



# PMBT3906MB

40 V, 200 mA PNP switching transistor

Rev. 1 — 2 April 2012

Product data sheet

## 1. Product profile

### 1.1 General description

PNP single switching transistor in a leadless ultra small DFN1006B-3 (SOT883B) Surface-Mounted Device (SMD) plastic package.

NPN complement: PMBT3904MB.

### 1.2 Features and benefits

- Single general-purpose switching transistor
- AEC-Q101 qualified
- Ultra small SMD plastic package
- Board-space reduction
- Low package height of 0.37 mm

### 1.3 Applications

- General-purpose switching and amplification
- Mobile applications

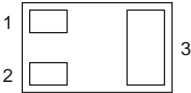
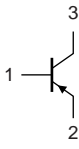
### 1.4 Quick reference data

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		-	-	-200	mA
$h_{FE}$	DC current gain	$V_{CE} = -1$ V; $I_C = -10$ mA	100	180	300	

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base	 <p>Transparent top view</p>	 <p>sym013</p>
2	emitter		
3	collector		



3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMBT3906MB	DFN1006B-3	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.37 mm	SOT883B

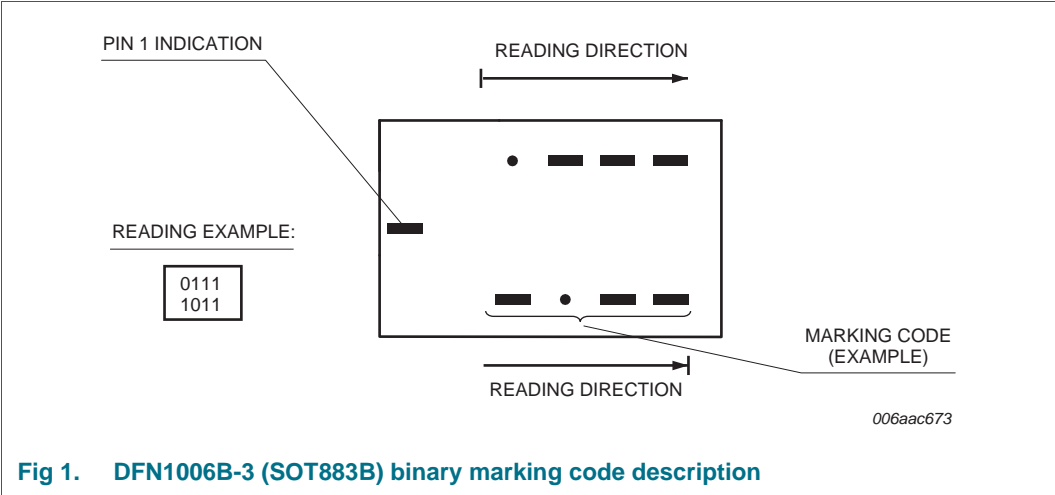
4. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
PMBT3906MB	0100 1000

[1] For DFN1006B-3 (SOT883B) binary marking code description, see [Figure 1](#).

4.1 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 <sub>CBO</sub>	collector-base voltage	open emitter	-	−40	V	
V <sub>CEO</sub>	collector-emitter voltage	open base	-	−40	V	
V <sub>EBO</sub>	emitter-base voltage	open collector	-	−6	V	
I <sub>C</sub>	collector current		-	−200	mA	
I <sub>CM</sub>	peak collector current	single pulse; t <sub>p</sub> ≤ 1 ms	-	−200	mA	
I <sub>BM</sub>	peak base current	single pulse; t <sub>p</sub> ≤ 1 ms	-	−100	mA	
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	<a href="#">[1]</a> <a href="#">[2]</a>	-	250	mW
			<a href="#">[1]</a> <a href="#">[3]</a>	-	590	mW
T <sub>j</sub>	junction temperature		-	150	°C	
T <sub>amb</sub>	ambient temperature		−55	+150	°C	
T <sub>stg</sub>	storage temperature		−65	+150	°C	

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

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[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
			[1][3]	-	212	K/W

- [1] Reflow soldering is the only recommended soldering method.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

