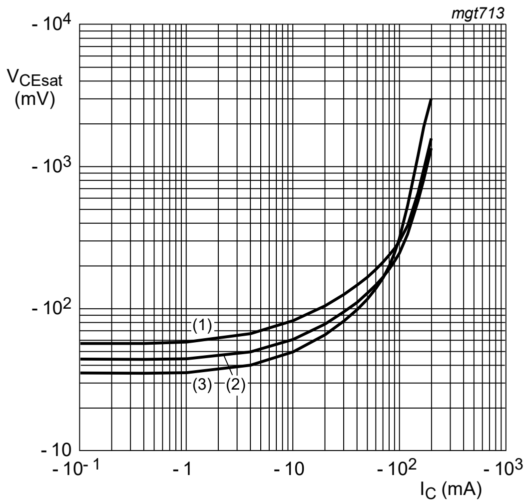
V_{CE} = -5 V

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig. 5. BC857AQB-Q: Base-emitter voltage as a function of collector current; typical values



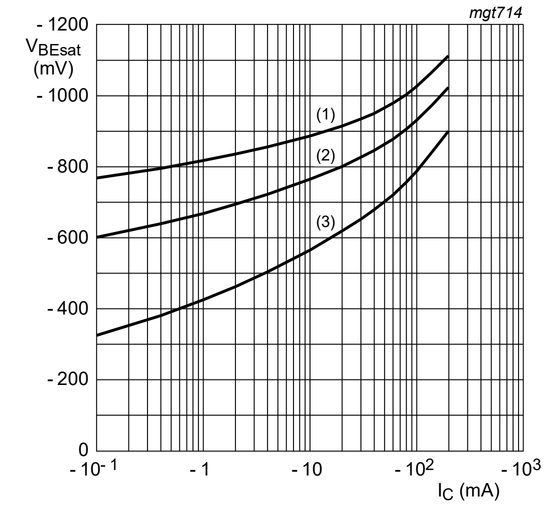
I_C/ I_B= 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 6. BC857AQB-Q: Collector-emitter saturation voltage as a function of collector current; typical values



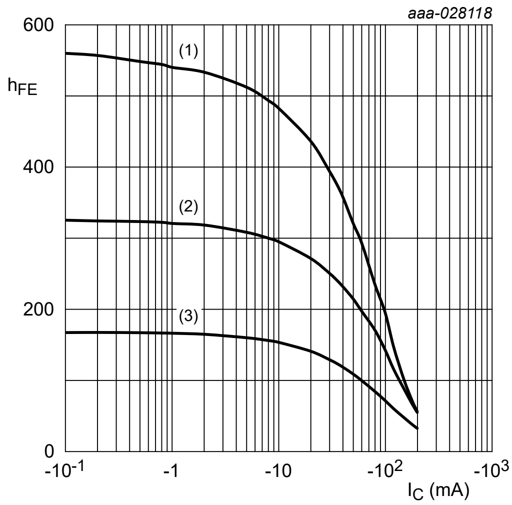
I_C/ I_B= 20

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

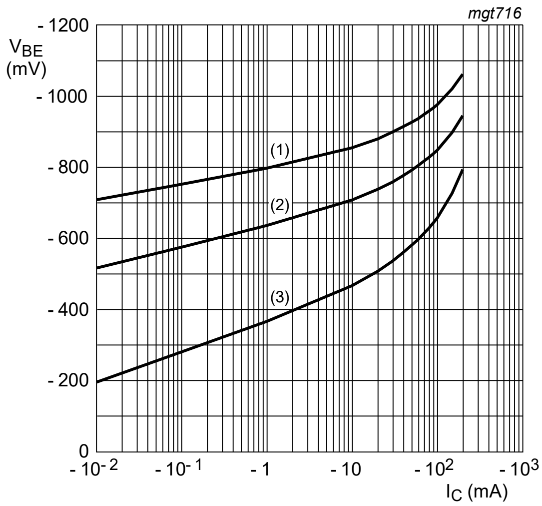
(3) T_{amb} = 150 °C

Fig. 7. BC857AQB-Q: Base-emitter saturation voltage as a function of collector current; typical values



