



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	Transparent top view	sym013
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 ^[1]
PMBT3906MB	0100 1000

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

4.1 Binary marking code description

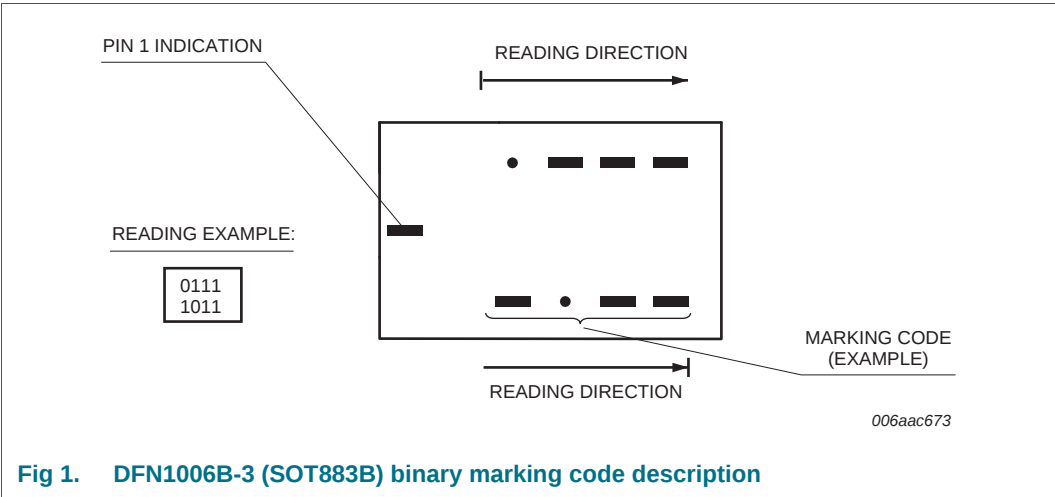


Fig 1. DFN1006B-3 (SOT883B) binary marking code description

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		-	−200	mA	
I _{CM}	peak collector current	single pulse; t _p ≤ 1 ms	-	−200	mA	
I _{BM}	peak base current	single pulse; t _p ≤ 1 ms	-	−100	mA	
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1] [2]	-	250	mW
			[1] [3]	-	590	mW
T _j	junction temperature		-	150	°C	
T _{amb}	ambient temperature		−55	+150	°C	
T _{stg}	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 cm².

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 cm².