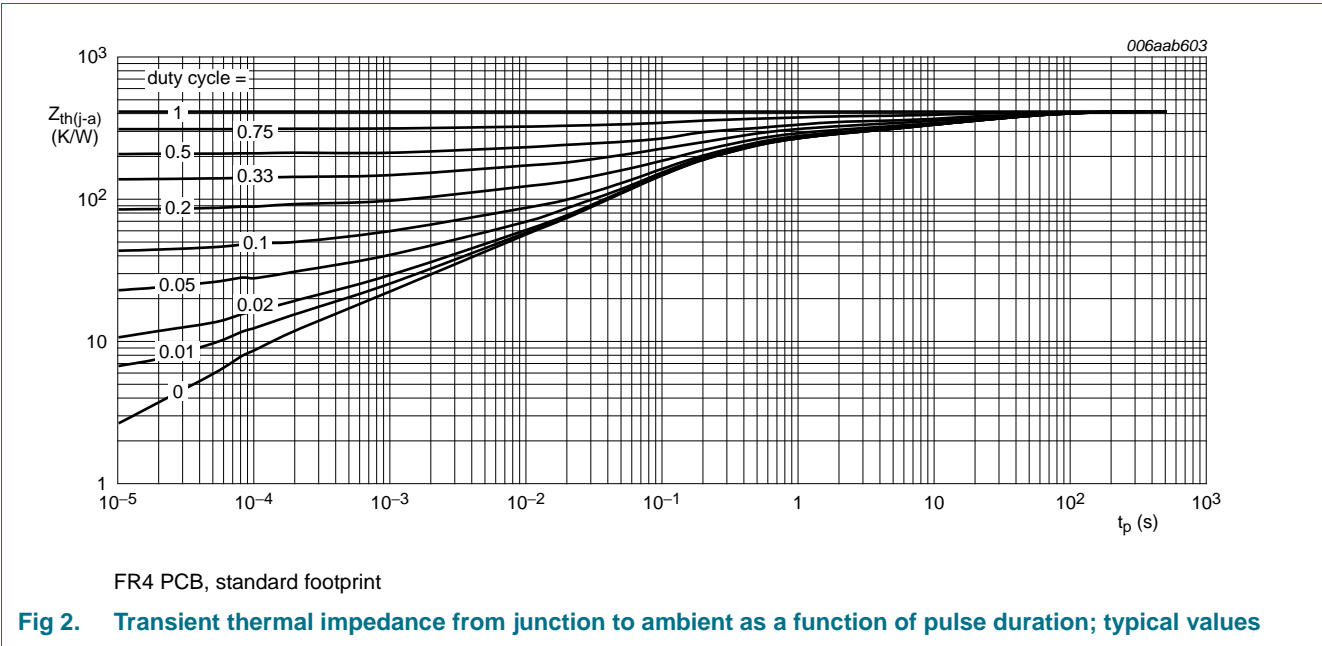


Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

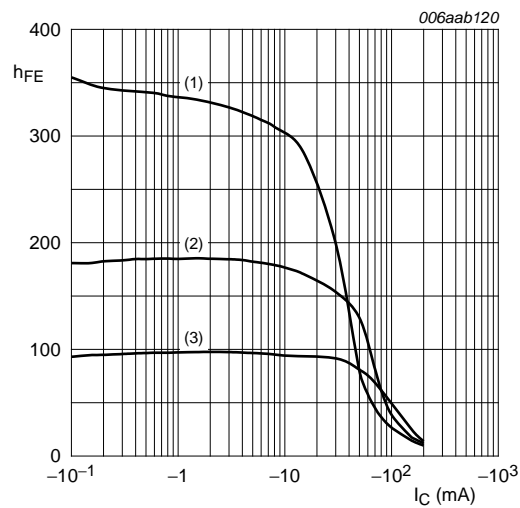
## 7. Characteristics

**Table 7. Characteristics**

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

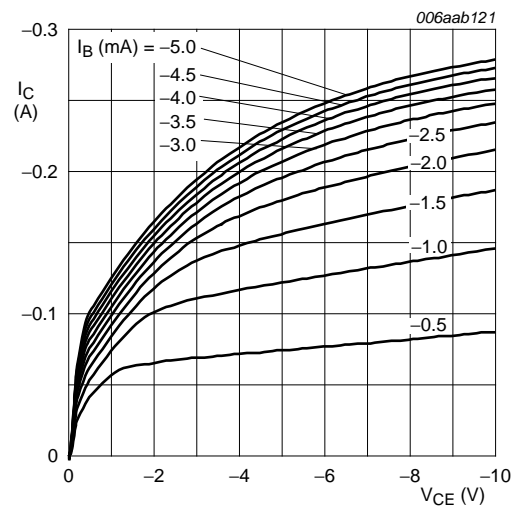
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -30\text{ V}; I_E = 0\text{ A}$	-	-	-50	nA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -6\text{ V}; I_C = 0\text{ A}$	-	-	-50	nA
$h_{FE}$	DC current gain	$V_{CE} = -1\text{ V}$				
		$I_C = -0.1\text{ mA}$	60	180	-	
		$I_C = -1\text{ mA}$	80	180	-	
		$I_C = -10\text{ mA}$	100	180	300	
		$I_C = -50\text{ mA}$	60	130	-	
		$I_C = -100\text{ mA}$	[1] 30	50	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -10\text{ mA}; I_B = -1\text{ mA}$	-	-100	-250	mV
		$I_C = -50\text{ mA}; I_B = -5\text{ mA}$	-	-165	-400	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -10\text{ mA}; I_B = -1\text{ mA}$	-	-750	-850	mV
		$I_C = -50\text{ mA}; I_B = -5\text{ mA}$	-	-850	-950	mV
