



# PBSS2540MB

40 V, 0.5 A NPN low V<sub>CEsat</sub> (BISS) transistor

Rev. 1 — 4 April 2012

Product data sheet

## 1. Product profile

### 1.1 General description

NPN low  $V_{CEsat}$  Breakthrough In Small Signal (BISS) transistor in a leadless ultra small DFN1006B-3 (SOT883B) Surface-Mounted Device (SMD) plastic package.

PNP complement: PBSS3540MB.

### 1.2 Features and benefits

- Leadless ultra small SMD plastic package
- Low package height of 0.37 mm
- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability  $I_C$  and  $I_{CM}$
- High efficiency due to less heat generation
- AEC-Q101 qualified
- Reduced Printed-Circuit Board (PCB) requirements

### 1.3 Applications

- DC-to-DC conversion
- Supply line switching
- Battery charger
- LCD backlighting
- Drivers in low supply voltage applications (e.g. lamps and LEDs)

### 1.4 Quick reference data

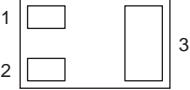
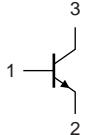
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base	-	-	40	V
$I_C$	collector current		-	-	500	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	1	A
$R_{CEsat}$	collector-emitter saturation resistance	$I_C = 500$ mA; $I_B = 50$ mA; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_{amb} = 25$ °C	-	380	500	mΩ



## 2. Pinning information

Table 2. Pinning information

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

**SOT883B (DFN1006B-3)**

## 3. Ordering information

Table 3. Ordering information

Type number	Package		Version
Type number	Name	Description	Version
PBSS2540MB	DFN1006B-3	Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.37 mm	SOT883B

## 4. Marking

Table 4. Marking codes

Type number	Marking code
PBSS2540MB	0001 0010

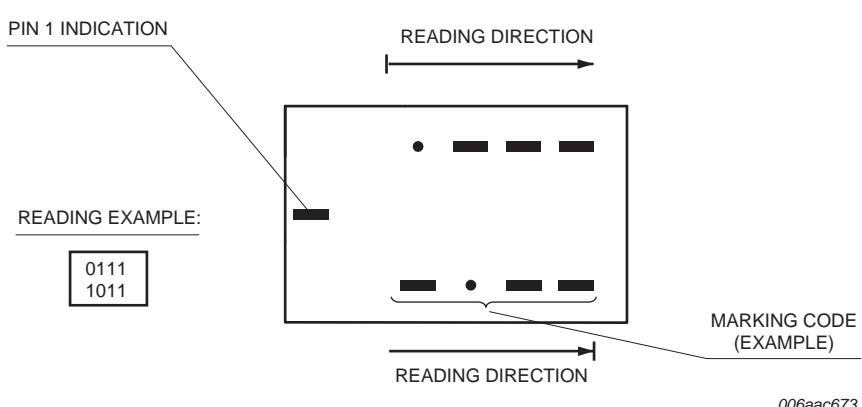


Fig 1. DFN1006B-3 (SOT883B) binary marking code description

## 5. Limiting values

**Table 5. 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	-	40	V
$V_{CEO}$	collector-emitter voltage	open base	-	40	V
$V_{EBO}$	emitter-base voltage	open collector	-	6	V
$I_C$	collector current		-	500	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	1	A
$I_{BM}$	peak base current	single pulse; $t_p \leq 1$ ms	-	100	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	<a href="#">[1][2]</a>	-	250 mW
			<a href="#">[3][2]</a>	-	590 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 PCB, single-sided copper, tin-plated and standard footprint.

