PMBT3906MB

40 V, 200 mA PNP switching transistor

2 February 2018 **Product data sheet**

1. General description

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

NPN complement: PMBT3904MB.

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

3. Applications

- General-purpose switching and amplification
- Mobile applications

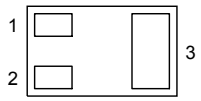
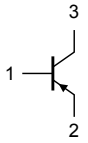
4. Quick reference data

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	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Transparent top view **DFN1006B-3 (SOT883B)**	 *sym013*
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMBT3906MB	DFN1006B-3	plastic, leadless ultra small plastic package; 3 solder lands; 0.35 mm pitch; 1.0 mm x 0.6 mm x 0.37 mm body	SOT883B

7. Marking

Table 4. Marking codes

Type number	Marking code
PMBT3906MB	0100 1000

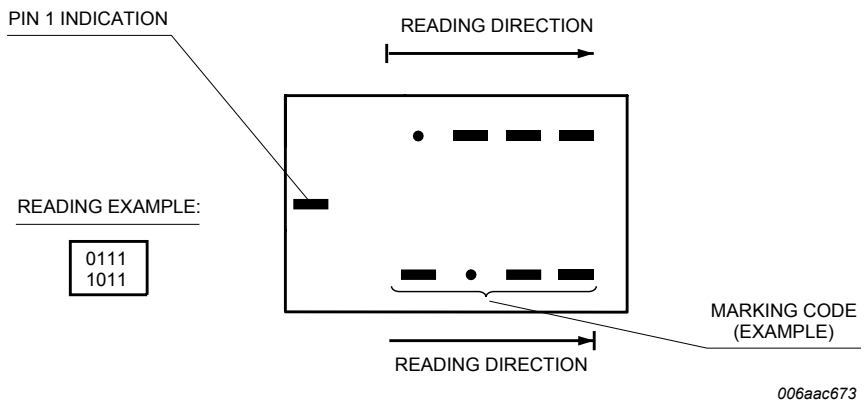


Fig. 1. DFN1006B-3 (SOT883B) binary marking code description

8. 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			-	-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

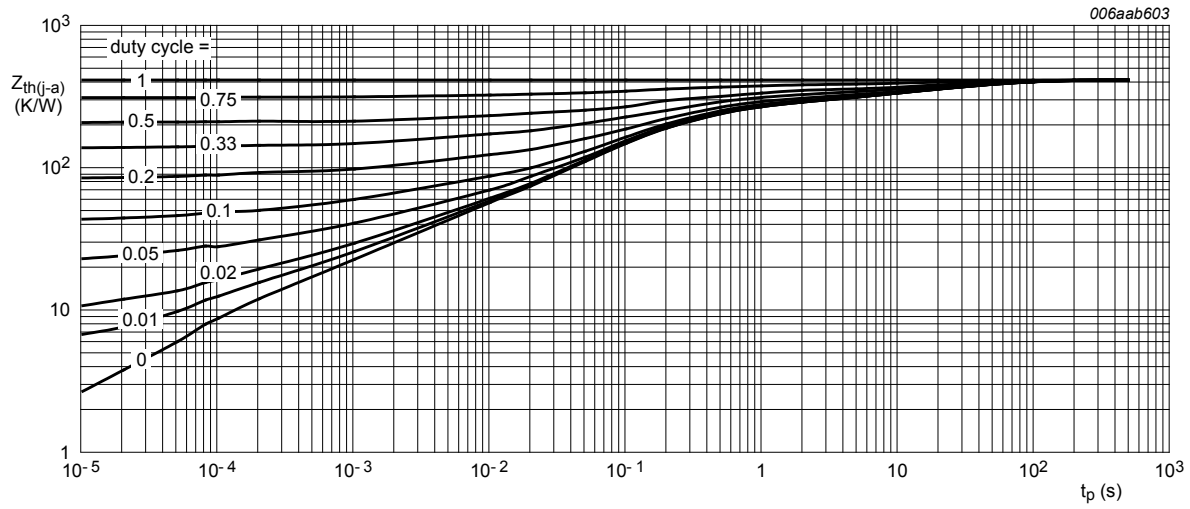
[1] Reflow soldering is the only recommended soldering method.
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

9. 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

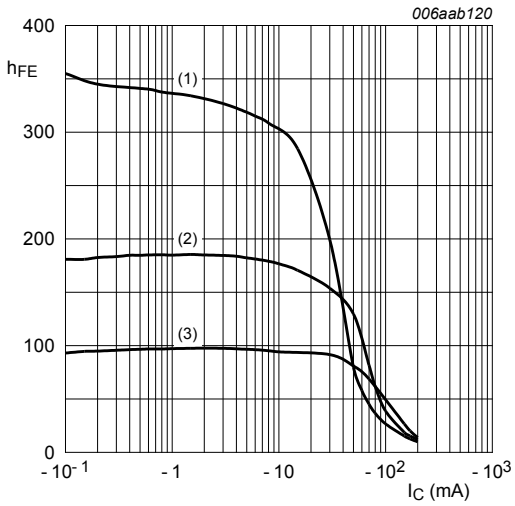
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