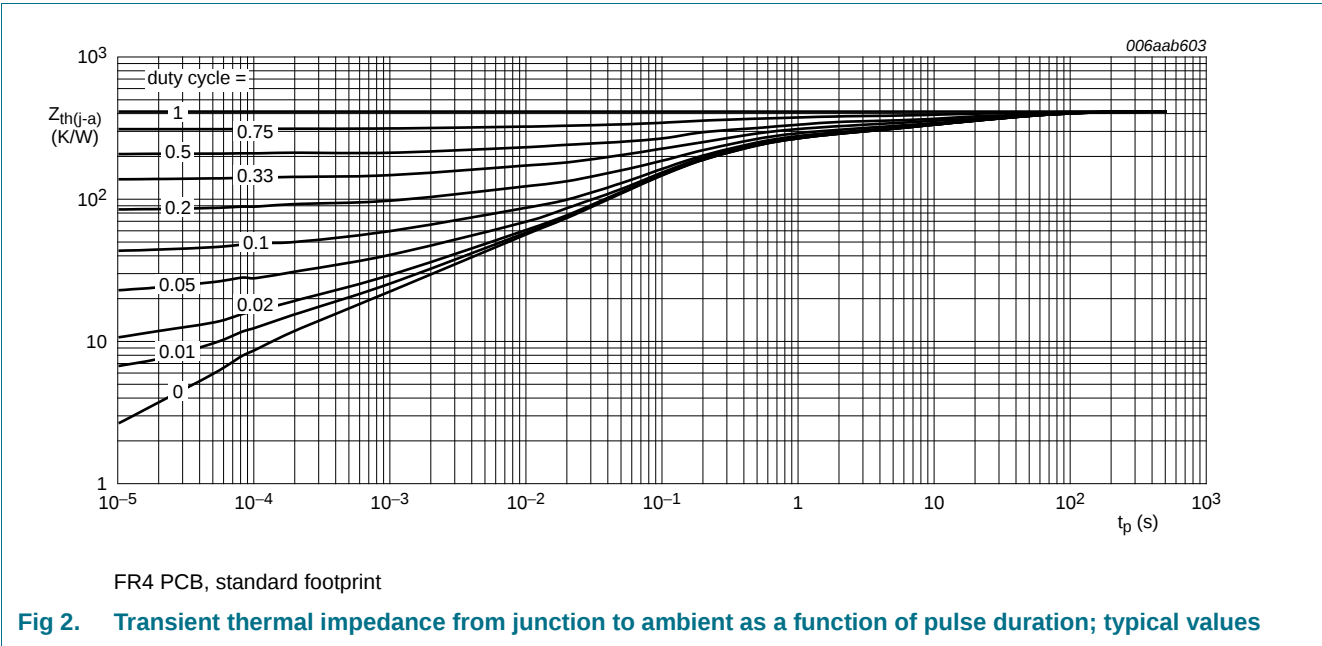


Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

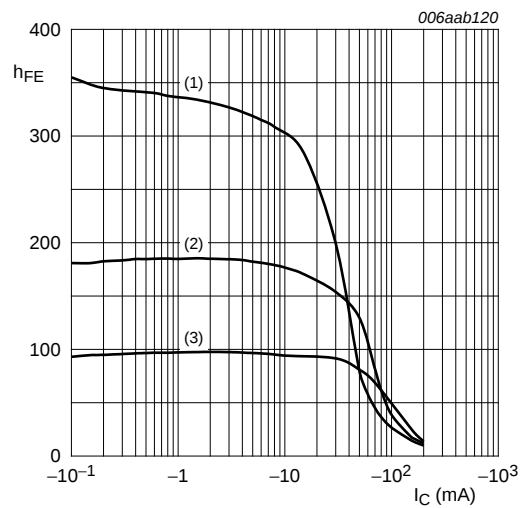
7. Characteristics

Table 7. Characteristics

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

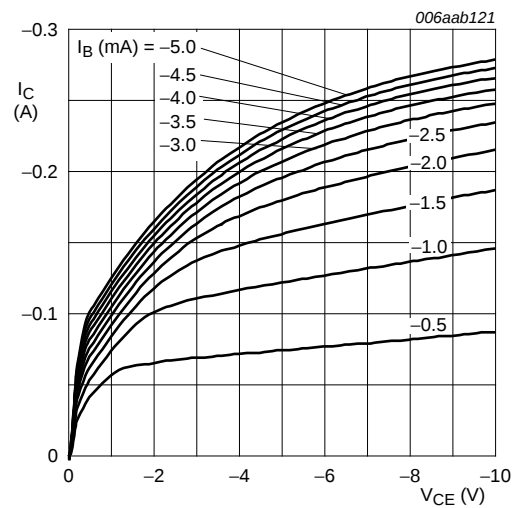
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -30\text{ V}$; $I_E = 0\text{ A}$	-	-	-50	nA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -6\text{ V}$; $I_C = 0\text{ A}$	-	-	-50	nA
h_{FE}	DC current gain	$V_{CE} = -1\text{ V}$				
		$I_C = -0.1\text{ mA}$	60	180	-	
		$I_C = -1\text{ mA}$	80	180	-	
		$I_C = -10\text{ mA}$	100	180	300	
		$I_C = -50\text{ mA}$	60	130	-	
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	$V_{CB} = -5\text{ V}$; $I_E = I_C = 0\text{ A}$; $f = 1\text{ MHz}$	-	-	4.5	pF
C_e	emitter capacitance	$V_{EB} = -500\text{ mV}$; $I_C = I_E = 0\text{ A}$; $f = 1\text{ MHz}$	-	-	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 kHz	-	-	4	dB