[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

## 6. Thermal characteristics

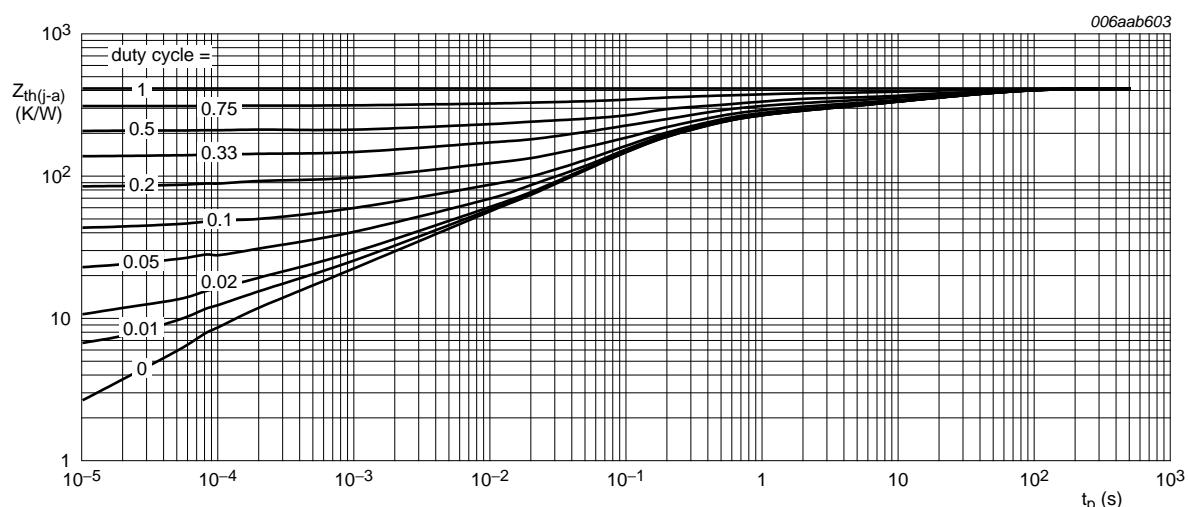
**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]	-	-	500 K/W
			[3][2]	-	-	212 K/W

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

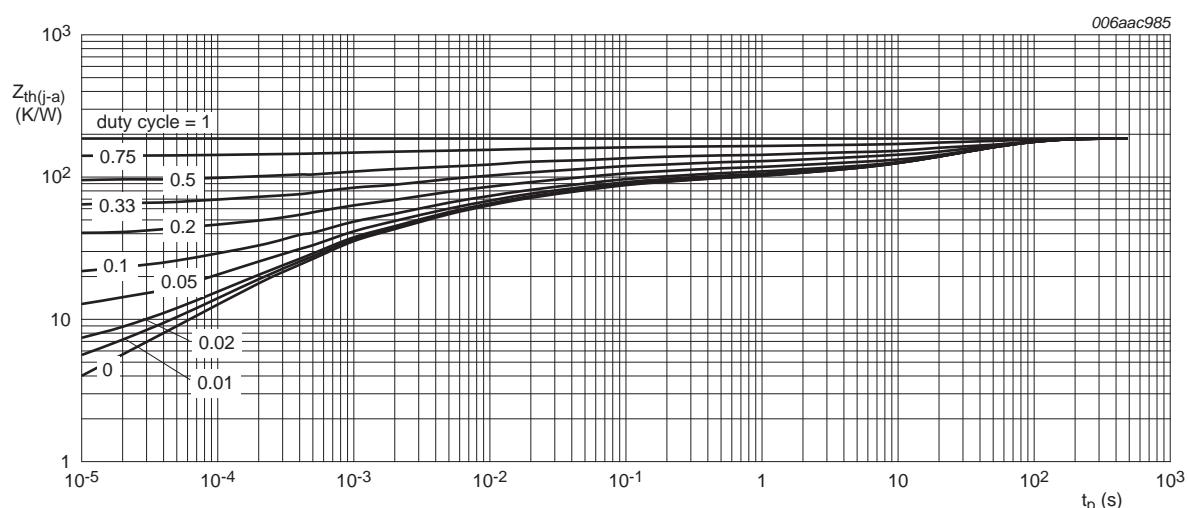
[2] Reflow soldering is the only recommended soldering method.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.



