



BC847xQC-Q series

45 V, 100 mA NPN general-purpose transistor

Rev. 2 — 21 May 2021

Product data sheet

1. General description

NPN general-purpose transistor in an ultra small DFN1412D-3 (SOT8009) leadless Surface-Mounted Device (SMD) plastic package with side-wettable flanks.

Table 1. Product overview

Type number	Package		PNP complement:
	Nexperia	JEDEC	
BC847AQC-Q	SOT8009	MO-340CA	BC857AQC-Q
BC847BQC-Q			BC857BQC-Q
BC847CQC-Q			BC857CQC-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

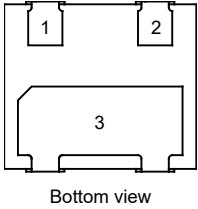
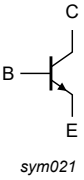
Table 2. Quick reference data

$T_{amb} = 25\text{ °C}$ 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; $t_p \leq 1\text{ ms}$	-	-	200	mA
h_{FE}	DC current gain					
	BC847AQC-Q	$V_{CE} = 5\text{ V}; I_C = 2\text{ mA}$	110	-	220	
	BC847BQC-Q		200	-	450	
	BC847CQC-Q		420	-	800	

5. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Bottom view	 sym021
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC847AQC-Q	DFN1412D-3	plastic, leadless ultra small outline package with sidewettable flanks (SWF); 3 terminals; 0.8 mm pitch; 1.4 mm x 1.2 mm x 0.48 mm body	SOT8009
BC847BQC-Q			
BC847CQC-Q			

7. Marking

Table 5. Marking

Type number	Marking code
BC847AQC-Q	9C
BC847BQC-Q	9D
BC847CQC-Q	9E

8. Limiting values

Table 6. Limiting values

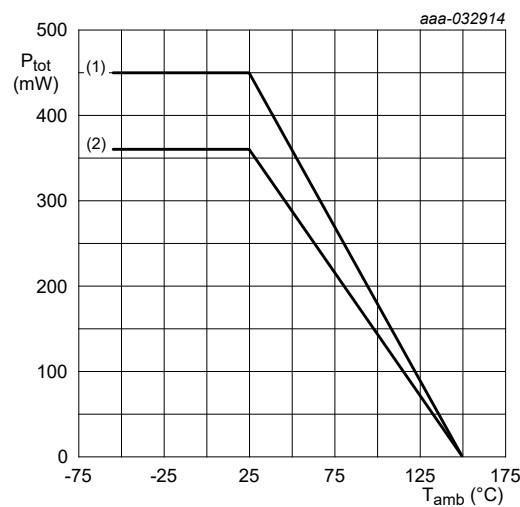
In accordance with the Absolute Maximum Rating System (IEC 60134).

$T_{amb} = 25\text{ °C}$ 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; $t_p \leq 1\text{ ms}$	-	200	mA
I_{BM}	peak base current	single pulse; $t_p \leq 1\text{ ms}$	-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	360	mW
			[2]	450	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 Printed-Circuit-Board (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 DFN1412D-3 (SOT8009)

9. Thermal characteristics

Table 7. Thermal characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	348	K/W
			[2]	-	-	278	K/W

- [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 Printed-Circuit-Board (PCB); single-sided 70 μm copper; tin-plated and standard footprint.