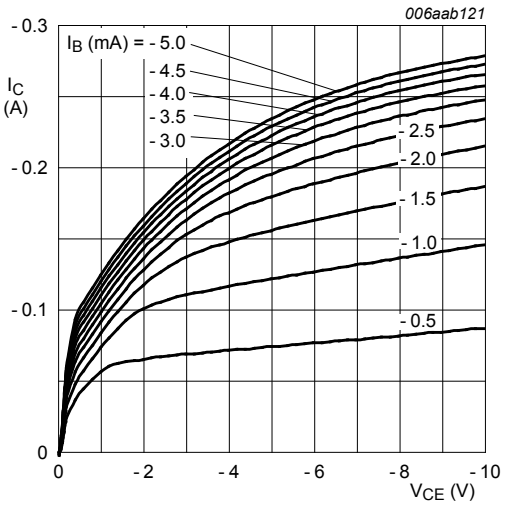
T_{amb} = 25 °C unless otherwise specified

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	-	
		V_{CE} = -1 V; I_C = -1 mA		80	180	-	
		V_{CE} = -1 V; I_C = -10 mA		100	180	300	
		V_{CE} = -1 V; I_C = -50 mA		60	130	-	
		V_{CE} = -1 V; I_C = -100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02		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	I_C = -10 mA; I_{Bon} = -1 mA; I_{Boff} = 1 mA; V_{CC} = -3 V		-	-	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 = 0 A; i_e = 0 A; f = 1 MHz		-	-	4.5	pF
C_e	emitter capacitance	V_{EB} = -500 mV; I_C = 0 A; 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; 10 Hz ≤ f ≤ 15700 Hz		-	-	4	dB



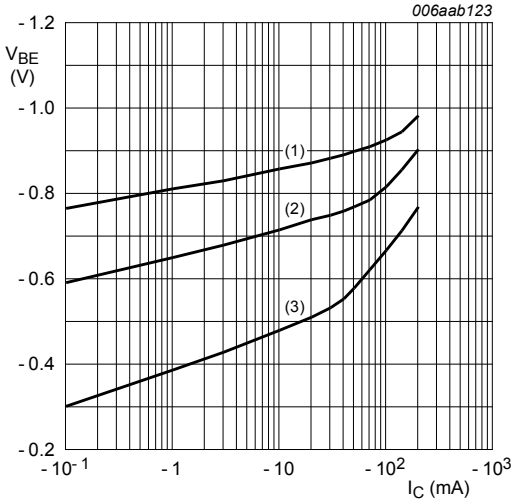
V_{CE} = -1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

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



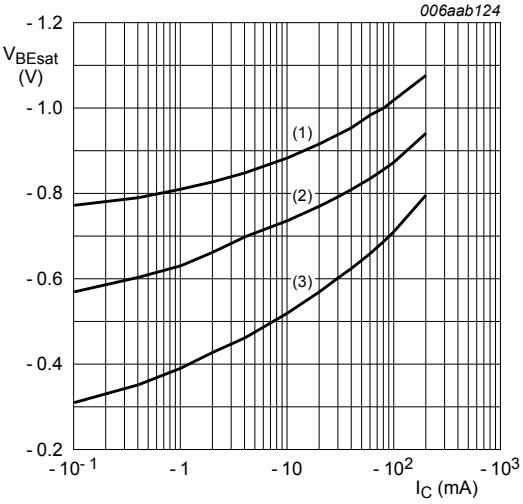
T_{amb} = 25 °C

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



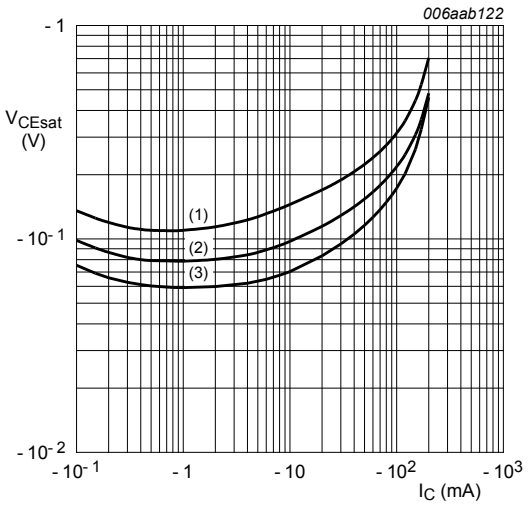
V_{CE} = -1 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

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



I_C/I_B = 5
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

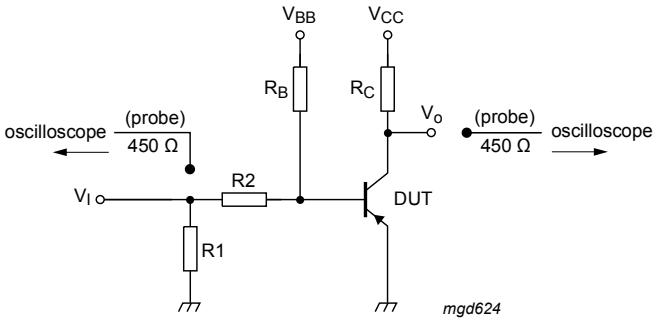
Fig. 6. Base-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 10$
(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

