



PMBT222AMB

40 V, 600 mA NPN switching transistor

21 September 2018

Product data sheet

1. General description

NPN switching transistor in an ultra small DFN1006B-3 (SOT883B) leadless Surface-Mounted Device (SMD) plastic package.

PNP complement: PMBT2907AMB

2. Features and benefits

- High current (max. 600 mA)
- Low voltage (max. 40V)
- Leadless ultra small SMD plastic package
- Low package height of 0.37 mm
- Power dissipation comparable to SOT23

3. Applications

- Switching and linear applications
- Mobile applications

4. Quick reference data

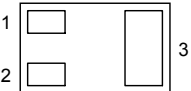
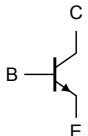
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CE0}	collector-emitter voltage	open base	-	-	40	V
I_C	collector current		-	-	600	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	800	mA
h_{FE}	DC current gain	$V_{CE} = 10$ V; $I_C = 150$ mA	[1]	100	-	300
		$V_{CE} = 10$ V; $I_C = 500$ mA	[1]	40	-	-

[1] Pulsed test: $t_p \leq 300$ μ s; $\delta \leq 0.02$

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 <p>Transparent top view DFN1006B-3 (SOT883B)</p>	 <p>sym021</p>
2	E	emitter		
3	C	collector		

6. Ordering information

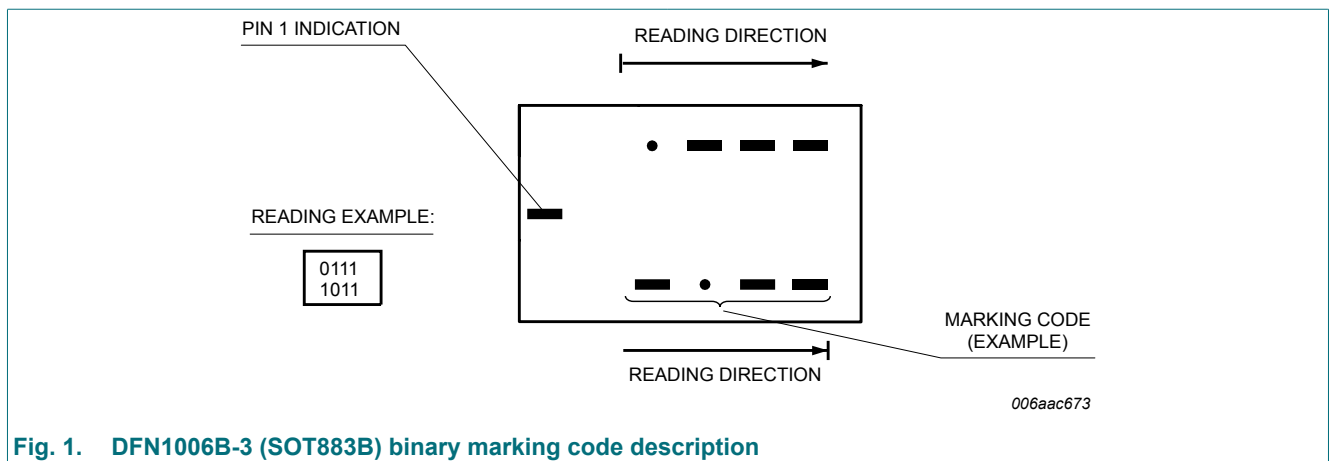
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMBT2222AMB	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
PMBT2222AMB	0110 0111



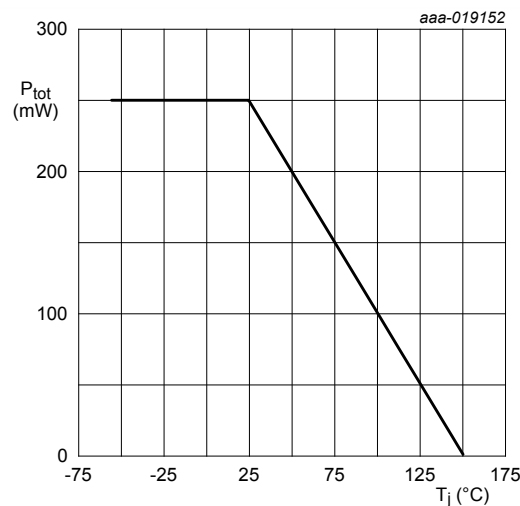
8. Limiting values

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	-	75	V
V_{CEO}	collector-emitter voltage	open base	-	40	V
V_{EBO}	emitter-base voltage	open collector	-	6	V
I_C	collector current		-	600	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	800	mA
I_{BM}	peak base current		-	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	250	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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.



