



BC847RAPN

45 V, 100 mA NPN/PNP general-purpose double transistors

7 June 2017

Product data sheet

1. General description

NPN/PNP general-purpose double transistors in a leadless ultra small DFN1412-6 (SOT1268) Surface-Mounted Device (SMD) plastic package.

NPN/NPN complement: BC847RA

PNP/PNP complement: BC857RA

2. Features and benefits

- Reduces component count
- Reduces pick and place costs
- Low package height of 0.5 mm
- AEC-Q101 qualified

3. Applications

- General-purpose switching and amplification
- Mobile applications

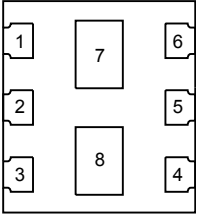
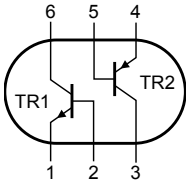
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor; for the PNP transistor with negative polarity						
V_{CEO}	collector-emitter voltage	open base	-	-	45	V
I_C	collector current		-	-	100	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	200	mA
h_{FE}	DC current gain	$V_{CE} = 5$ V; $I_C = 2$ mA; $T_{amb} = 25$ °C	200	-	450	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E1	emitter TR1	 Transparent top view DFN1412-6 (SOT1268)	 <i>sym019</i>
2	B1	base TR1		
3	C2	collector TR2		
4	E2	emitter TR2		
5	B2	base TR2		
6	C1	collector TR1		
7	C1	collector TR1		
8	C2	collector TR2		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BC847RAPN	DFN1412-6	plastic thermal enhanced ultra thin small outline package; no leads; 6 terminals; body: 1.4 mm x 1.2 mm x 0.47 mm	SOT1268

7. Marking

Table 4. Marking codes

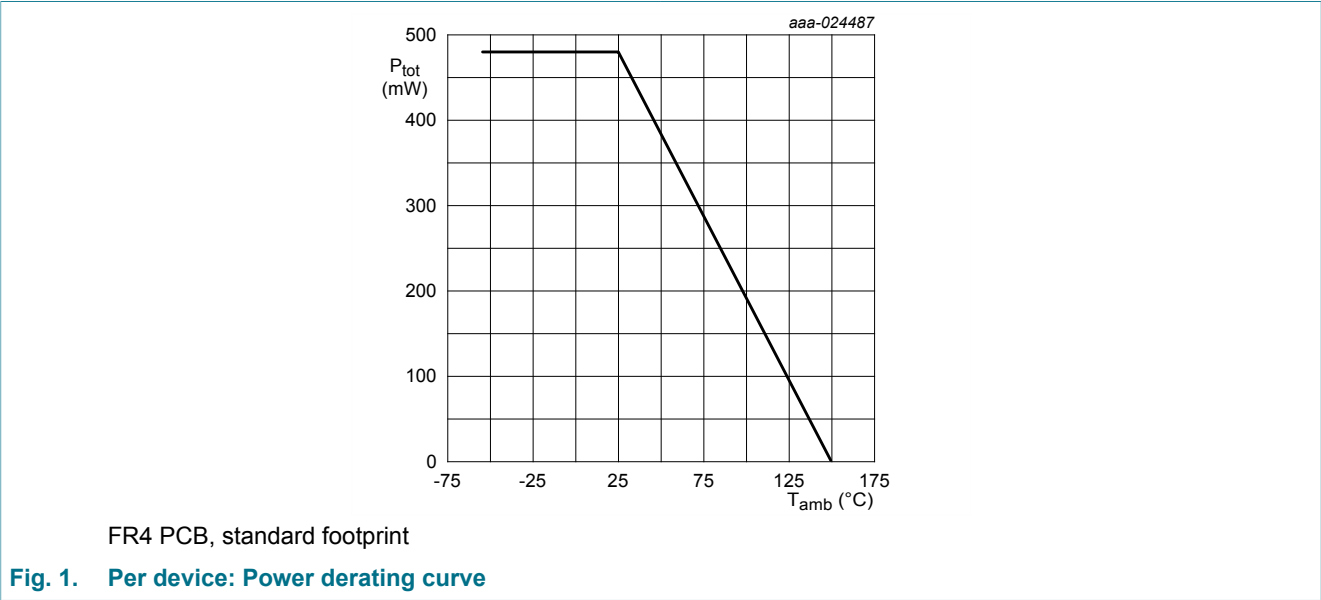
Type number	Marking code
BC847RAPN	A4

8. Limiting values

Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor; for the PNP transistor with negative polarity						
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			-	100	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	325	mW
Per device						
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	480	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.

