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# BCM847QAS

45 V, 100 mA NPN/NPN matched double transistors

24 April 2018

Product data sheet

## 1. General description

NPN/NPN matched double transistors in an ultra small DFN1010B-6 (SOT1216) leadless Surface-Mounted Device (SMD) plastic package.

PNP/PNP complement: BCM857QAS

## 2. Features and benefits

- Reduces component count
- Reduces pick and place costs
- Low package height of 0.37 mm
- Current gain matching
- Base-emitter voltage matching
- Application-optimized pinout
- AEC-Q101 qualified

## 3. Applications

- Current mirror
- Differential amplifier

## 4. Quick reference data

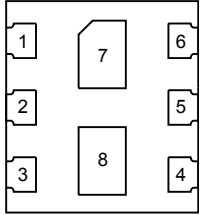
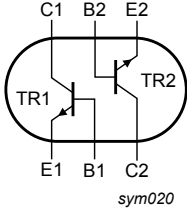
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per transistor</b>						
$V_{CE0}$	collector-emitter voltage	open base	-	-	45	V
$I_C$	collector current		-	-	100	mA
$I_{CM}$	peak collector current	$t_p \leq 1$ ms; single pulse	-	-	200	mA
$h_{FE}$	DC current gain	$V_{CE} = 5$ V; $I_C = 2$ mA; $T_{amb} = 25$ °C	200	290	450	
<b>Per device</b>						
$h_{FE1}/h_{FE2}$	DC current gain matching	$V_{CE} = 5$ V; $I_C = 2$ mA; $T_{amb} = 25$ °C	0.95	1	1.05	
$V_{BE1}-V_{BE2}$	base-emitter voltage matching		[1]	-	2	mV

[1] The smaller of the two values is subtracted from the larger value.

### 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E1	emitter TR1	 <p>Transparent top view DFN1010B-6 (SOT1216)</p>	 <p>sym020</p>
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

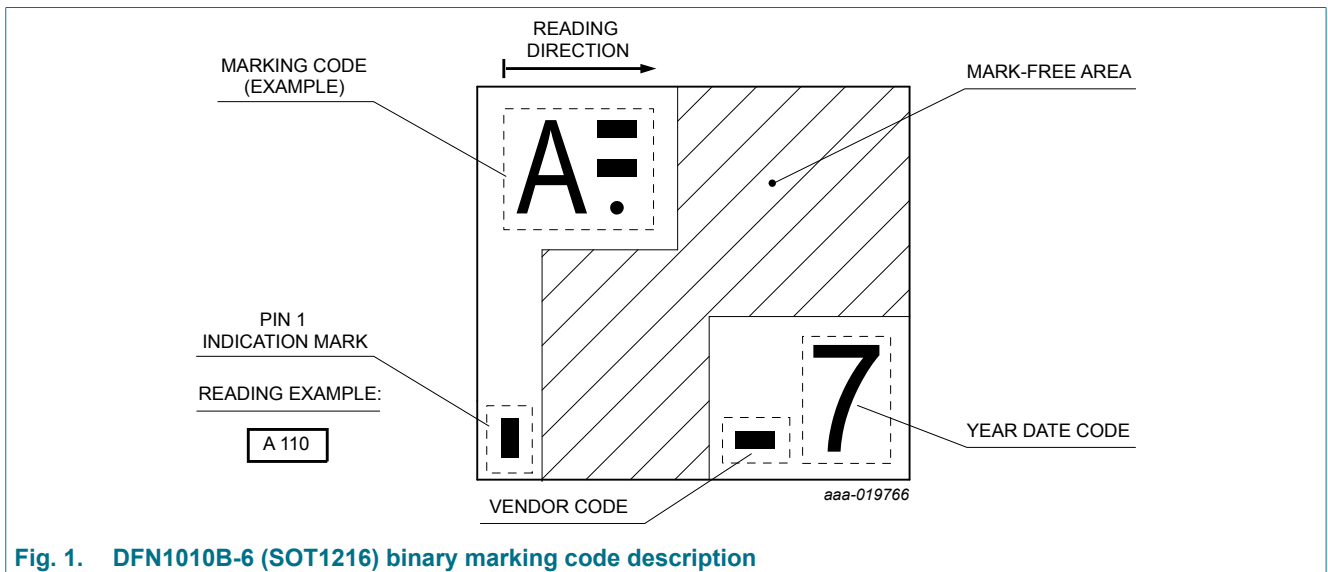
Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BCM847QAS	DFN1010B-6	DFN1010B-6: plastic thermal enhanced ultra thin small outline package; no leads; 6 terminals	SOT1216

