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

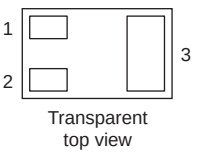
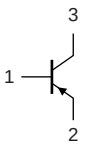
1.4 Quick reference data

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

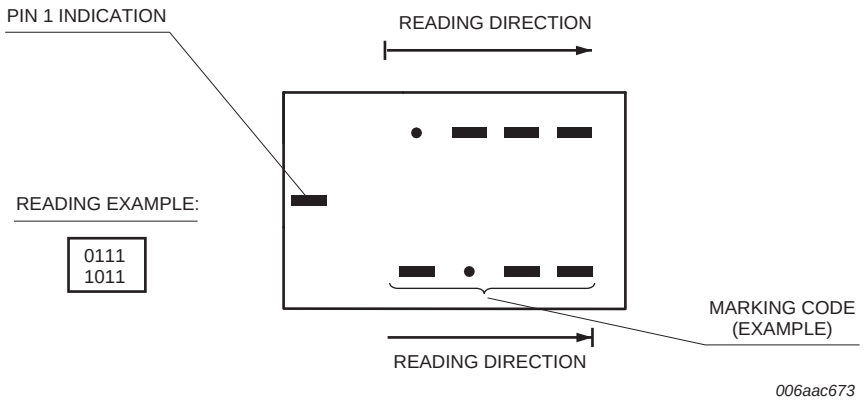


Fig 1. DFN1006B-3 (SOT883B) binary marking code description

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; $t_p \leq 1$ ms		-	–200	mA
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms		-	–100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °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 cm^2.

6. Thermal characteristics

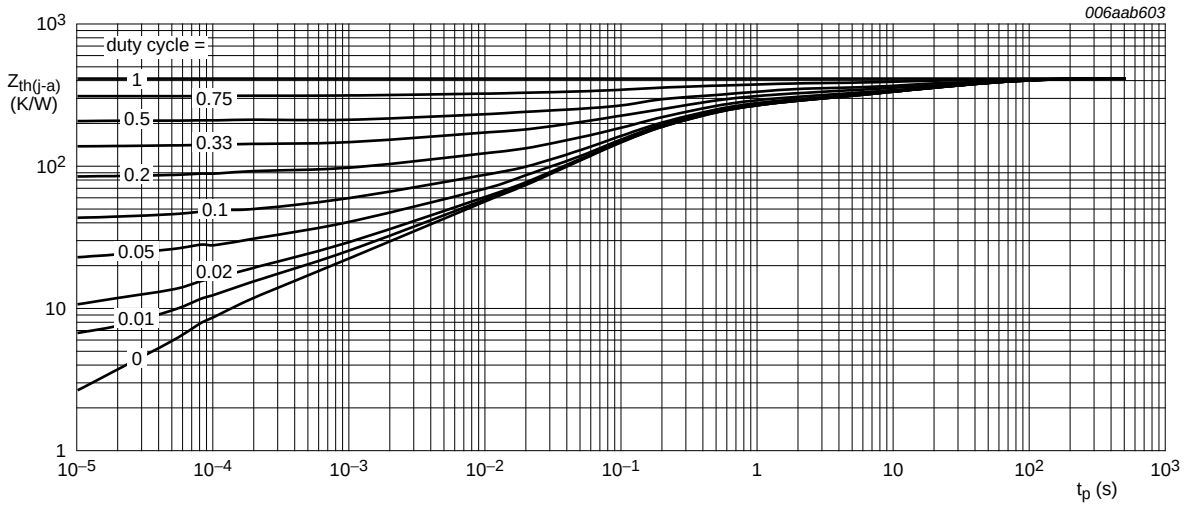
Table 6. Thermal characteristics

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^2.



FR4 PCB, standard footprint

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

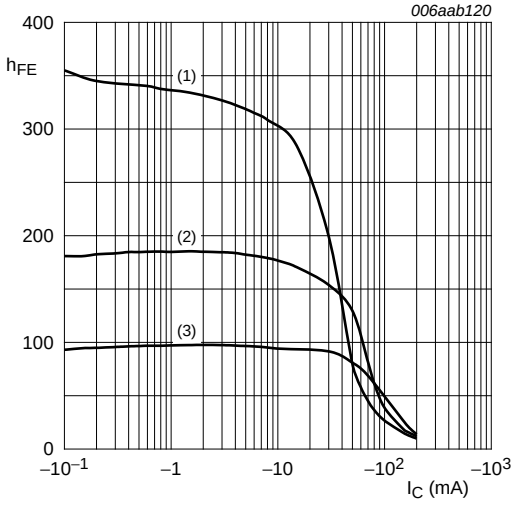
7. Characteristics

Table 7. Characteristics

T_{amb} = 25 °C unless otherwise specified.

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

[1] Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$.