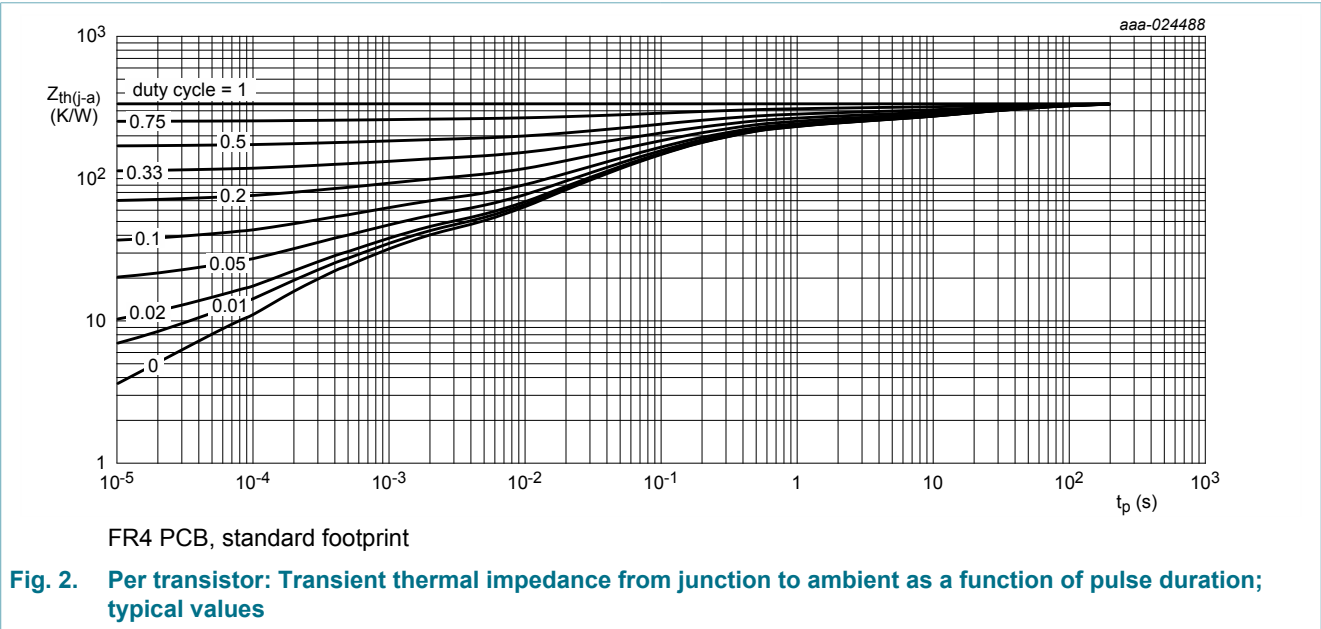


9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	385	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	261	K/W

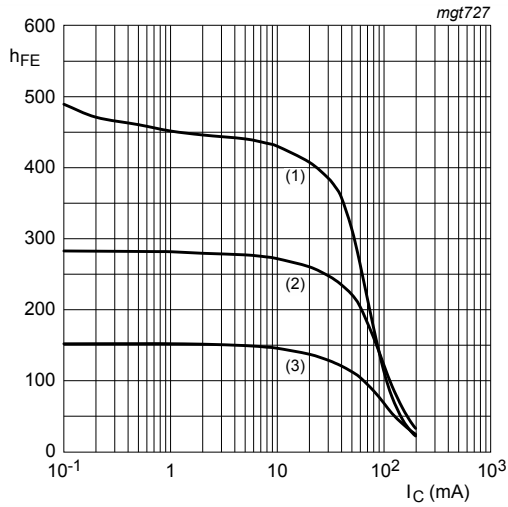
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