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



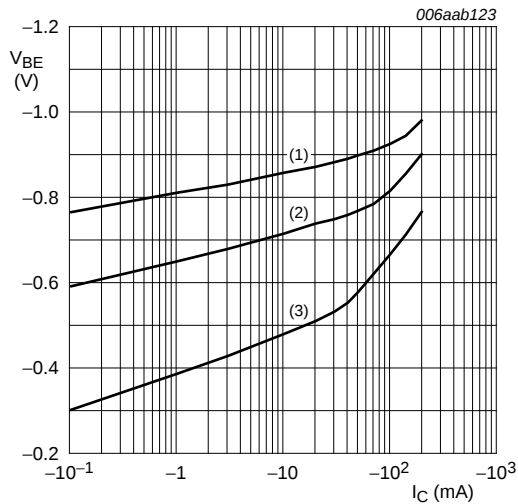
- $V_{CE} = -1\text{ V}$
- (1) $T_{amb} = 150^\circ\text{C}$
 - (2) $T_{amb} = 25^\circ\text{C}$
 - (3) $T_{amb} = -55^\circ\text{C}$

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



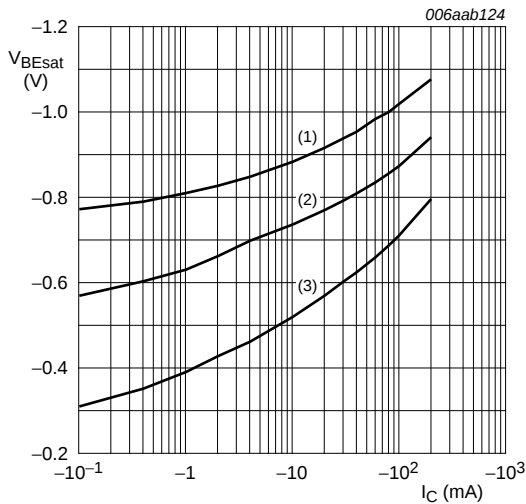
$T_{amb} = 25^\circ\text{C}$

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



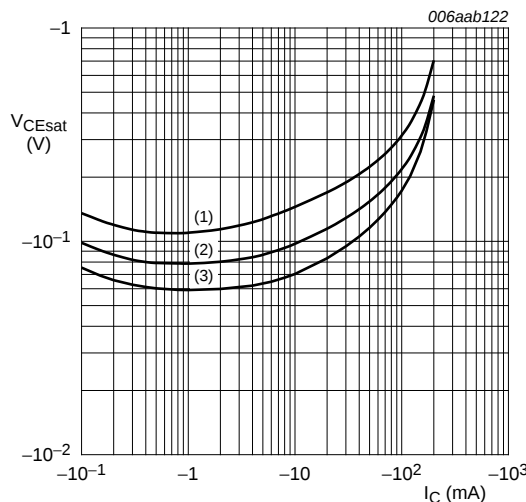
- $V_{CE} = -1\text{ V}$
- (1) $T_{amb} = -55^\circ\text{C}$
 - (2) $T_{amb} = 25^\circ\text{C}$
 - (3) $T_{amb} = 150^\circ\text{C}$

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



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

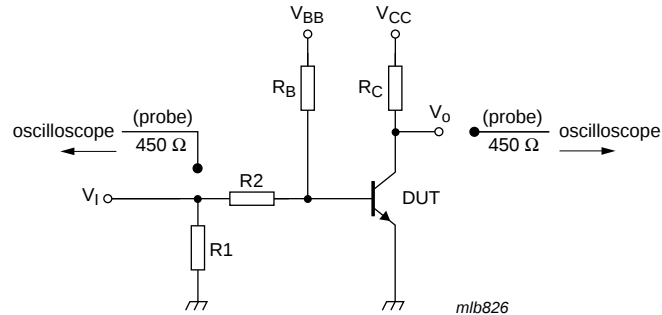
Fig 6. Base-emitter saturation voltage as a function of collector current; typical values



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

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

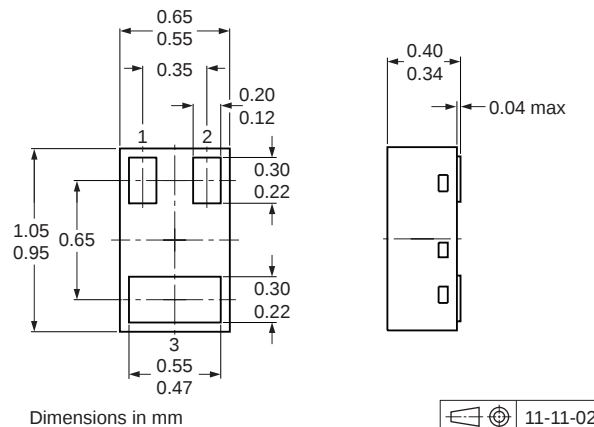


Fig 9. Package outline DFN1006B-3 (SOT883B)