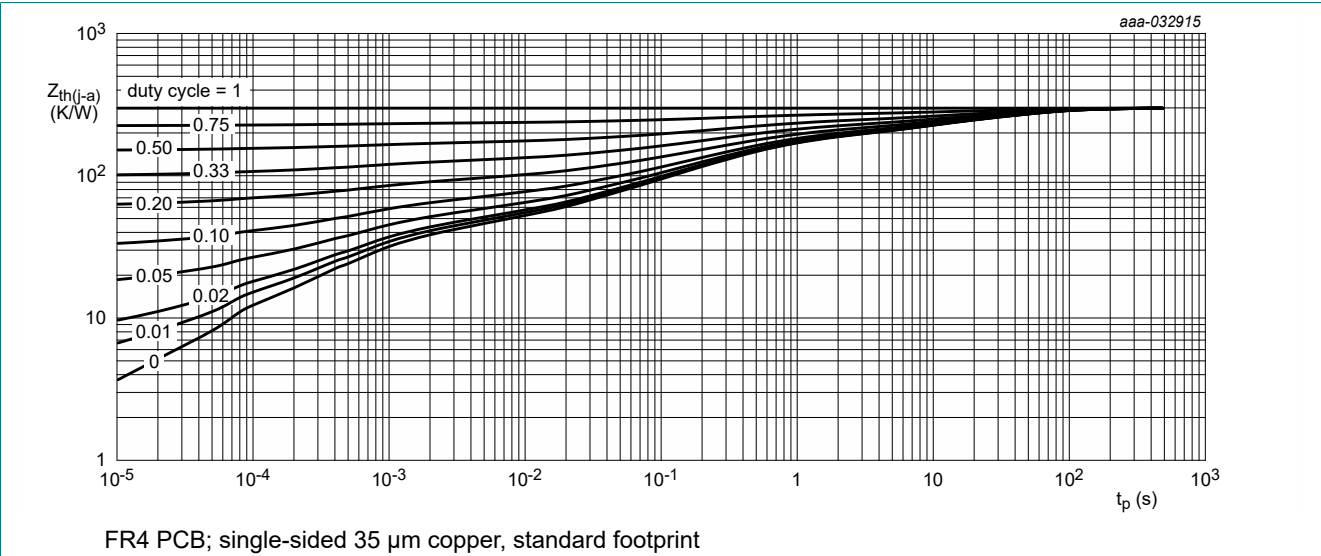


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

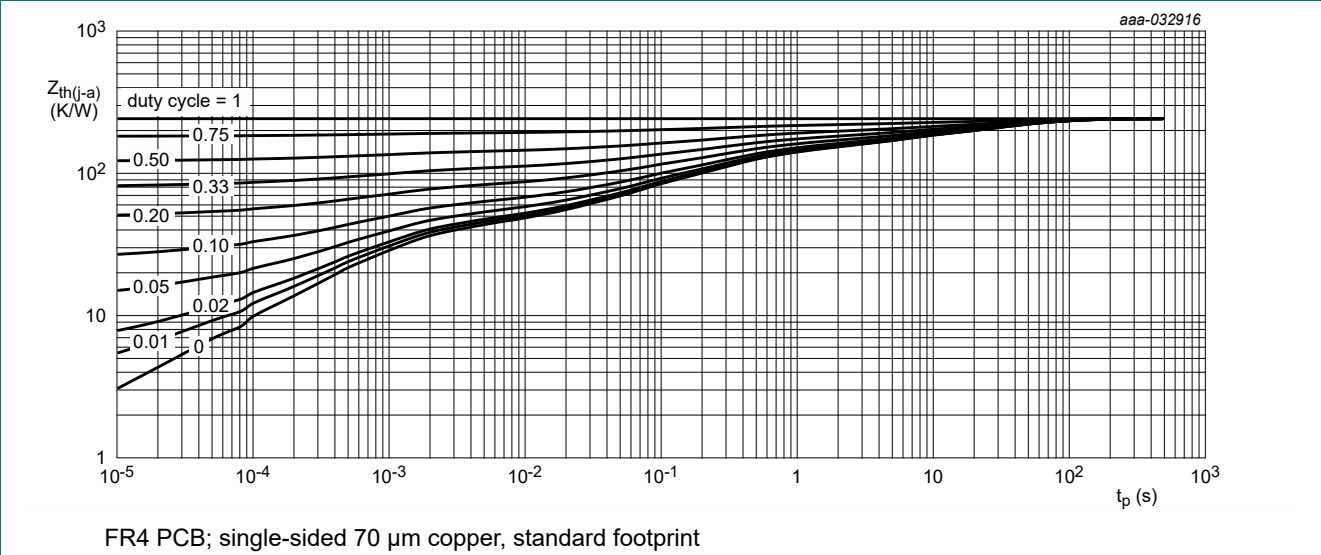


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 8. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\text{ }\mu\text{A}$; $I_E = 0\text{ A}$	50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2\text{ mA}$; $I_B = 0\text{ A}$	45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 100\text{ }\mu\text{A}$; $I_C = 0\text{ A}$	6	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = 30\text{ V}$; $I_E = 0\text{ A}$	-	-	15	nA
		$V_{CB} = 30\text{ V}$; $I_E = 0\text{ A}$; $T_J = 150\text{ °C}$	-	-	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					
	BC847AQC-Q	$V_{CE} = 5\text{ V}$; $I_C = 2\text{ mA}$	110	-	220	
	BC847BQC-Q		200	-	450	
	BC847CQC-Q		420	-	800	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA}$; $I_B = 0.5\text{ mA}$	-	-	200	mV
		$I_C = 100\text{ mA}$; $I_B = 5\text{ mA}$ [1]	-	-	400	mV
V_{BE}	base-emitter voltage	$V_{CE} = 5\text{ V}$; $I_C = 2\text{ mA}$ [2]	580	-	700	mV