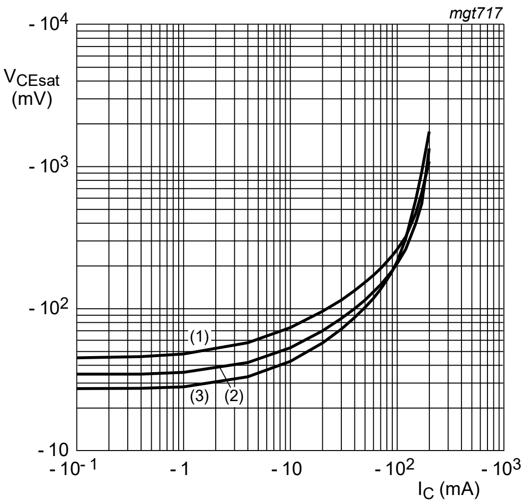
V_{CE} = -5 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 8. BC857BQB-Q: DC current gain as a function of collector current; typical values



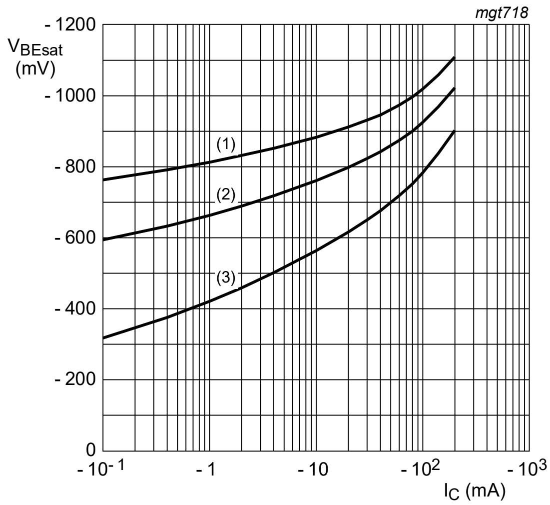
V_{CE} = -5 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 9. BC857BQB-Q: Base-emitter voltage as a function of collector current; typical values



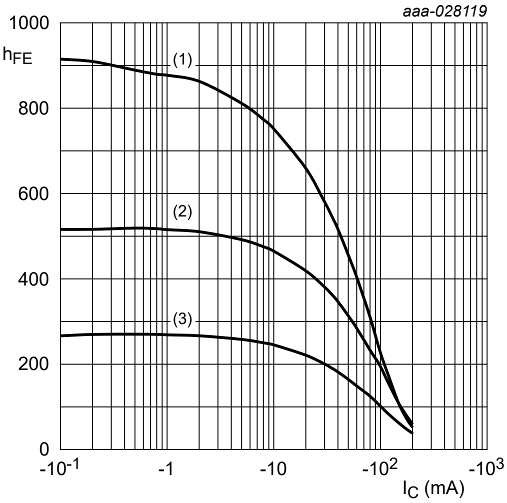
I_C/ I_B= 20
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 10. BC857BQB-Q: Collector-emitter saturation voltage as a function of collector current; typical values



I_C/ I_B= 20
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 11. BC857BQB-Q: Base-emitter saturation voltage as a function of collector current; typical values



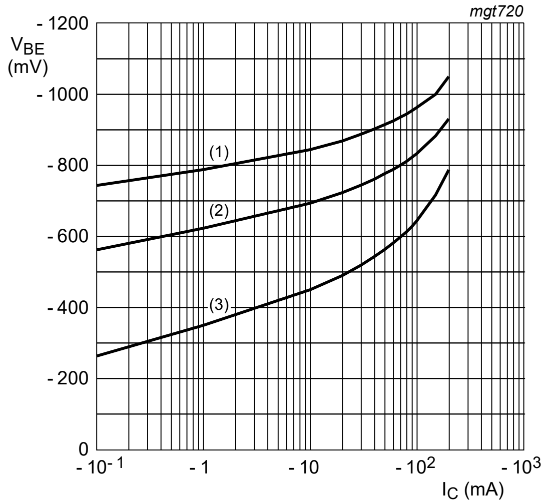
V_{CE} = -5 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 12. BC857CQB-Q: DC current gain as a function of collector current; typical values