10. Characteristics

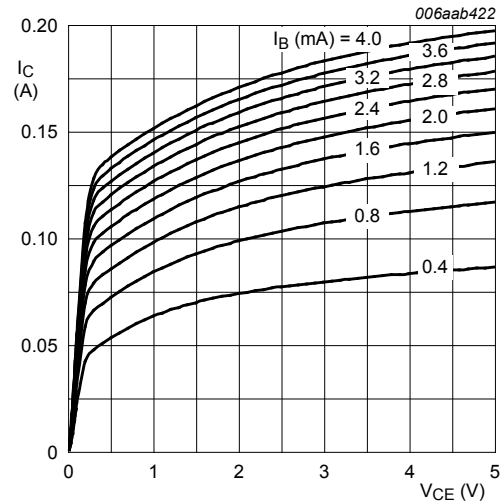
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor; for the PNP transistor with negative polarity							
I_{CBO}	collector-base cut-off current	$V_{CB} = 30 \text{ V}; I_E = 0 \text{ A}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	15	nA
		$V_{CB} = 30 \text{ V}; I_E = 0 \text{ A}; T_J = 150 \text{ }^{\circ}\text{C}$		-	-	5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5 \text{ V}; I_C = 0 \text{ A}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	100	nA
h_{FE}	DC current gain	$V_{CE} = 5 \text{ V}; I_C = 2 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		200	-	450	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10 \text{ mA}; I_B = 0.5 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	100	mV
		$I_C = 100 \text{ mA}; I_B = 5 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	300	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10 \text{ mA}; I_B = 0.5 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	760	-	mV
		$I_C = 100 \text{ mA}; I_B = 5 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	900	-	mV
V_{BE}	base-emitter voltage	$V_{CE} = 5 \text{ V}; I_C = 2 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		600	660	725	mV
		$V_{CE} = 5 \text{ V}; I_C = 10 \text{ mA}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	710	820	mV
C_C	collector capacitance	$V_{CB} = 10 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A};$ $f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	4	pF
C_E	emitter capacitance	$V_{EB} = 0.5 \text{ V}; I_C = 0 \text{ A}; i_c = 0 \text{ A};$ $f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	11	-	pF
		$V_{EB} = -0.5 \text{ V}; I_C = 0 \text{ mA}; i_c = 0 \text{ mA};$ $f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	10	-	pF
f_T	transition frequency	$V_{CE} = 5 \text{ V}; I_C = 10 \text{ mA}; f = 100 \text{ MHz};$ $T_{amb} = 25 \text{ }^{\circ}\text{C}$		100	-	-	MHz
NF	noise figure	$V_{CE} = 5 \text{ V}; I_C = 0.2 \text{ mA}; R_S = 2 \text{ k}\Omega;$ $f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	10	dB



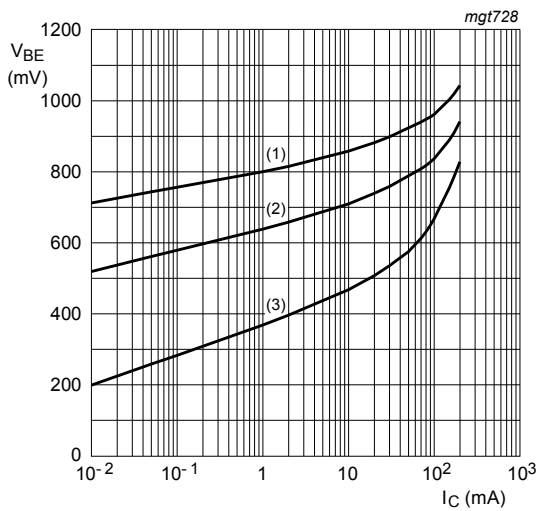
$V_{CE} = 5 \text{ V}$
 (1) $T_{amb} = 150 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55 \text{ }^{\circ}\text{C}$

Fig. 3. NPN transistor: DC current gain as a function of collector current; typical values



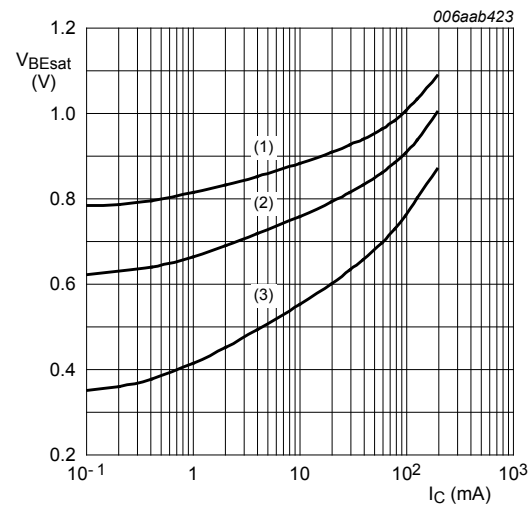
$T_{amb} = 25 \text{ }^{\circ}\text{C}$

Fig. 4. NPN transistor: Collector current as a function of collector-emitter voltage; typical values