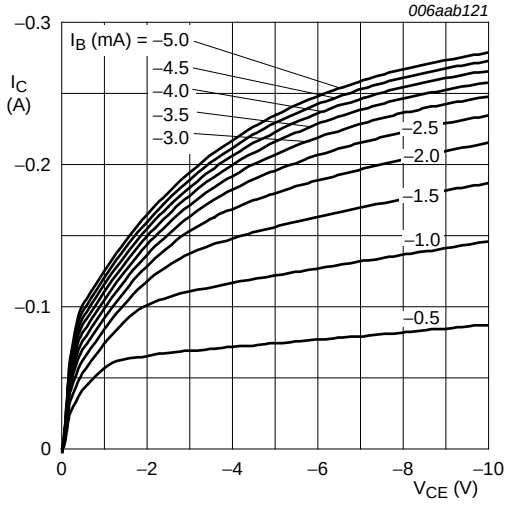
V_{CE} = −1 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

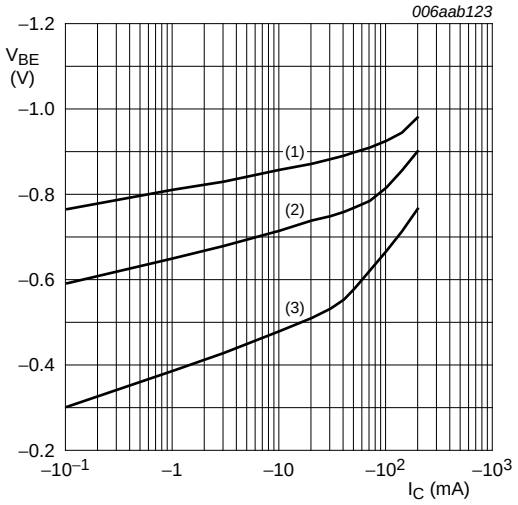
(3) T_{amb} = −55 °C

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



T_{amb} = 25 °C

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



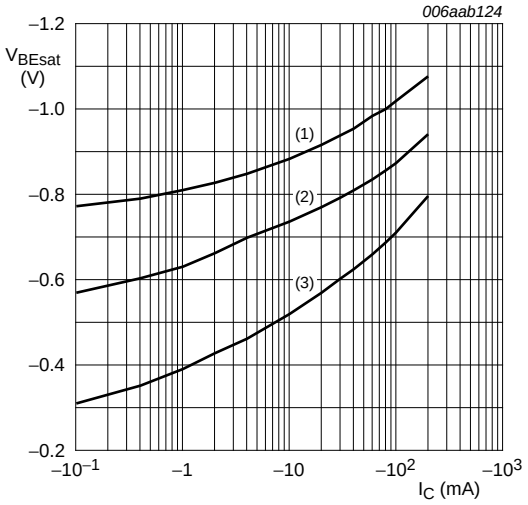
V_{CE} = −1 V

(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



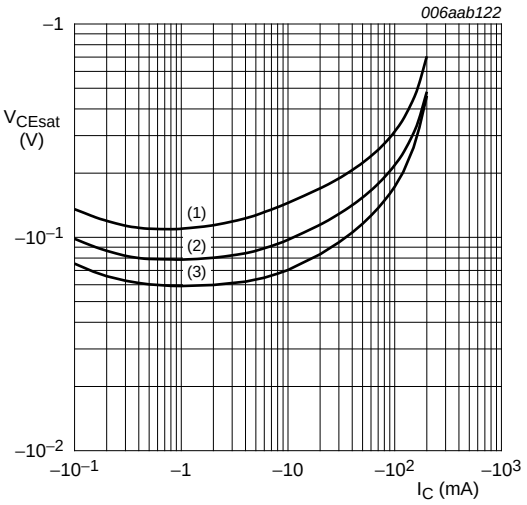
I_C/I_B = 10

(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

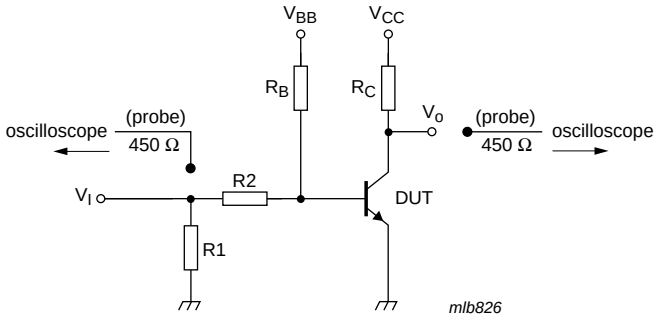
(1) T_{amb} = 150 °C

(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 V; t = 600 μs; t_p = 10 μs; $t_r = t_f \leq 3$ ns