### 7. Marking

Table 4. Marking codes

Type number	Marking code
BCM847QAS	C 010



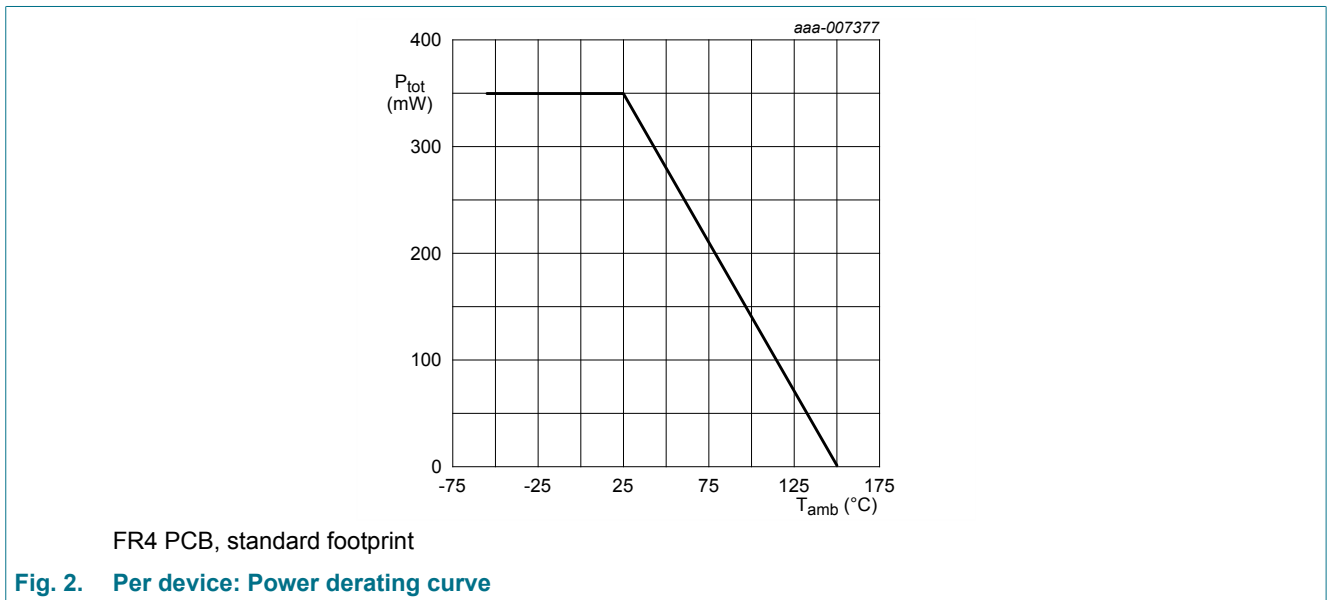
## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per transistor</b>						
$V_{CBO}$	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	$t_p \leq 1$ ms; single pulse		-	200	mA
$I_{BM}$	peak base current			-	100	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	230	mW
<b>Per device</b>						
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	350	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.