11. 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

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

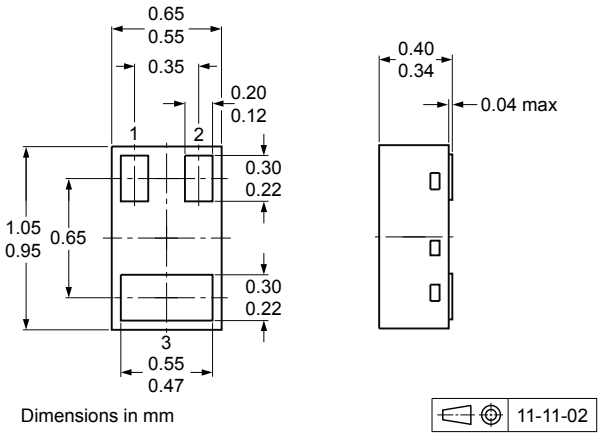


Fig. 9. Package outline DFN1006B-3 (SOT883B)

13. Soldering

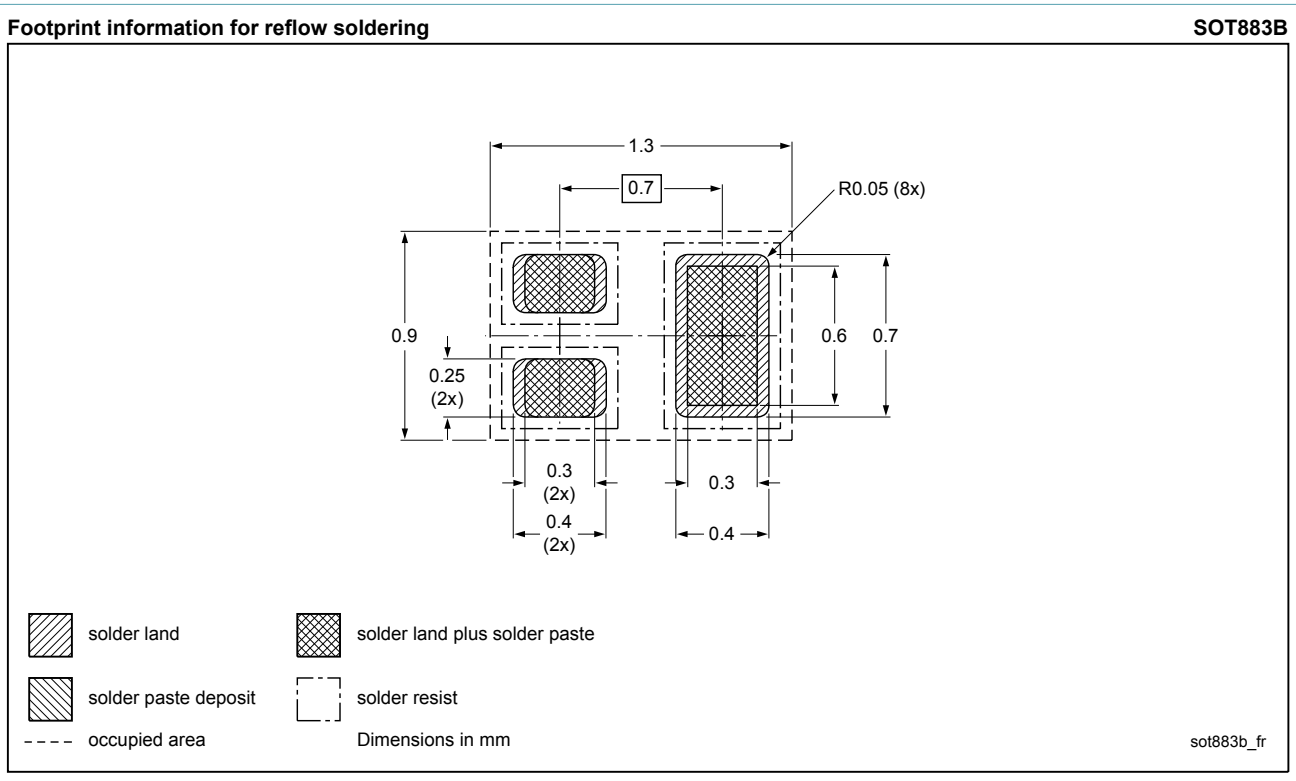


Fig. 10. Reflow soldering footprint for DFN1006B-3 (SOT883B)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMBT3906MB v.2	20180202	Product data sheet	-	PMBT3906MB v.1
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Packing information removed. • Test information to PNP-version corrected.			
PMBT3906MB v.1	20120402	Product data sheet	-	-

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.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
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