R1 = 56 Ω; R2 = 2.5 kΩ; R_B = 3.9 kΩ; R_C = 270 Ω

V_{BB} = −1.9 V; V_{CC} = 3 V

Oscilloscope: input impedance Z_i = 50 Ω

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

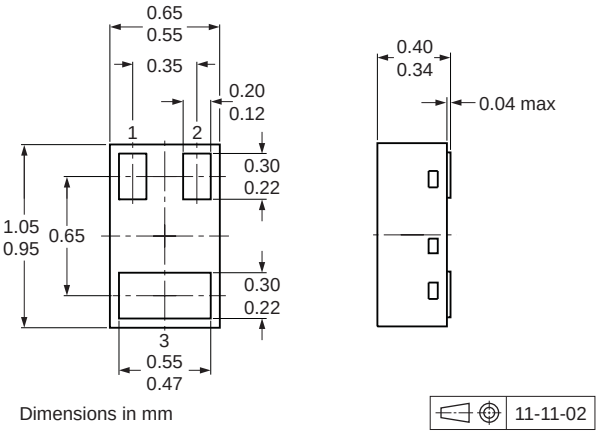


Fig 9. Package outline DFN1006B-3 (SOT883B)

11. Packing information

Table 8. Packing methods

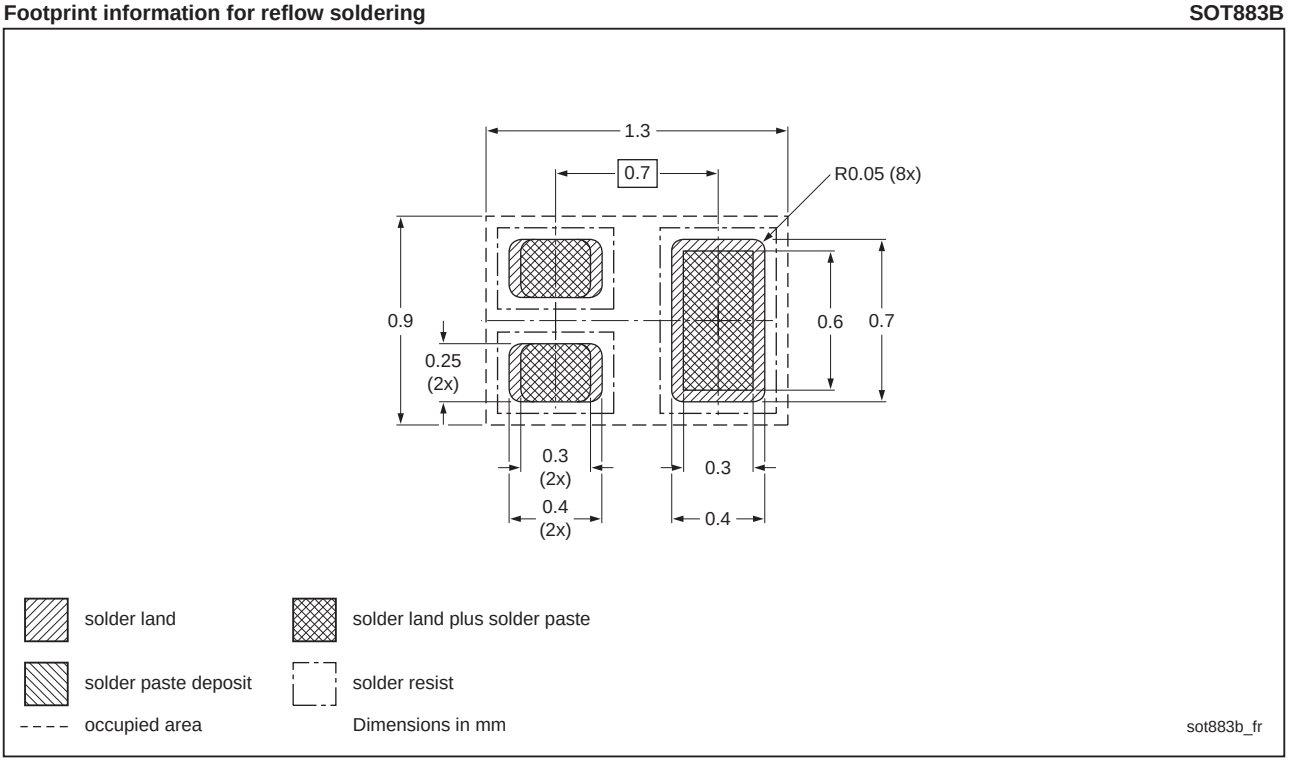
The indicated -xxx are the last three digits of the 12NC ordering code.[1]

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

Footprint information for reflow soldering **SOT883B**



Reflow soldering is the only recommended soldering method.

Fig 10. Reflow soldering footprint DFN1006B-3 (SOT883B)

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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16. Contents

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