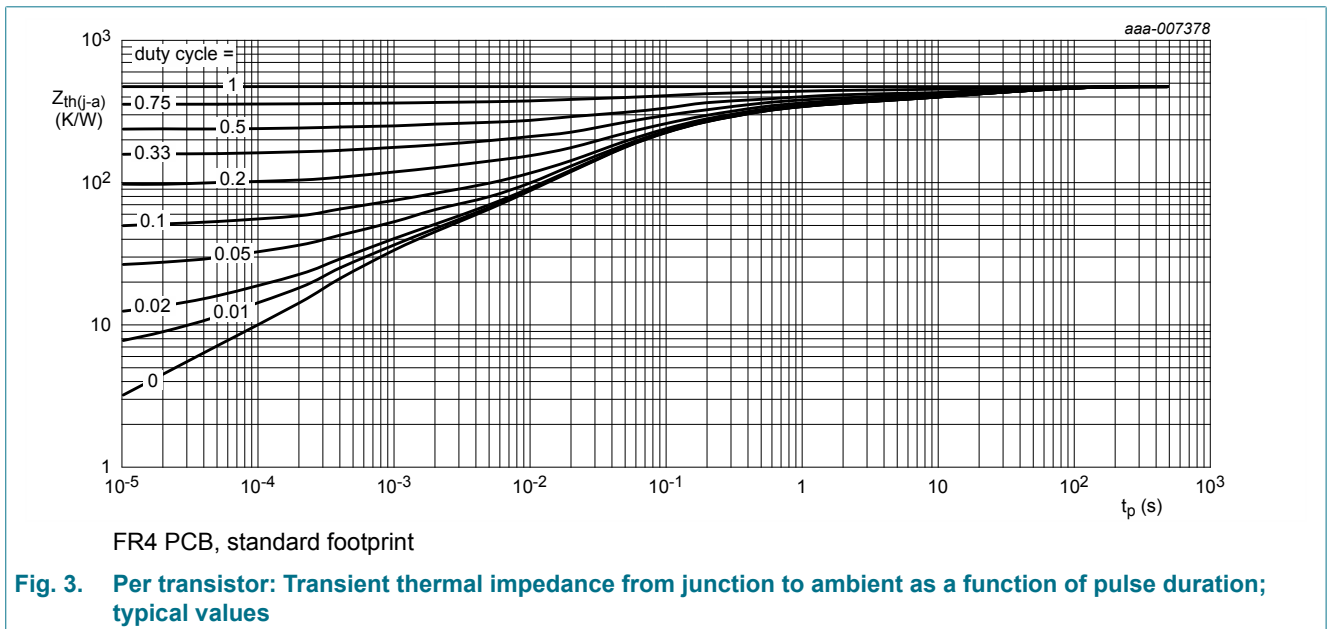


## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per transistor</b>							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	544	K/W
<b>Per device</b>							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	358	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	
<b>Per transistor</b>							
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100 \mu\text{A}; I_E = 0 \text{ A}$	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	$I_C = 0 \text{ A}; I_E = 100 \mu\text{A}$	6	-	-	V	
$I_{CBO}$	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	$\mu\text{A}$	
$I_{EBO}$	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	$V_{CE} = 5 \text{ V}; I_C = 10 \mu\text{A}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	250	-		
		$V_{CE} = 5 \text{ V}; I_C = 2 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	200	290	450		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10 \text{ mA}; I_B = 0.5 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	200	mV	
		$I_C = 100 \text{ mA}; I_B = 5 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	[1]	-	400	mV	
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 10 \text{ mA}; I_B = 0.5 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	[2]	760	-	mV	
		$I_C = 100 \text{ mA}; I_B = 5 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	[2]	900	-	mV	
$V_{BE}$	base-emitter voltage	$V_{CE} = 5 \text{ V}; I_C = 2 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	[3]	600	660	725	mV
		$V_{CE} = 5 \text{ V}; I_C = 10 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	[3]	-	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	
$f_T$	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	
<b>Per device</b>							
$h_{FE1}/h_{FE2}$	DC current gain matching	$V_{CE} = 5 \text{ V}; I_C = 2 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	0.95	1	1.05		
$V_{BE1}-V_{BE2}$	base-emitter voltage matching		[4]	-	-	2	mV

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

[2]  $V_{BEsat}$  decreases by about 1.7 mV/K with increasing temperature.

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

[4] The smaller of the two values is subtracted from the larger value.