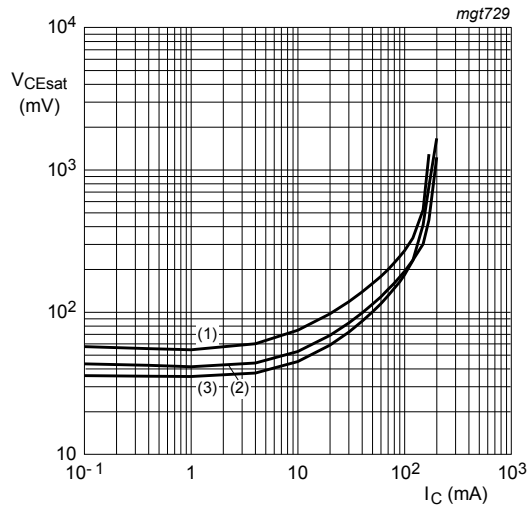
$V_{CE} = 5 \text{ V}$
 (1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 150 \text{ }^{\circ}\text{C}$

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



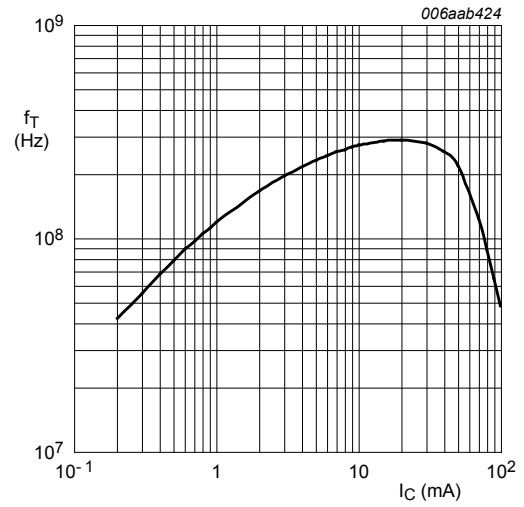
$I_C/I_B = 20$
 (1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 150 \text{ }^{\circ}\text{C}$

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



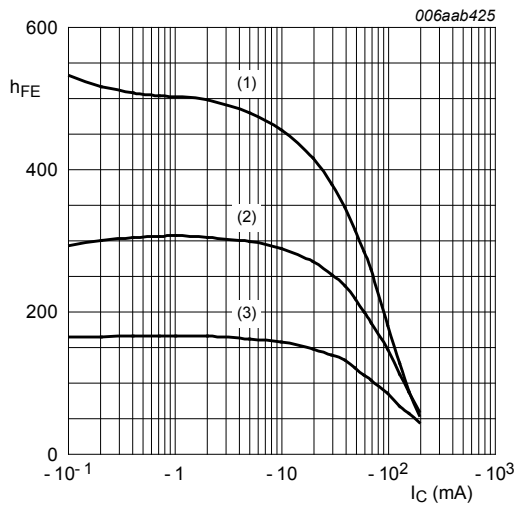
$I_C/I_B = 20$
 (1) $T_{amb} = 150\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

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



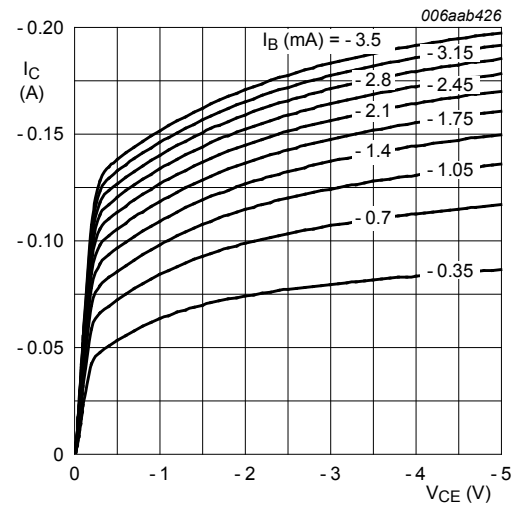
$T_{amb} = 25\text{ °C}$;
 $V_{CE} = 5\text{ V}$;
 $f = 100\text{ MHz}$

Fig. 8. NPN transistor: Transition frequency as a function of collector current; typical values