$t_d$	delay time	$V_{CC} = -3\text{ V};$ $I_C = -10\text{ mA};$	-	-	35	ns
$t_r$	rise time	$I_{Bon} = -1\text{ mA};$	-	-	35	ns
$t_{on}$	turn-on time	$I_{Boff} = 1\text{ mA}$	-	-	70	ns
$t_s$	storage time		-	-	225	ns
$t_f$	fall time		-	-	75	ns
$t_{off}$	turn-off time		-	-	300	ns
$C_c$	collector capacitance	$V_{CB} = -5\text{ V}; I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	-	4.5	pF
$C_e$	emitter capacitance	$V_{EB} = -500\text{ mV};$ $I_C = i_c = 0\text{ A}; f = 1\text{ MHz}$	-	-	10	pF
$f_T$	transition frequency	$V_{CE} = -20\text{ V};$ $I_C = -10\text{ mA};$ $f = 100\text{ MHz}$	250	-	-	MHz
NF	noise figure	$V_{CE} = -5\text{ V};$ $I_C = -100\text{ }\mu\text{A}; R_S = 1\text{ k}\Omega;$ $f = 10\text{ Hz to }15.7\text{ kHz}$	-	-	4	dB

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



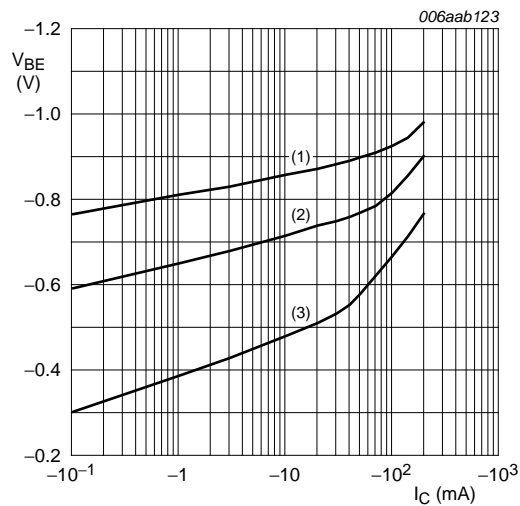
- $V_{CE} = -1\text{ V}$
- (1)  $T_{amb} = 150^\circ\text{C}$
  - (2)  $T_{amb} = 25^\circ\text{C}$
  - (3)  $T_{amb} = -55^\circ\text{C}$