FR4 PCB, standard footprint

Fig. 2. Power derating curve DFN1006-3 (SOT883)

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]	-	-	500	K/W

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

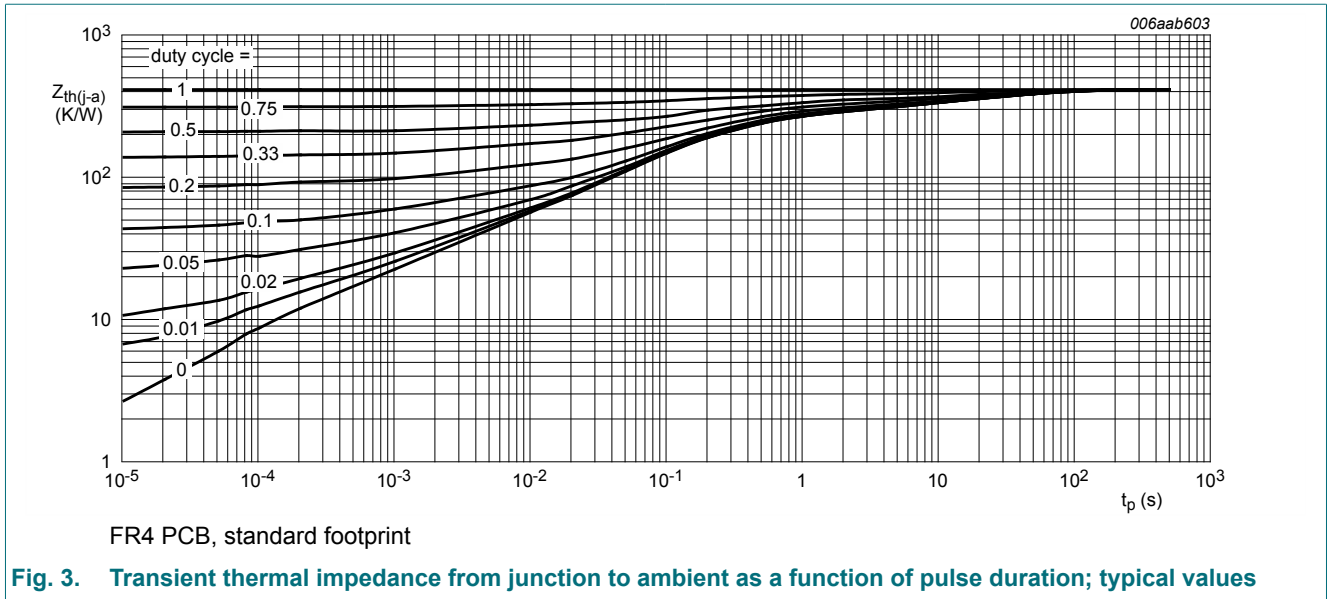


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

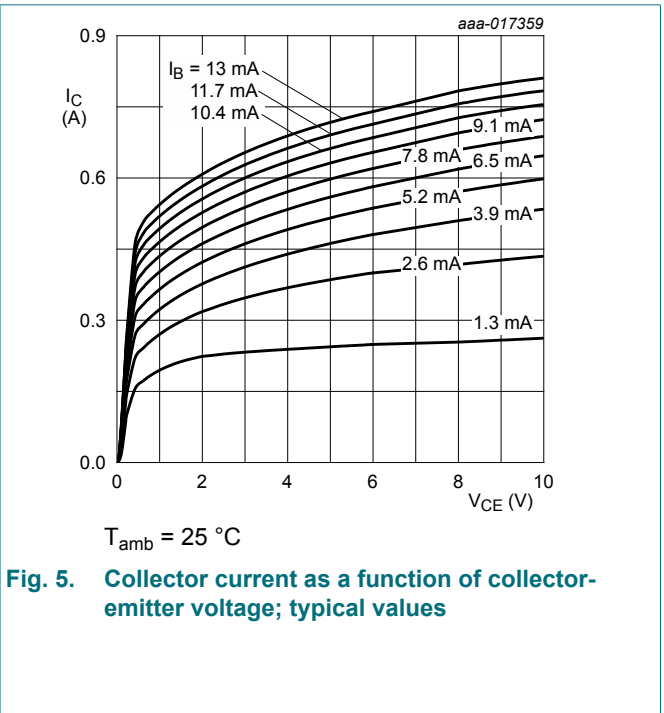
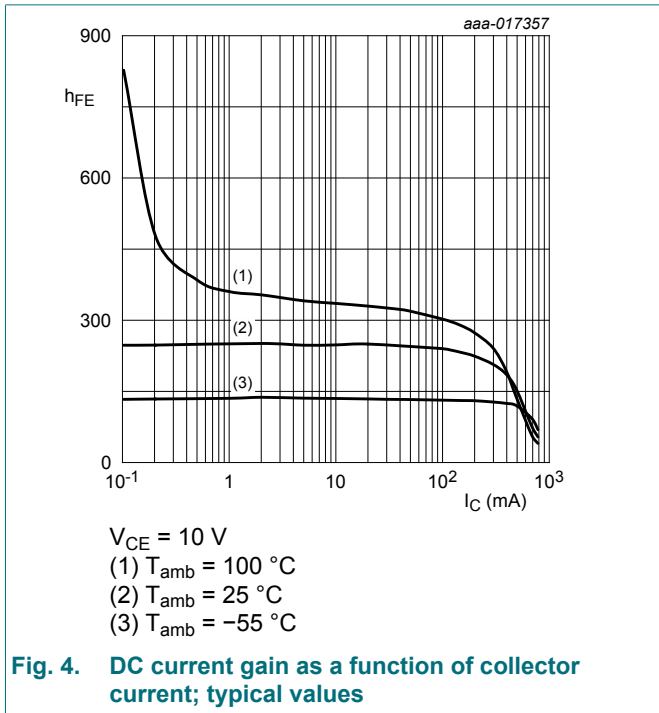
Table 7. Characteristics

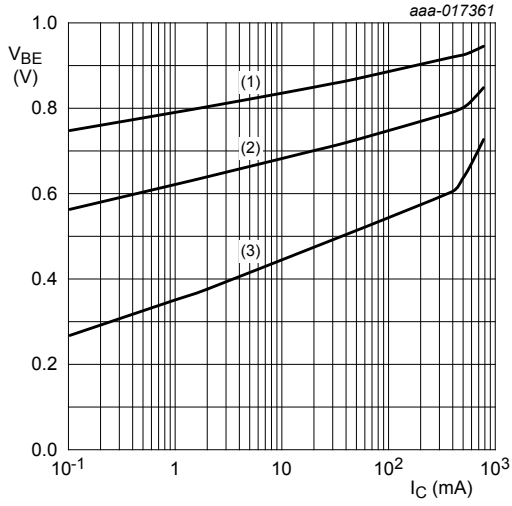
$T_{amb} = 25\text{ °C}$ unless otherwise specified

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\text{ }\mu\text{A}$; $I_E = 0\text{ A}$		75	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2\text{ mA}$; $I_B = 0\text{ A}$		40	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_C = 0\text{ A}$; $I_E = 100\text{ }\mu\text{A}$		6	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = 60\text{ V}$; $I_E = 0\text{ A}$		-	-	10	nA
		$V_{CB} = 60\text{ V}$; $I_E = 0\text{ A}$; $T_j = 125\text{ °C}$		-	-	10	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V}$; $I_C = 0\text{ A}$		-	-	10	nA
h_{FE}	DC current gain	$V_{CE} = 10\text{ V}$; $I_C = 100\text{ }\mu\text{A}$		35	-	-	
		$V_{CE} = 10\text{ V}$; $I_C = 1\text{ mA}$		50	-	-	
		$V_{CE} = 10\text{ V}$; $I_C = 10\text{ mA}$		75	-	-	
		$V_{CE} = 10\text{ V}$; $I_C = 10\text{ mA}$; $T_{amb} = -55\text{ °C}$		35	-	-	
		$V_{CE} = 10\text{ V}$; $I_C = 150\text{ mA}$	[1]	100	-	300	
		$V_{CE} = 1\text{ V}$; $I_C = 150\text{ mA}$	[1]	50	-	-	
		$V_{CE} = 10\text{ V}$; $I_C = 500\text{ mA}$	[1]	40	-	-	