FR4 PCB, standard footprint

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



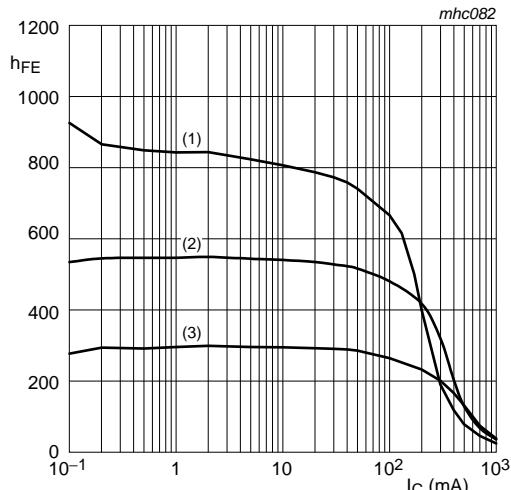
FR4 PCB, mounting pad for collector 1 cm<sup>2</sup>

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

## 7. Characteristics

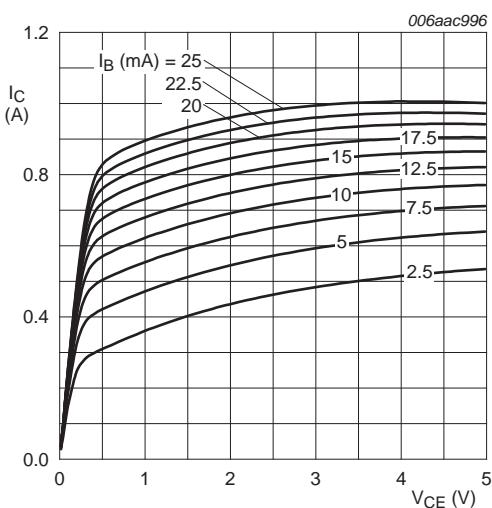
**Table 7. Characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 30 \text{ V}; I_E = 0 \text{ A}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	100	nA
		$V_{CB} = 30 \text{ V}; I_E = 0 \text{ A}; T_J = 150 \text{ }^\circ\text{C}$	-	-	50	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	$V_{CE} = 2 \text{ V}; I_C = 10 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	200	-	-	
		$V_{CE} = 2 \text{ V}; I_C = 100 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	150	-	-	
		$V_{CE} = 2 \text{ V}; I_C = 500 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	50	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10 \text{ mA}; I_B = 0.5 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	50	mV
		$I_C = 100 \text{ mA}; I_B = 5 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	100	mV
		$I_C = 200 \text{ mA}; I_B = 10 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	200	mV
		$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	250	mV
$R_{CEsat}$	collector-emitter saturation resistance	$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	380	500	mΩ
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	1.2	V
$V_{BEon}$	base-emitter turn-on voltage	$V_{CE} = 2 \text{ V}; I_C = 100 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	1.1	V
$f_T$	transition frequency	$V_{CE} = 5 \text{ V}; I_C = 100 \text{ mA}; f = 100 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$	250	450	-	MHz
$C_C$	collector capacitance	$V_{CB} = 10 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	6	pF



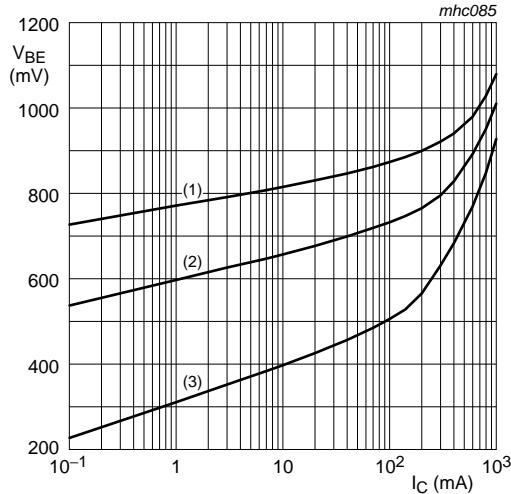
$V_{CE} = 2 \text{ V}$   
 (1)  $T_{amb} = 150 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = -55 \text{ }^{\circ}\text{C}$