		$V_{CE} = 5\text{ V}$; $I_C = 10\text{ mA}$ [2]	-	-	770	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10\text{ mA}$; $I_B = 0.5\text{ mA}$	-	760	-	mV
		$I_C = 100\text{ mA}$; $I_B = 5\text{ mA}$ [1]	-	900	-	mV
f_T	transition frequency	$V_{CE} = 5\text{ V}$; $I_C = 10\text{ mA}$; $f = 100\text{ MHz}$	100	-	-	MHz
C_c	collector capacitance	$V_{CB} = 10\text{ V}$; $I_E = i_e = 0\text{ A}$; $f = 1\text{ MHz}$	-	-	1.5	pF
C_e	emitter capacitance	$V_{EB} = 0.5\text{ V}$; $I_E = i_e = 0\text{ A}$; $f = 1\text{ MHz}$	-	11	-	pF
NF	noise figure	$V_{CE} = 5\text{ V}$; $I_C = 200\text{ }\mu\text{A}$; $R_S = 2\text{ k}\Omega$; $f = 1\text{ kHz}$; $B = 200\text{ Hz}$	-	-	10	dB

[1] pulsed; $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$

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

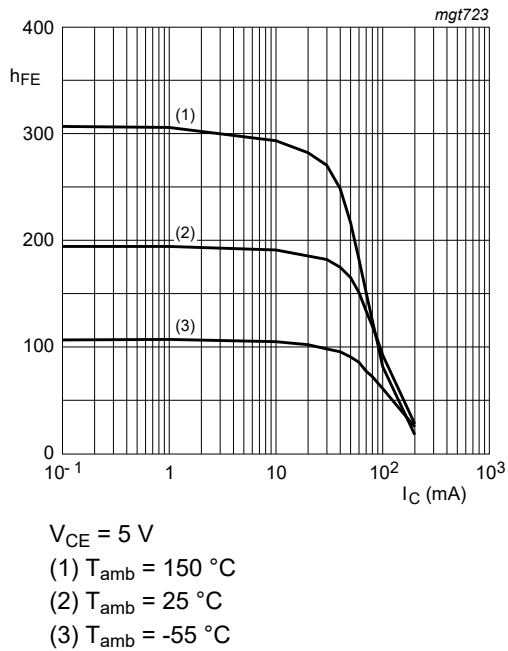


Fig. 4. BC847AQC-Q: DC current gain as a function of collector current; typical values

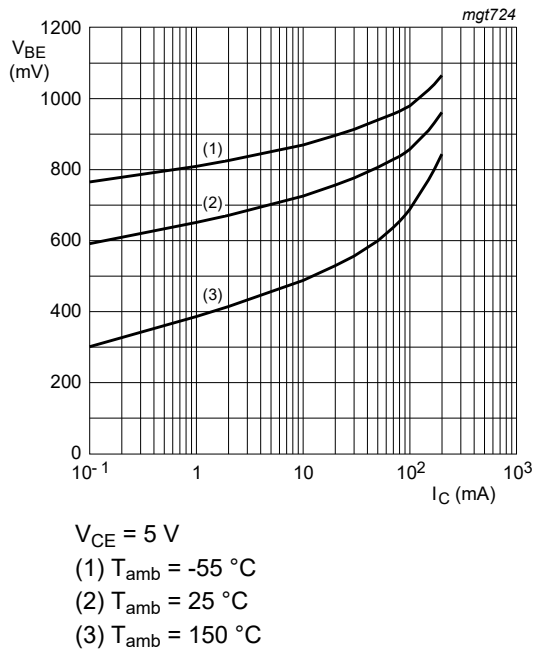


Fig. 5. BC847AQC-Q: Base-emitter voltage as a function of collector current; typical values