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 150 \text{ mA}; I_B = 15 \text{ mA}$	[1]	-	-	300	mV
		$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}$	[1]	-	-	1	V
V_{BEsat}	base-emitter saturation voltage	$I_C = 150 \text{ mA}; I_B = 15 \text{ mA}$	[1]	0.6	-	1.2	V
		$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}$	[1]	-	-	2	V
t_d	delay time	$I_C = 150 \text{ mA}; I_{B(on)} = 15 \text{ mA}; I_{B(off)} = -15 \text{ mA}$	-	-	15	ns	
t_r	rise time		-	-	20	ns	
t_{on}	turn-on time		-	-	35	ns	
t_s	storage time		-	-	200	ns	
t_f	fall time		-	-	60	ns	
t_{off}	turn-off time		-	-	260	ns	
C_c	collector capacitance		$V_{CB} = 10 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A}; f = 1 \text{ MHz}$	-	-	8	pF
C_e	emitter capacitance	$V_{EB} = 500 \text{ mV}; I_C = 0 \text{ A}; i_c = 0 \text{ A}; f = 1 \text{ MHz}$	-	-	25	pF	
f_T	transition frequency	$V_{CE} = 20 \text{ V}; I_C = 20 \text{ mA}; f = 100 \text{ MHz}$	[1]	-	340	MHz	

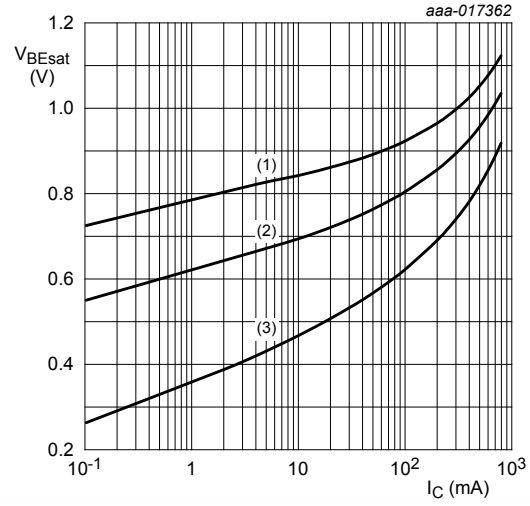
[1] Pulsed test: $t_p \leq 300 \mu\text{s}; \delta \leq 0.02$





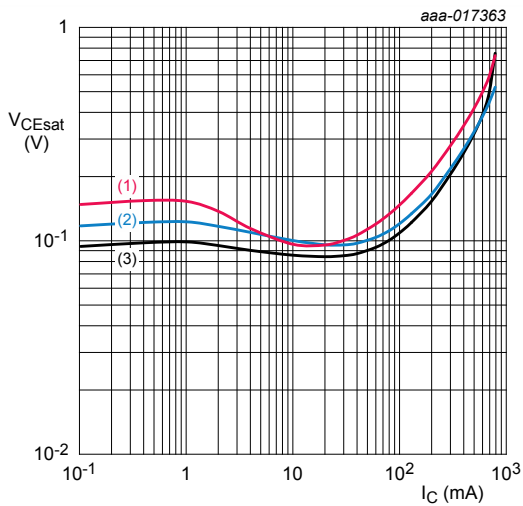
$V_{CE} = 10\text{ V}$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



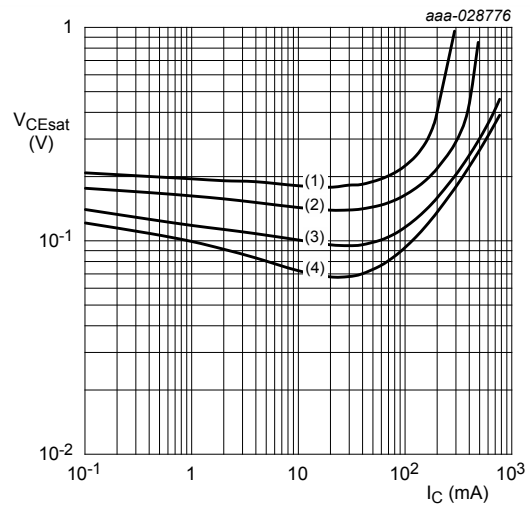
$I_C/I_B = 10$
 (1) $T_{amb} = -55\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 150\text{ °C}$