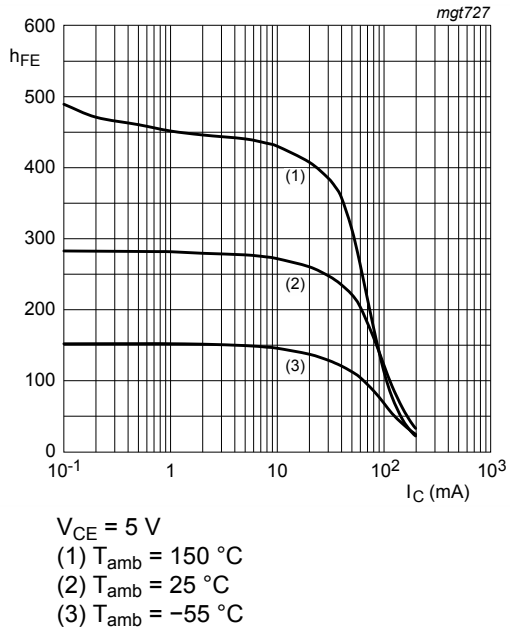


Fig. 4. DC current gain as a function of collector current; typical values

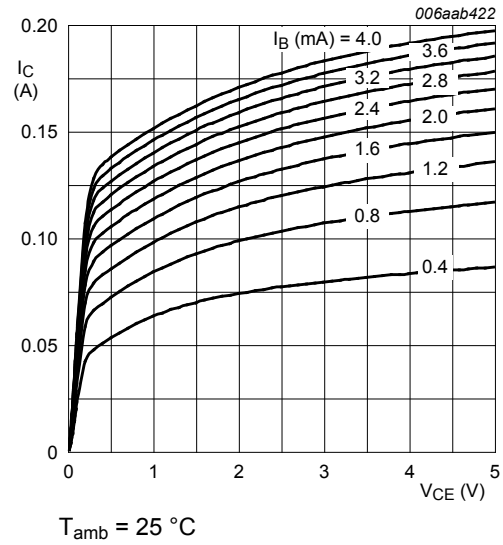


Fig. 5. Collector current as a function of collector-emitter voltage; typical values