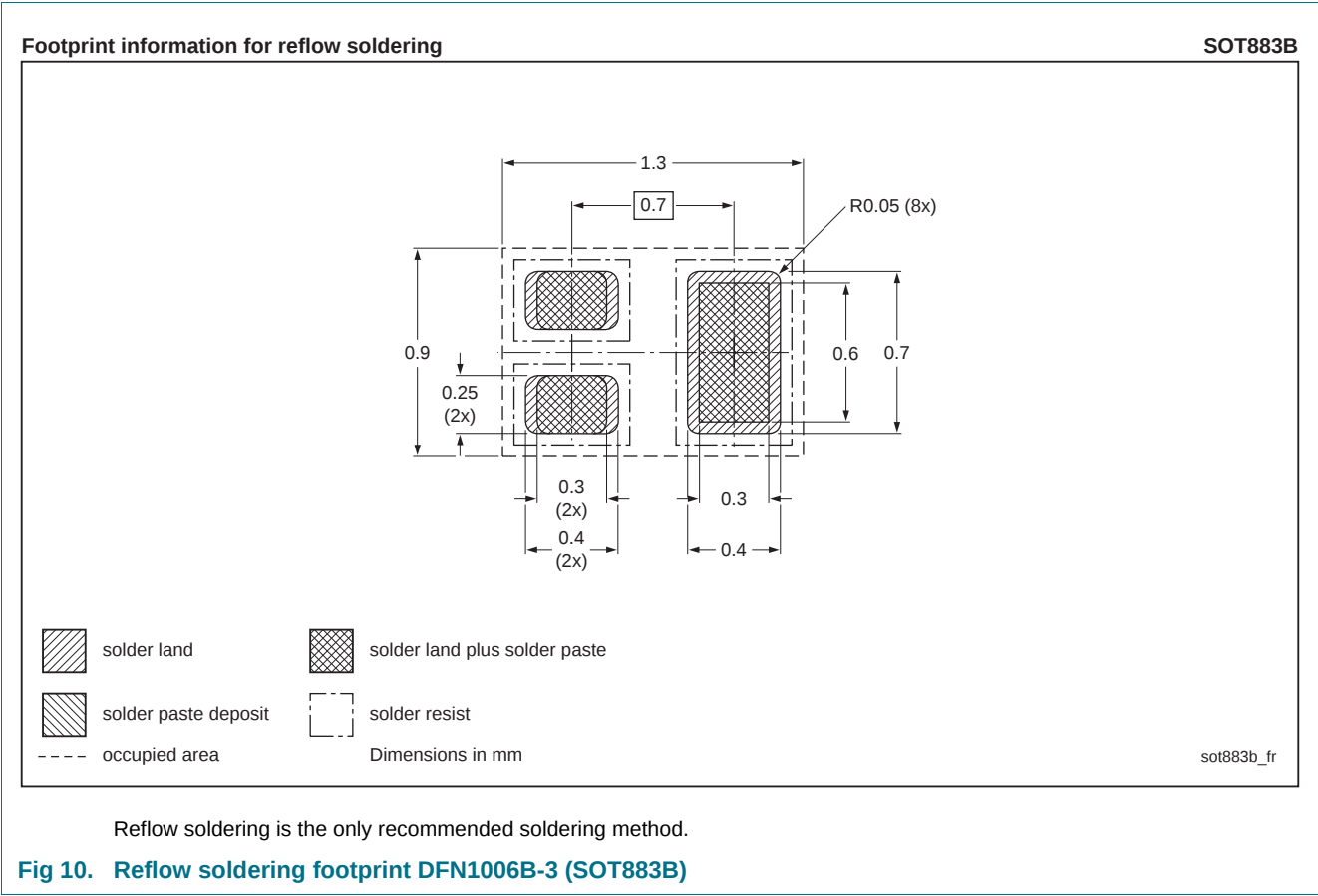
11. Packing information

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

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 ^{[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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