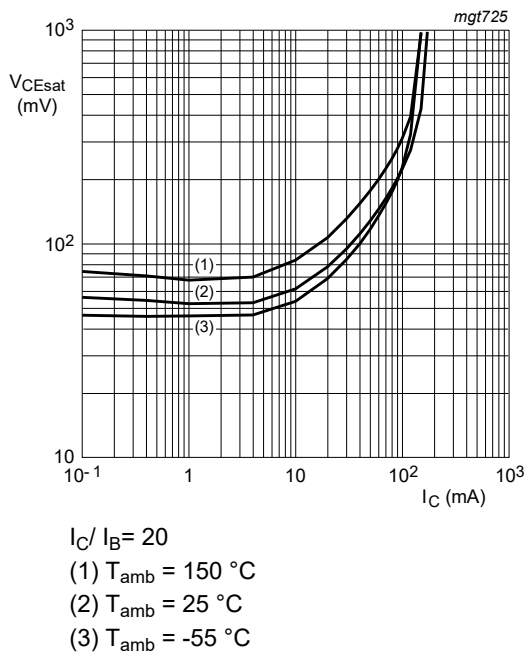


Fig. 6. BC847AQC-Q: Collector-emitter saturation voltage as a function of collector current; typical values

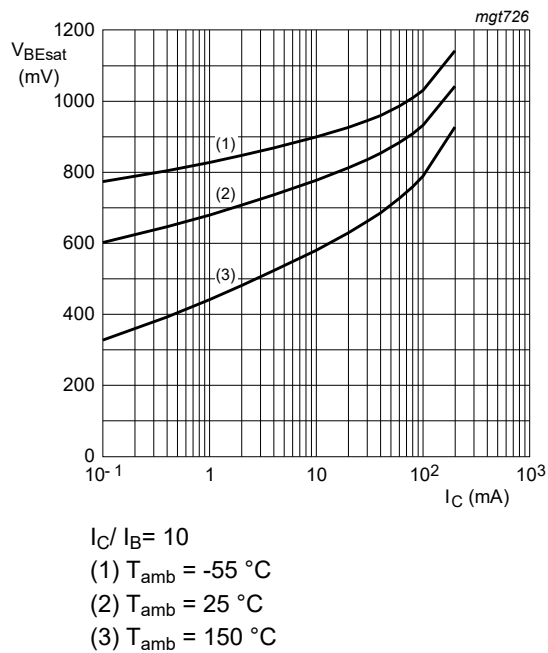


Fig. 7. BC847AQC-Q: Base-emitter saturation voltage as a function of collector current; typical values

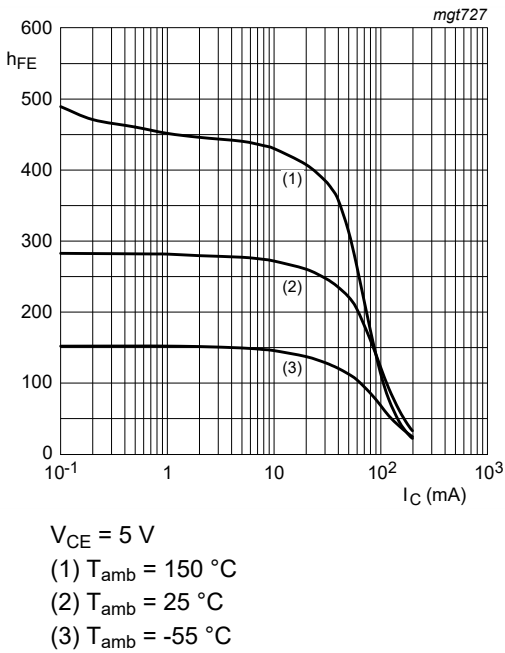


Fig. 8. BC847BQC-Q: DC current gain as a function of collector current; typical values

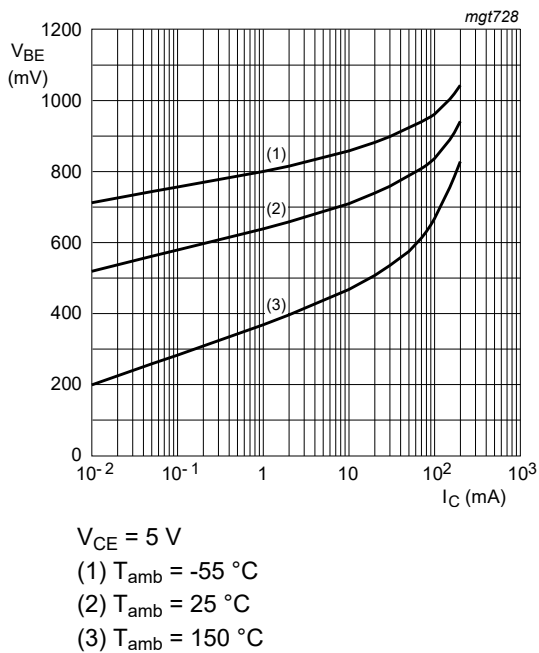


Fig. 9. BC847BQC-Q: Base-emitter voltage as a function of collector current; typical values