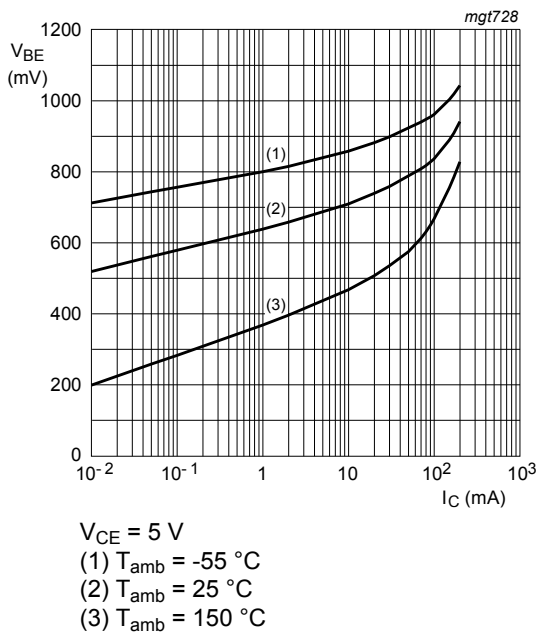


Fig. 6. Base-emitter voltage as a function of collector current; typical values

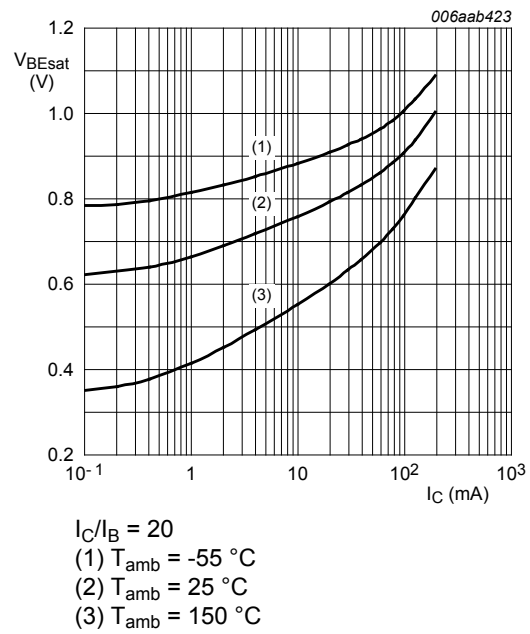
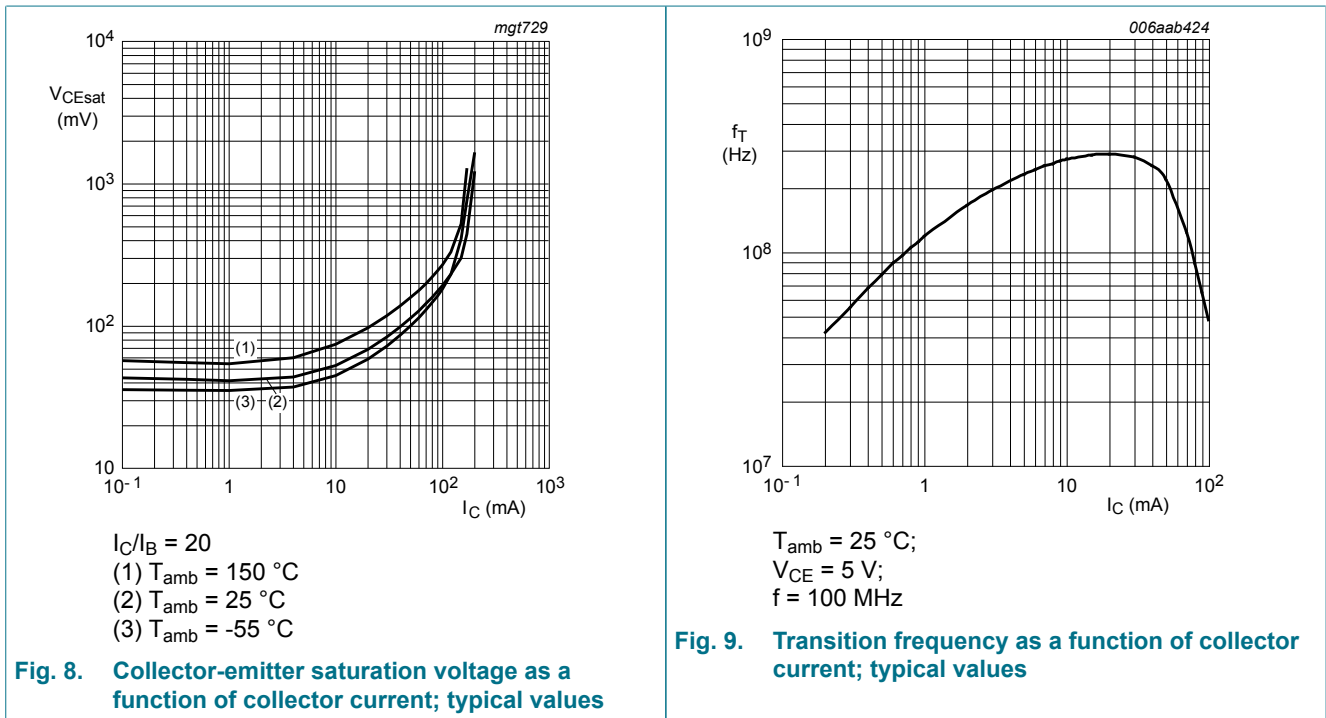


Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values

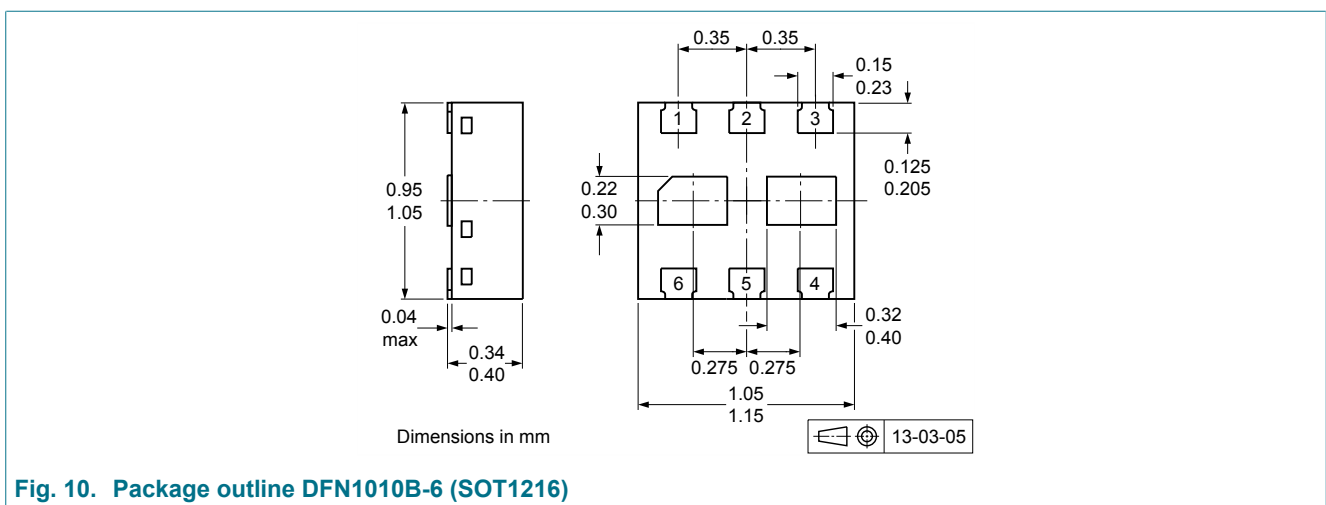


## 11. Test information

### 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

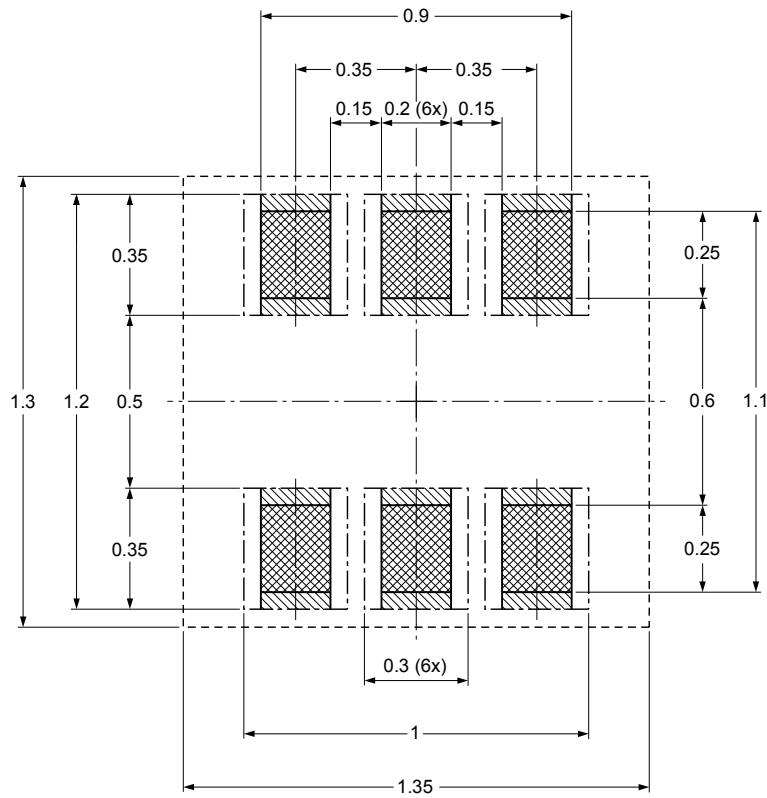








### 13. Soldering

Footprint information for reflow soldering of DFN1010B-6 package

SOT1216



-  solder paste
-  solder land plus solder paste
-  occupied area
-  solder resist

Dimensions in mm

Issue date ~~14-07-28~~  
17-03-31

sot1216\_fr

Fig. 11. Reflow soldering footprint for DFN1010B-6 (SOT1216)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BCM847QAS v.1	20180424	Product data sheet	-	-

## 45 V, 100 mA NPN/NPN matched double transistors

## 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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