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

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



$T_{amb} = 25\text{ °C}$

Fig. 10. PNP transistor: Collector current as a function of collector-emitter voltage; typical values

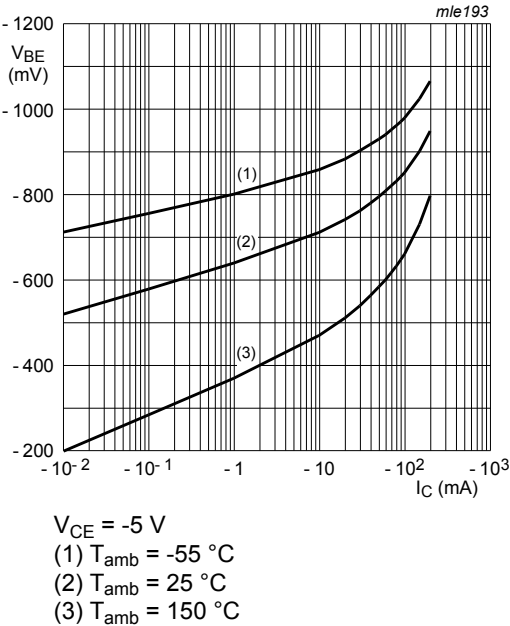


Fig. 11. PNP transistor: Base-emitter voltage as a function of collector current; typical values

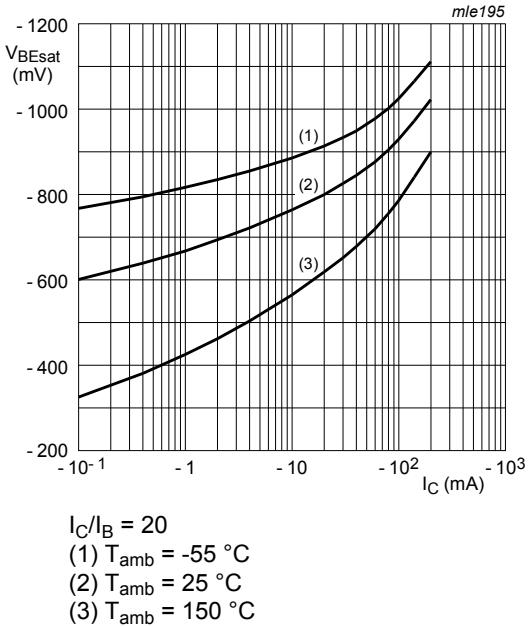


Fig. 12. PNP transistor: Base-emitter saturation voltage as a function of collector current; typical values

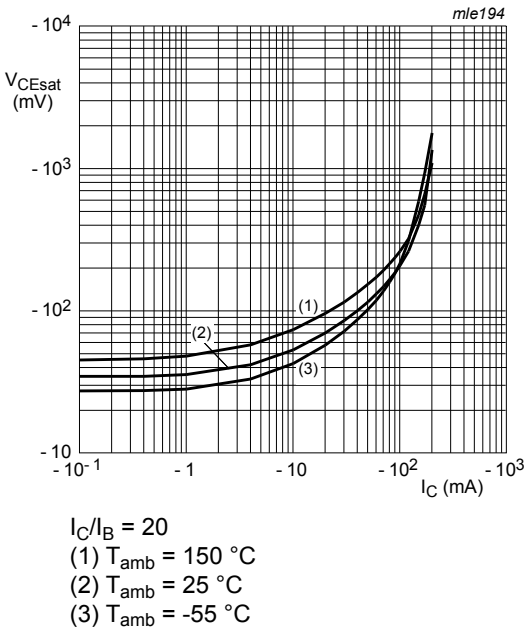


Fig. 13. PNP transistor: Collector-emitter saturation voltage as a function of collector current; typical values

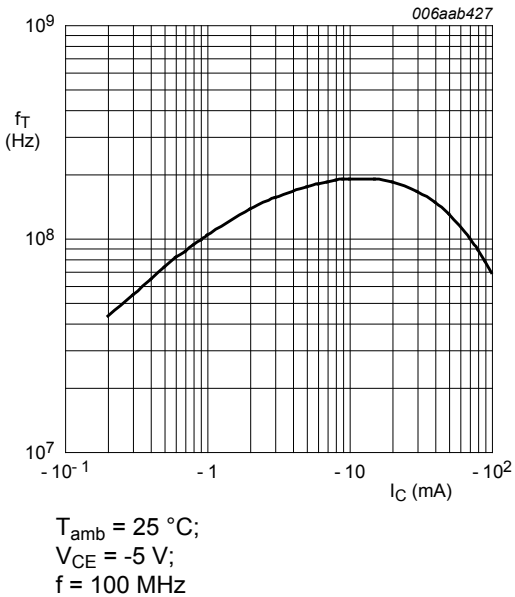


Fig. 14. PNP transistor: Transition frequency as a function of collector current; typical values