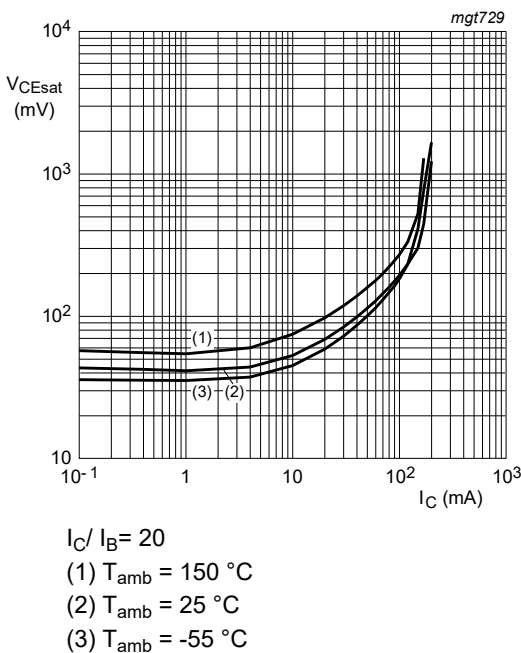


Fig. 10. BC847BQC-Q: Collector-emitter saturation voltage as a function of collector current; typical values

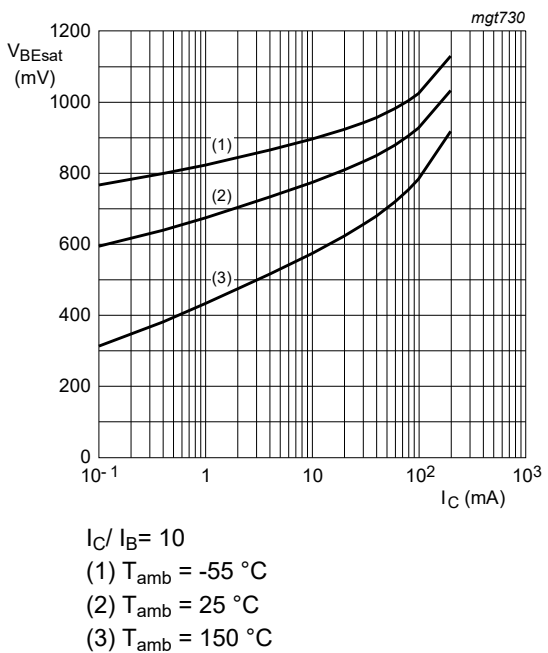