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



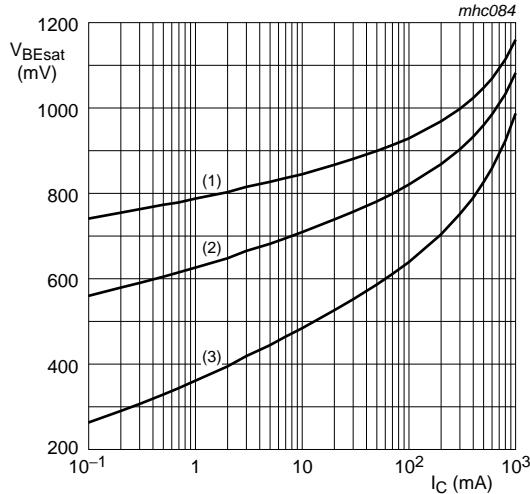
$T_{amb} = 25 \text{ }^{\circ}\text{C}$

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



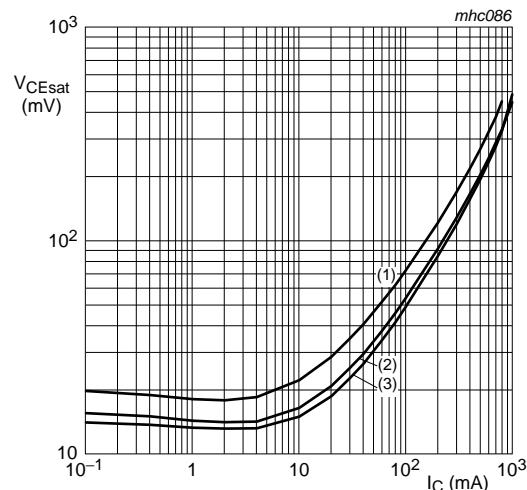
$V_{CE} = 2 \text{ V}$   
 (1)  $T_{amb} = -55 \text{ }^{\circ}\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$   
 (3)  $T_{amb} = 150 \text{ }^{\circ}\text{C}$

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



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

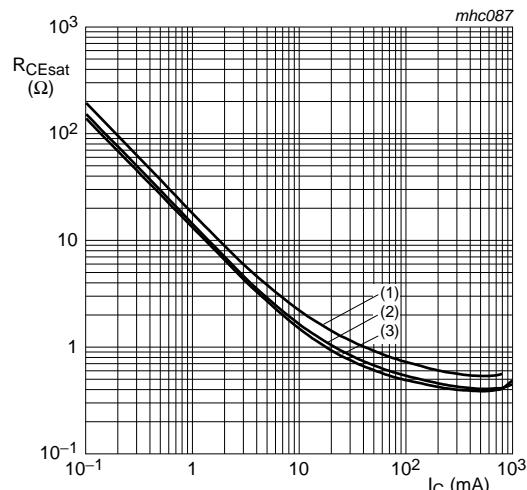
**Fig 7.** Base-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$

- (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 8.** Collector-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$

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

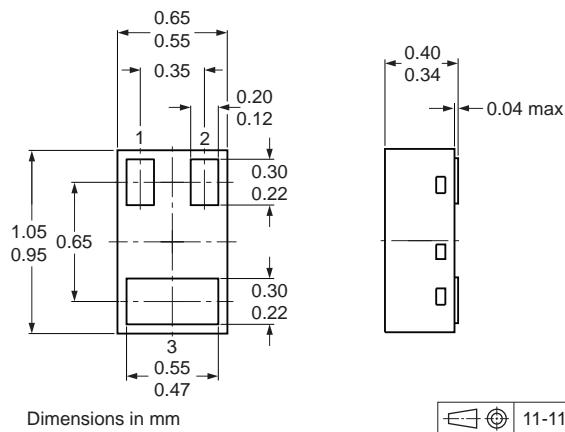
**Fig 9.** Collector-emitter saturation resistance as a function of collector current; typical values