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

DFN1412-6: plastic thermal enhanced ultra thin small outline package; no leads;
6 terminals; body: 1.4 x 1.2 x 0.47 mm

SOT1268

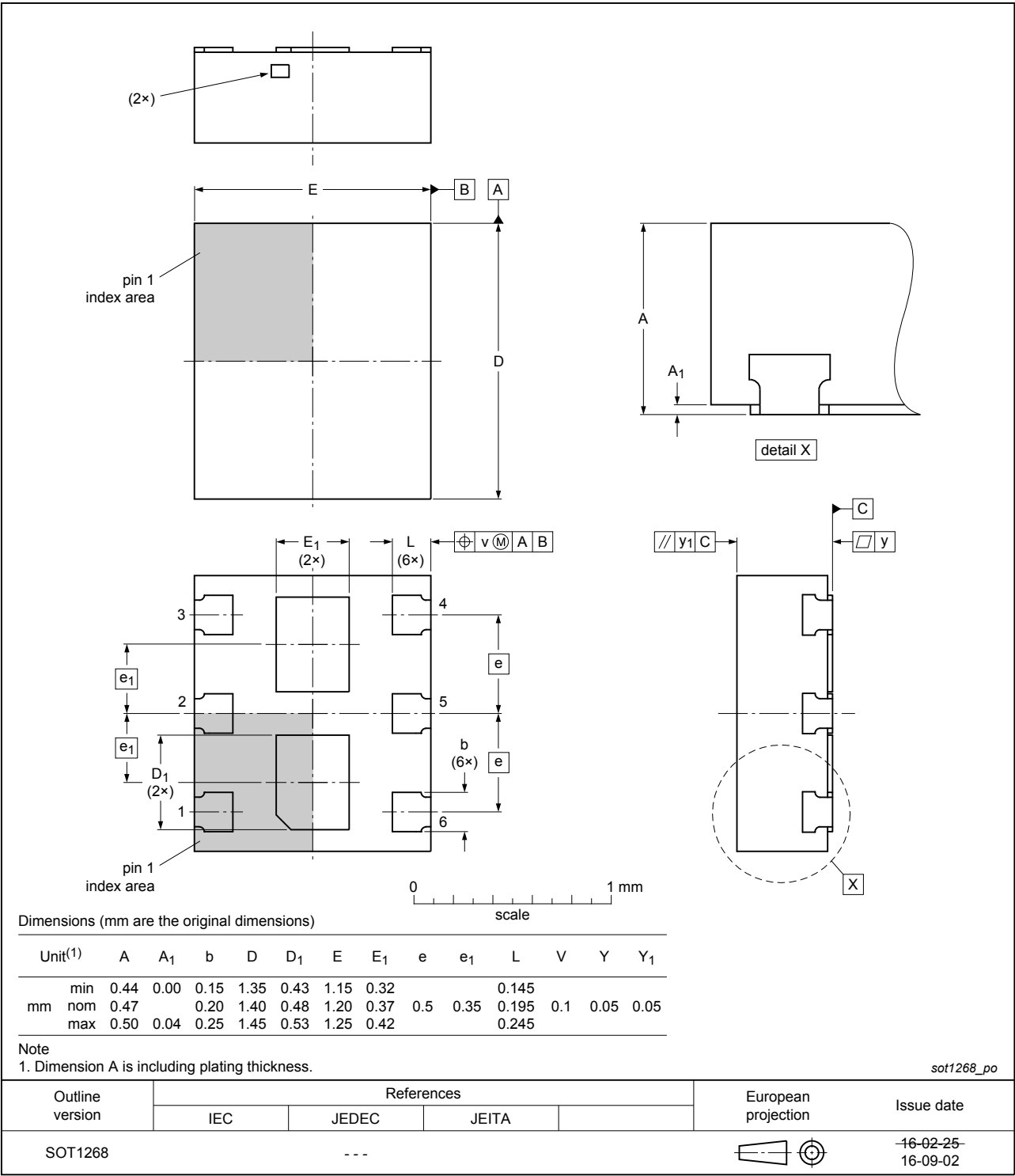


Fig. 15. Package outline DFN1412-6 (SOT1268)