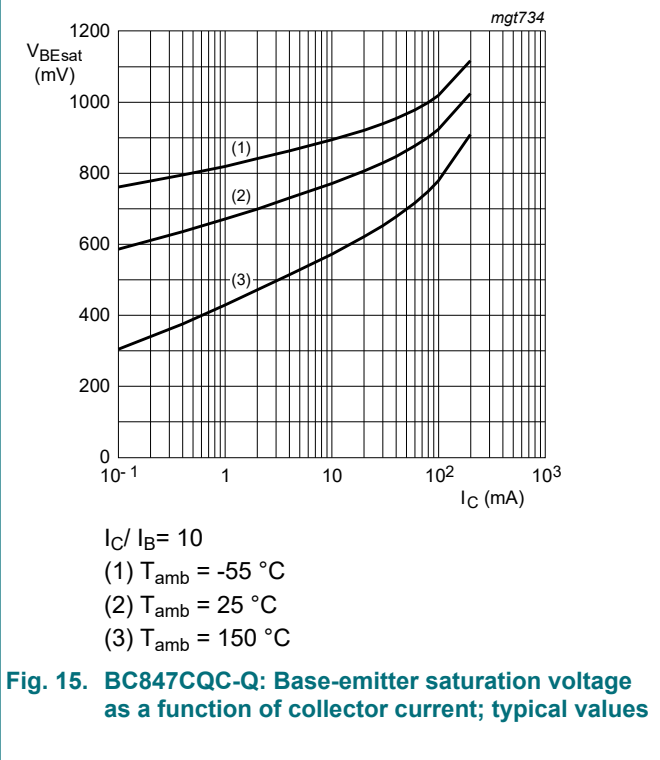
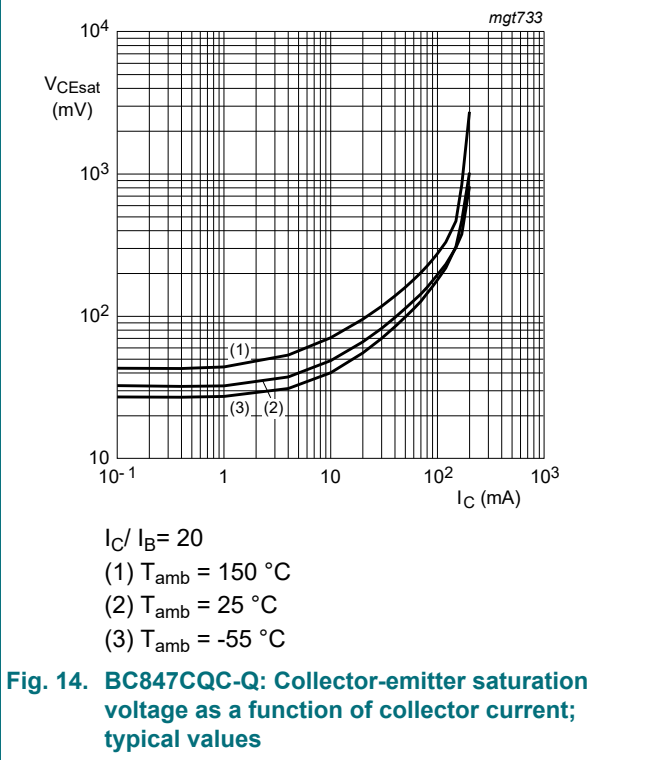
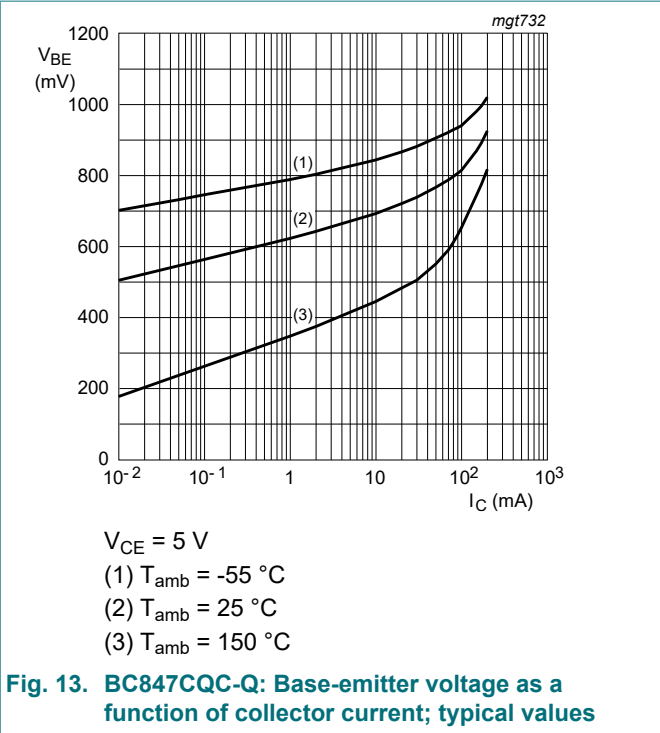
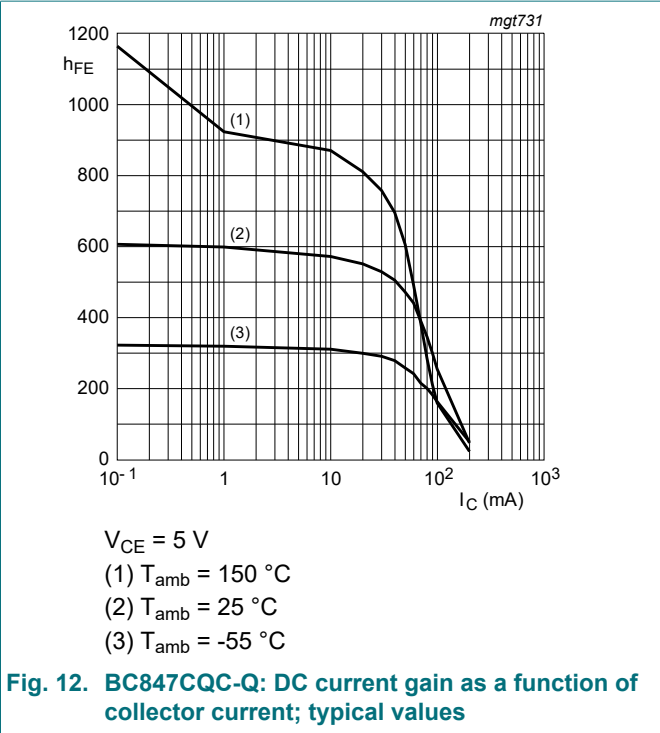