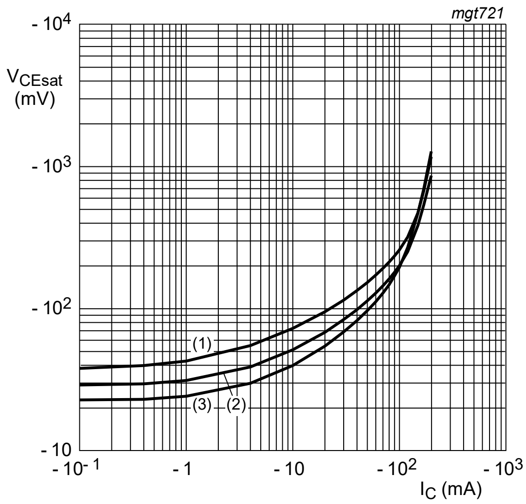
V_{CE} = -5 V

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig. 13. BC857CQB-Q: Base-emitter voltage as a function of collector current; typical values



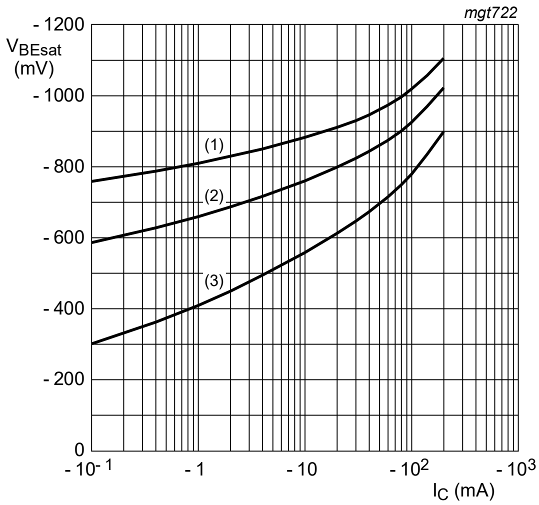
I_C / I_B = 20

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = -55 °C

Fig. 14. BC857CQB-Q: Collector-emitter saturation voltage as a function of collector current; typical values



I_C / I_B = 20

(1) T_{amb} = -55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig. 15. BC857CQB-Q: Base-emitter saturation voltage as a function of collector current; typical values

11. Test information

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

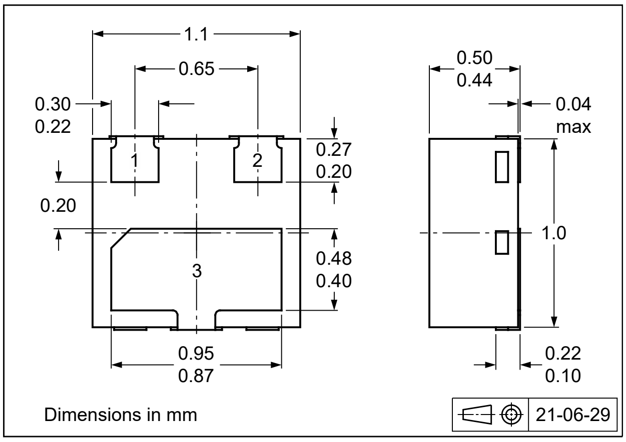


Fig. 16. Package outline DFN1110D-3 (SOT8015)