13. Soldering

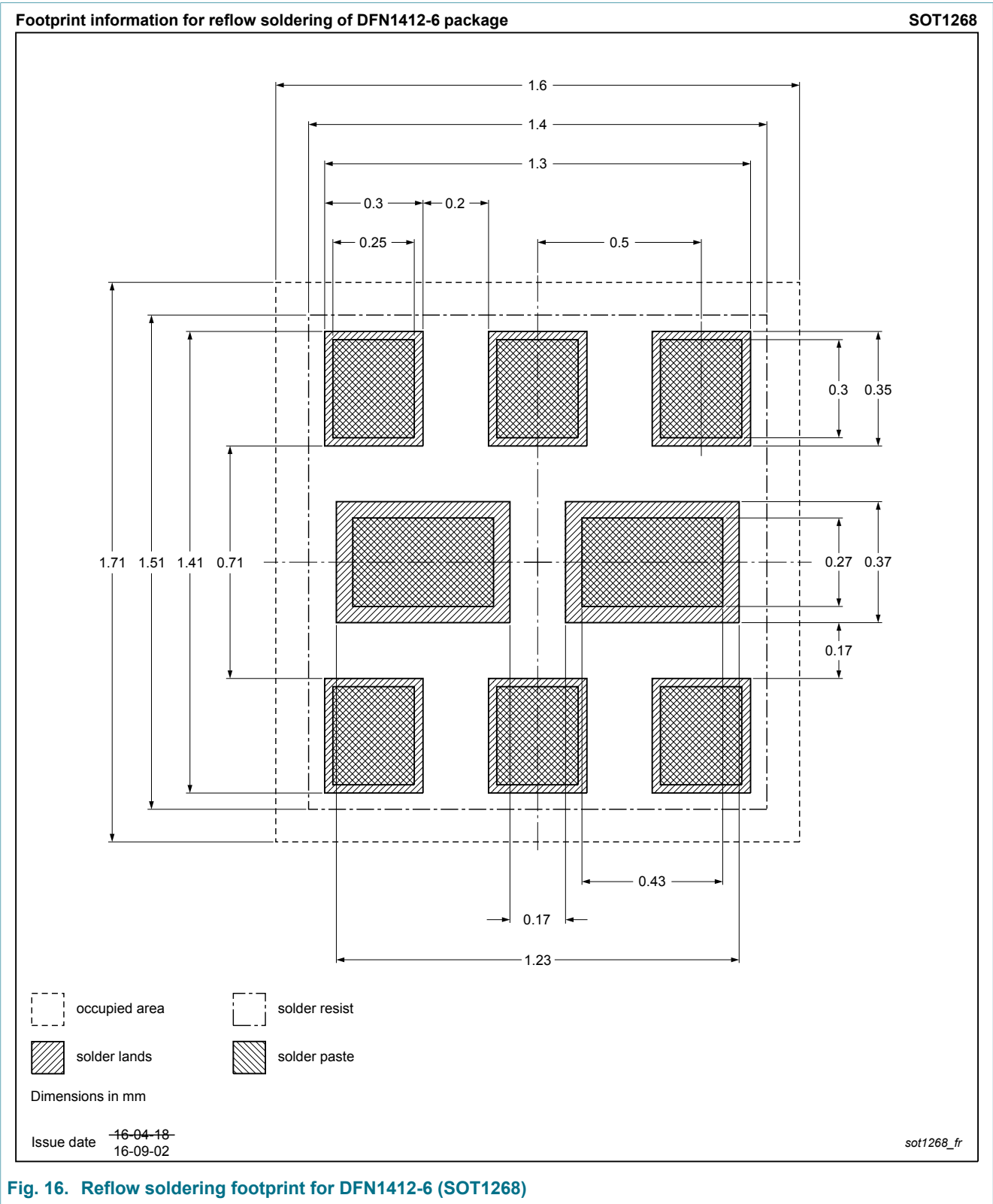


Fig. 16. Reflow soldering footprint for DFN1412-6 (SOT1268)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC847RAPN v.1	20170607	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.

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