Fig. 11. BC847BQC-Q: Base-emitter saturation voltage as a function of collector current; typical values



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

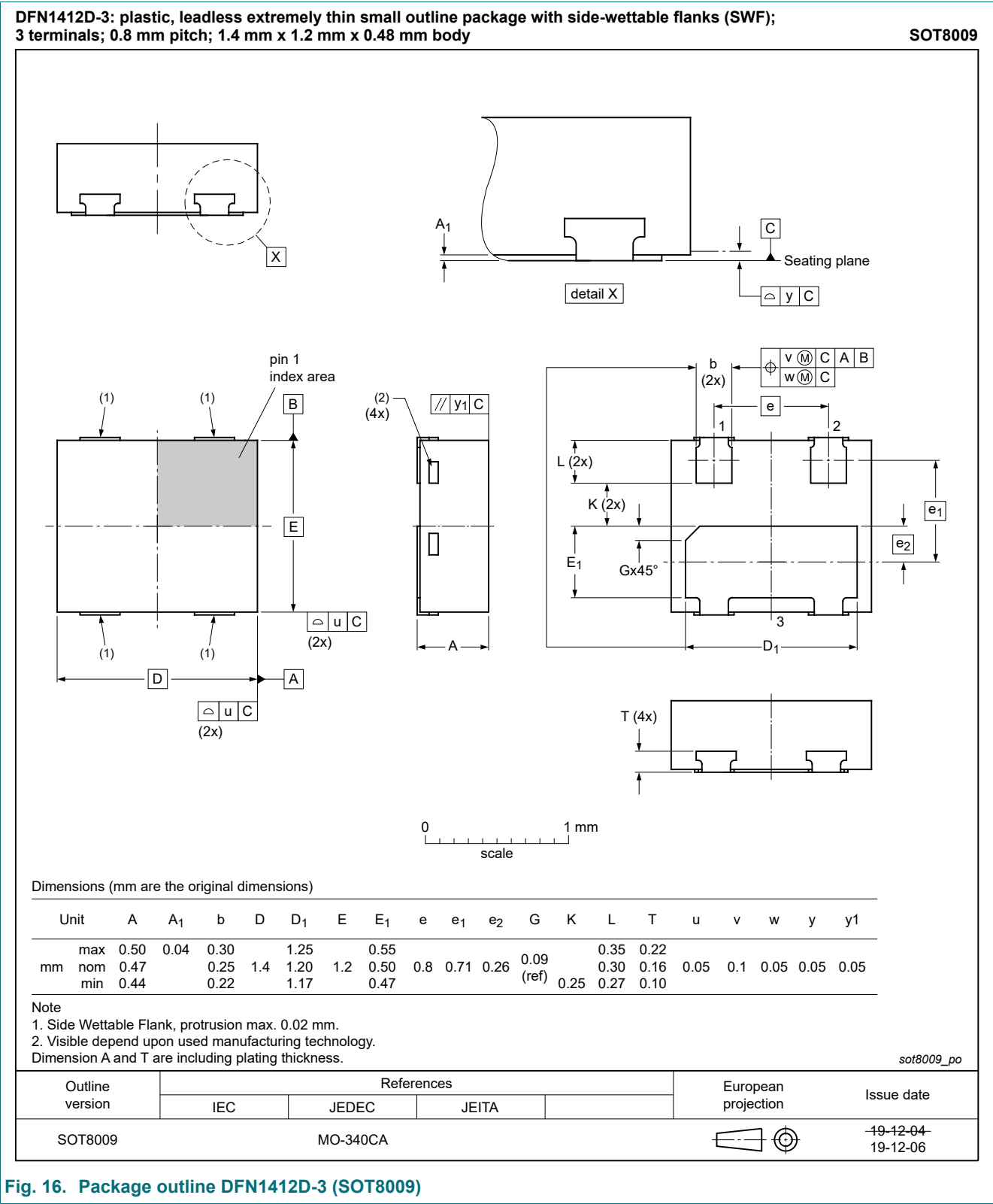


Fig. 16. Package outline DFN1412D-3 (SOT8009)