13. Soldering

Footprint information for reflow soldering of DFN1110D-3 package **SOT8015**

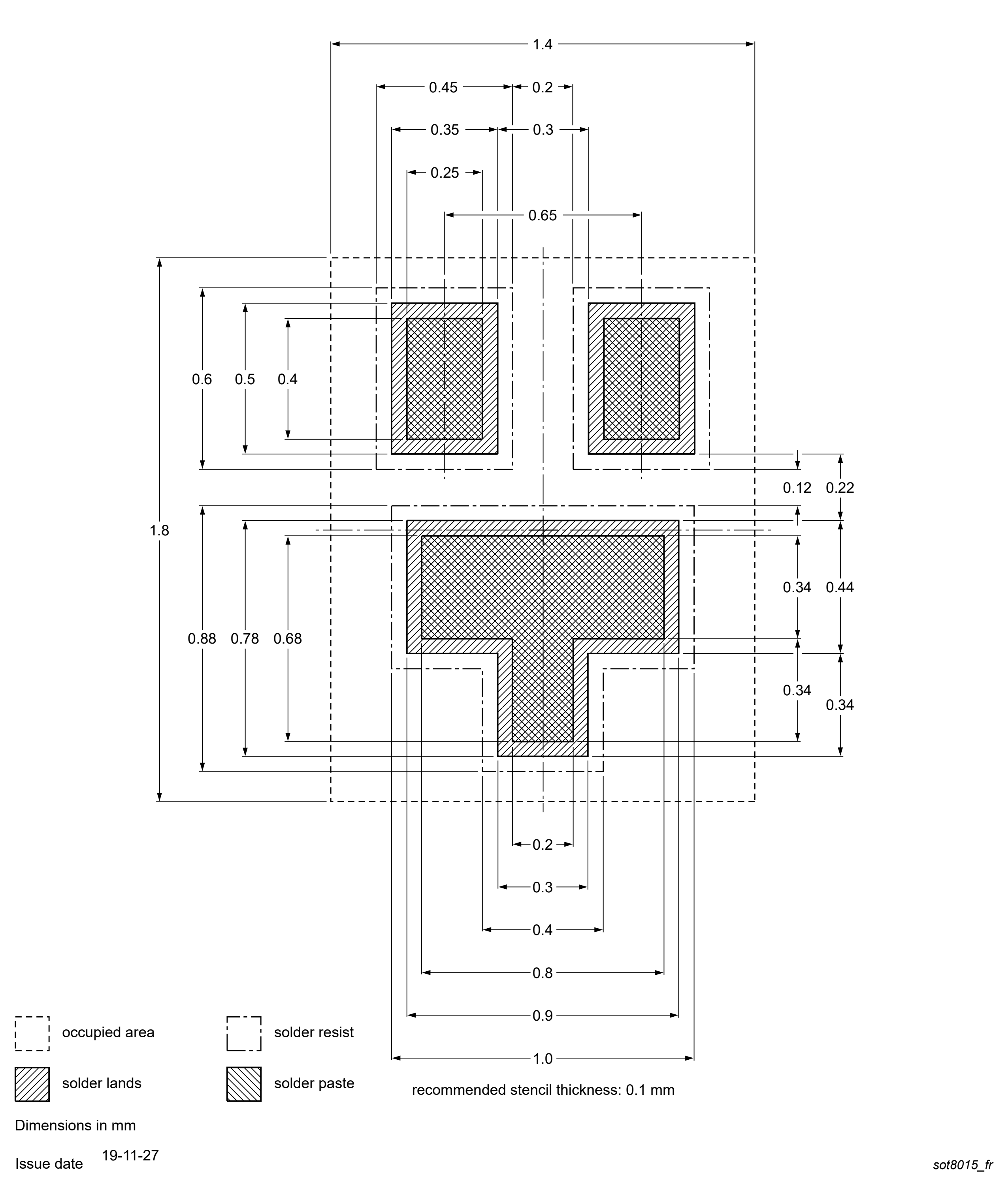


Fig. 17. Reflow soldering footprint for DFN1110D-3 (SOT8015)

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC857XQB-Q_SER v.4	20210920	Product data sheet	-	BC857XQB-Q_SER v.3
Modifications:	• Characteristics: C_e adjusted			
BC857XQB-Q_SER v.3	20210521	Product data sheet	-	BC857XQB-Q_SER v.2
BC857XQB-Q_SER v.2				BC857XQB-Q_SER v.1
BC857XQB-Q_SER v.1	20210222	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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Contents

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Date of release: 20 September 2021