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



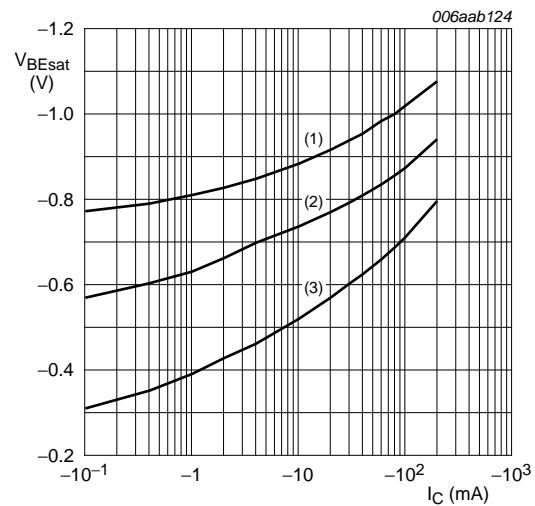
$T_{amb} = 25^\circ\text{C}$

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



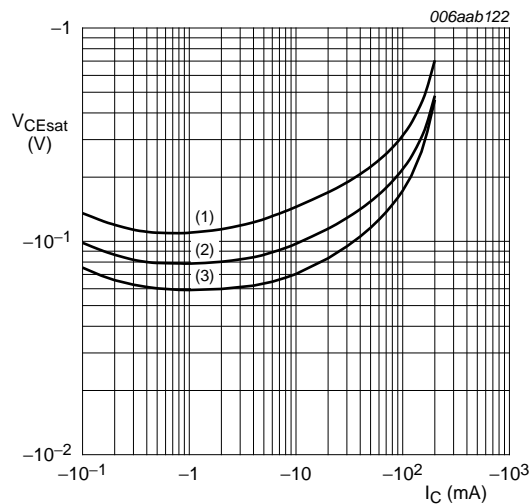
- $V_{CE} = -1$  V
- (1)  $T_{amb} = -55$  °C
  - (2)  $T_{amb} = 25$  °C
  - (3)  $T_{amb} = 150$  °C

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



- $I_C/I_B = 10$
- (1)  $T_{amb} = -55$  °C
  - (2)  $T_{amb} = 25$  °C
  - (3)  $T_{amb} = 150$  °C

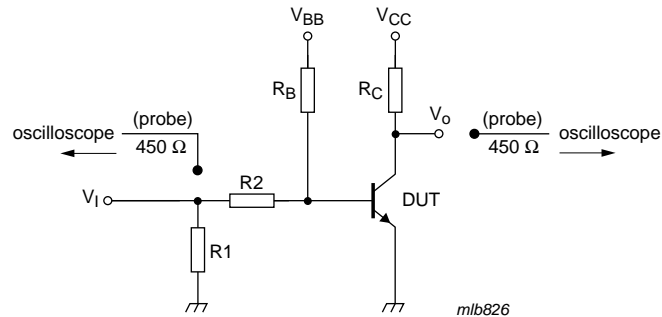
Fig 6. Base-emitter saturation voltage as a function of collector current; typical values



- $I_C/I_B = 10$
- (1)  $T_{amb} = 150$  °C
  - (2)  $T_{amb} = 25$  °C
  - (3)  $T_{amb} = -55$  °C

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

## 8. Test information



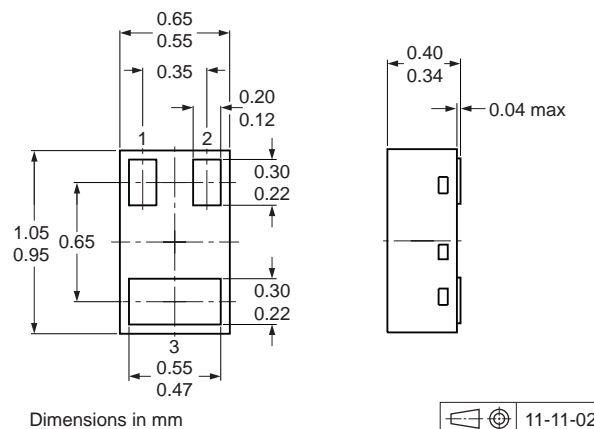
$V_I = 5 \text{ V}$ ;  $t = 600 \text{ } \mu\text{s}$ ;  $t_p = 10 \text{ } \mu\text{s}$ ;  $t_r = t_f \leq 3 \text{ ns}$   
 $R_1 = 56 \text{ } \Omega$ ;  $R_2 = 2.5 \text{ k}\Omega$ ;  $R_B = 3.9 \text{ k}\Omega$ ;  $R_C = 270 \text{ } \Omega$   
 $V_{BB} = -1.9 \text{ V}$ ;  $V_{CC} = 3 \text{ V}$   
 Oscilloscope: input impedance  $Z_i = 50 \text{ } \Omega$