## 8. Test information

### 8.1 Quality information

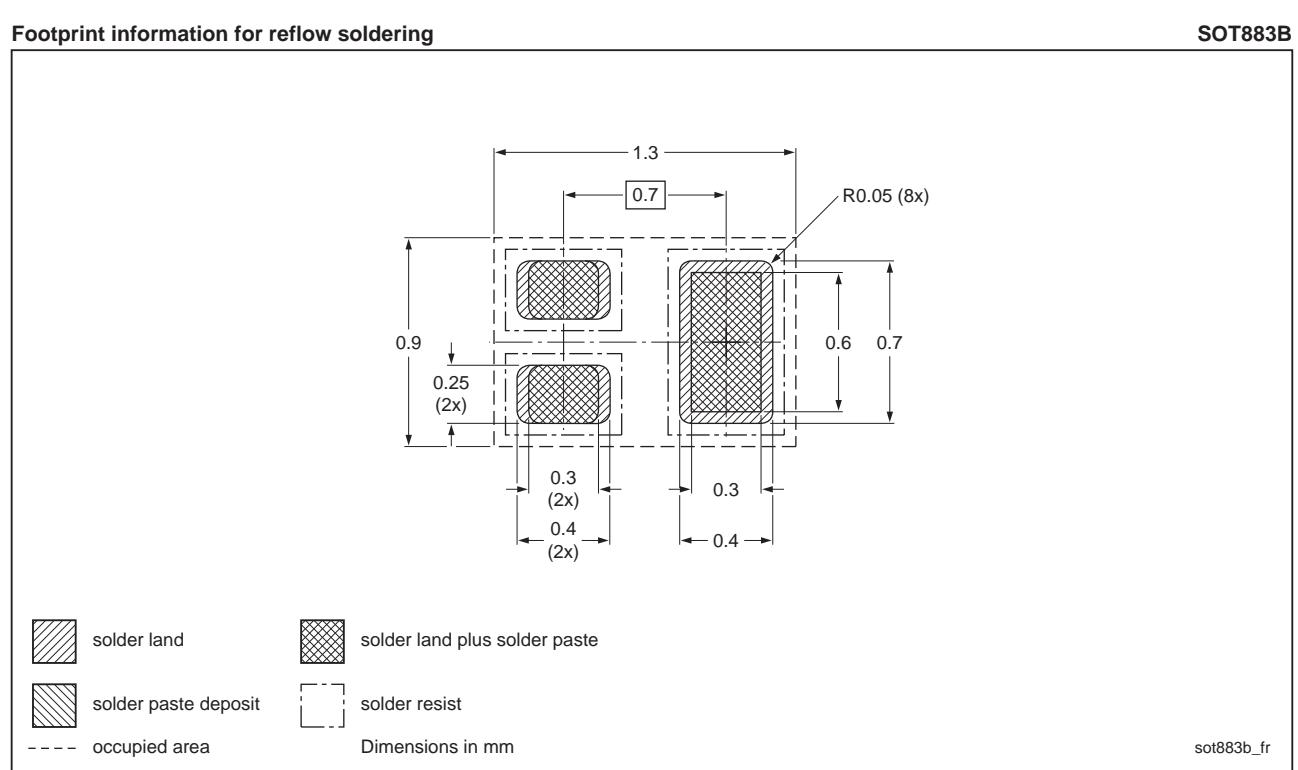
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

## 9. Package outline



**Fig 10. Package outline SOT883B (DFN1006B-3)**

## 10. Soldering



**Fig 11. Reflow soldering footprint for SOT883B (DFN1006B-3)**

## 11. Revision history

**Table 8. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS2540MB v.1	20120404	Product data sheet	-	-

## 12. Legal information

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Document status <sup>[1]</sup> [2]	Product status <sup>[3]</sup>	Definition
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