13. Soldering

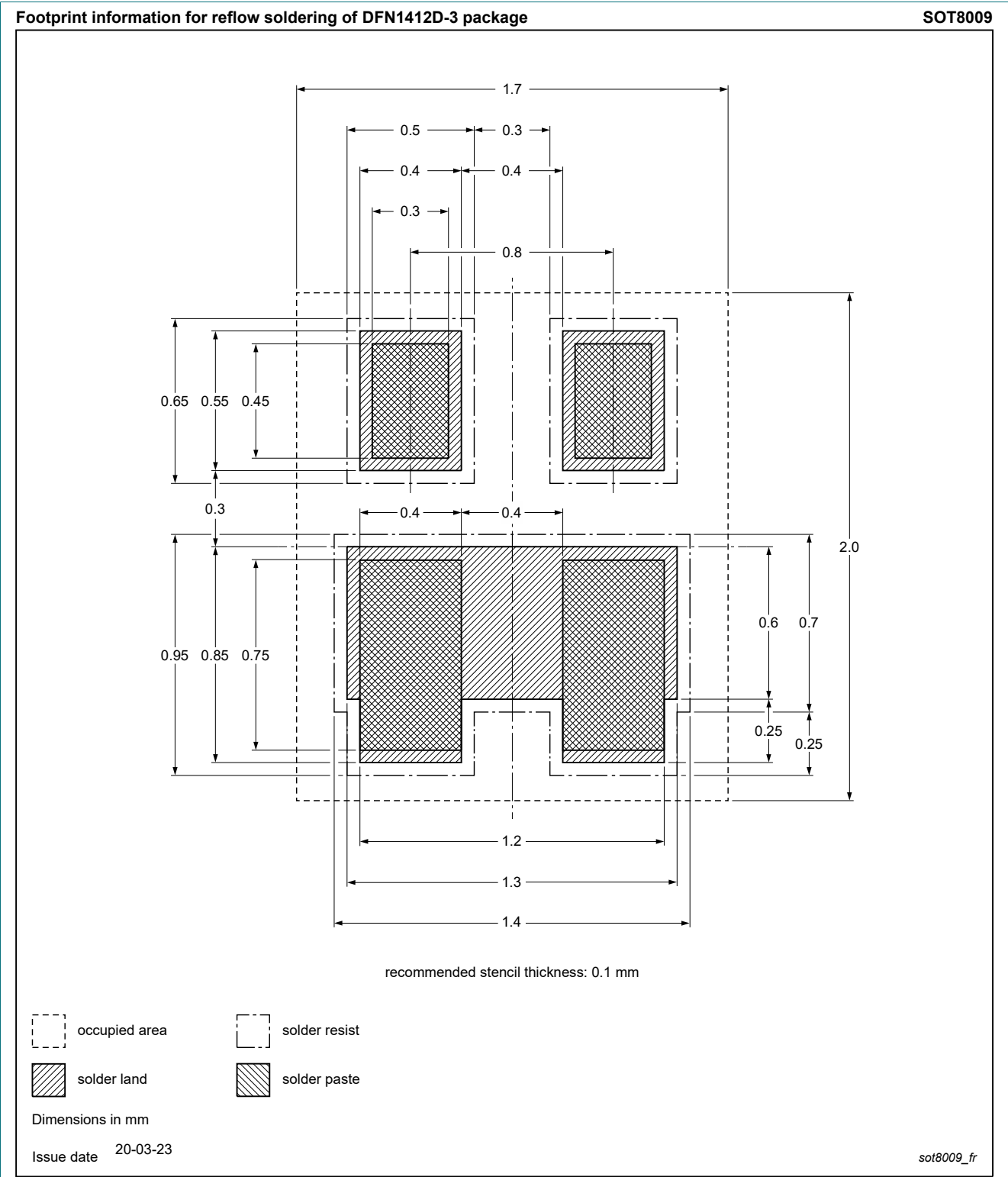


Fig. 17. Reflow soldering footprint for DFN1412D-3 (SOT8009)

14. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC847xQC-Q_SER v.2	20210521	Product data sheet	-	BC847xQC-Q_SER v.1
Modifications:	• Features and benefits: added recommendation for automotive applications			
BC847xQC-Q_SER v.1	20210304	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".
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Date of release: 21 May 2021