**Fig 8. Test circuit for switching times**

## 9. 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.

## 10. Package outline



**Fig 9. Package outline DFN1006B-3 (SOT883B)**



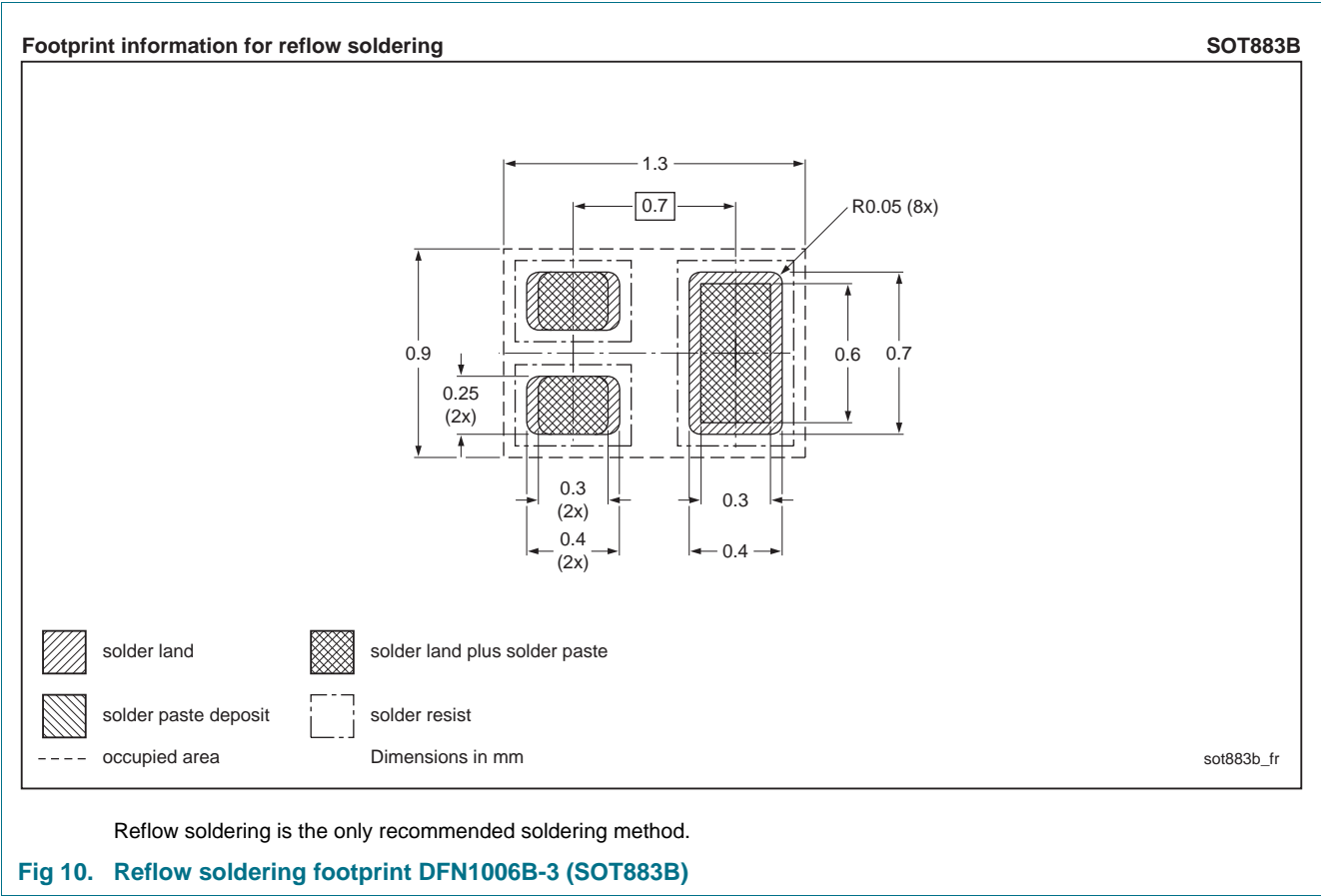
11. Packing information

Table 8. Packing methods  
The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

Type number	Package	Description	Packing quantity
			10000
PMBT3906MB	DFN1006B-3 (SOT883B)	2 mm pitch, 8 mm tape and reel	-315

[1] For further information and the availability of packing methods, see [Section 15](#).

12. Soldering



### 13. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMBT3906MB v.1	20120402	Product data sheet	-	-

## 14. Legal information

### 14.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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[2] The term 'short data sheet' is explained in section "Definitions".

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