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



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

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



$T_{amb} = 25\text{ °C}$
 (1) $I_C/I_B = 100$
 (2) $I_C/I_B = 50$
 (3) $I_C/I_B = 20$
 (4) $I_C/I_B = 10$

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

11. Test information

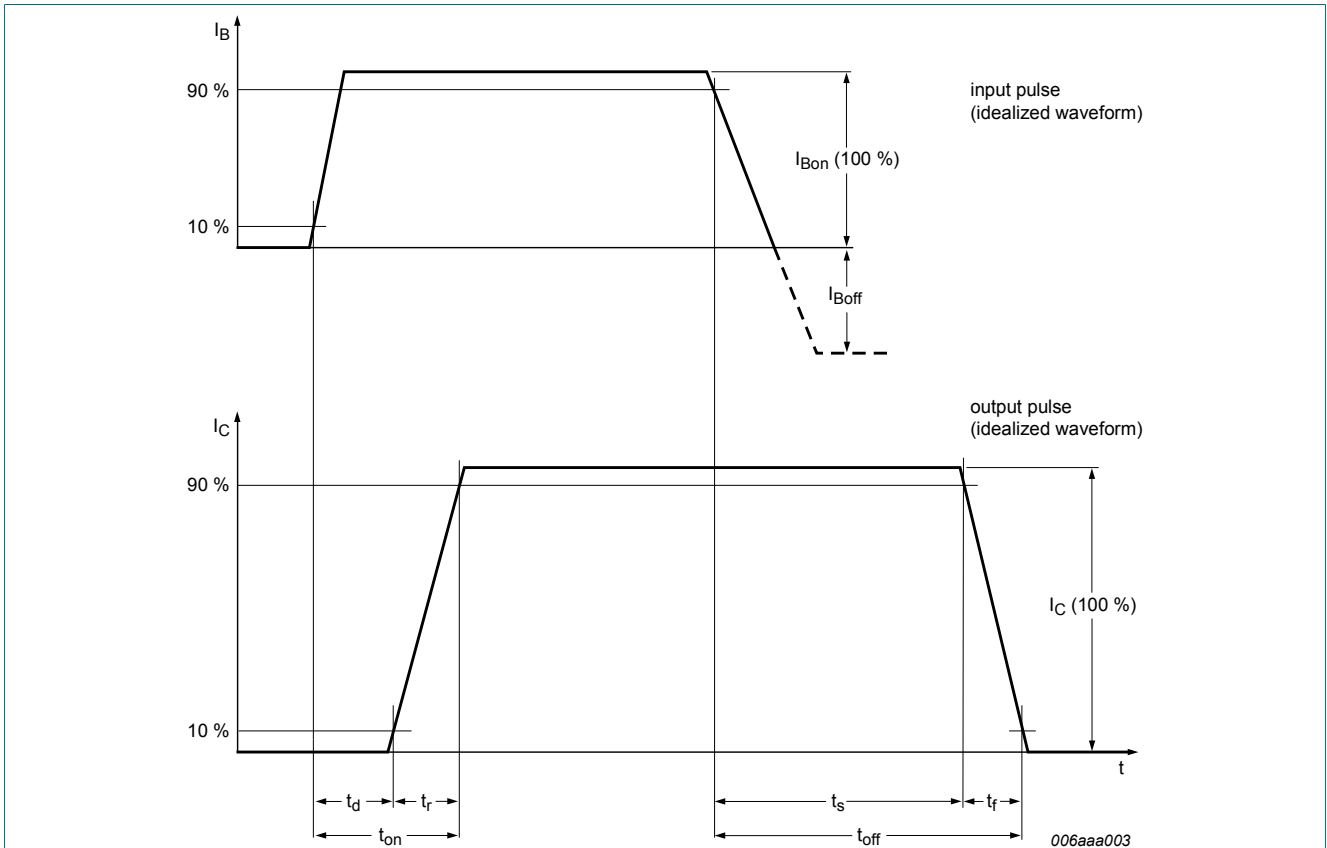


Fig. 10. Transistor switching time definition

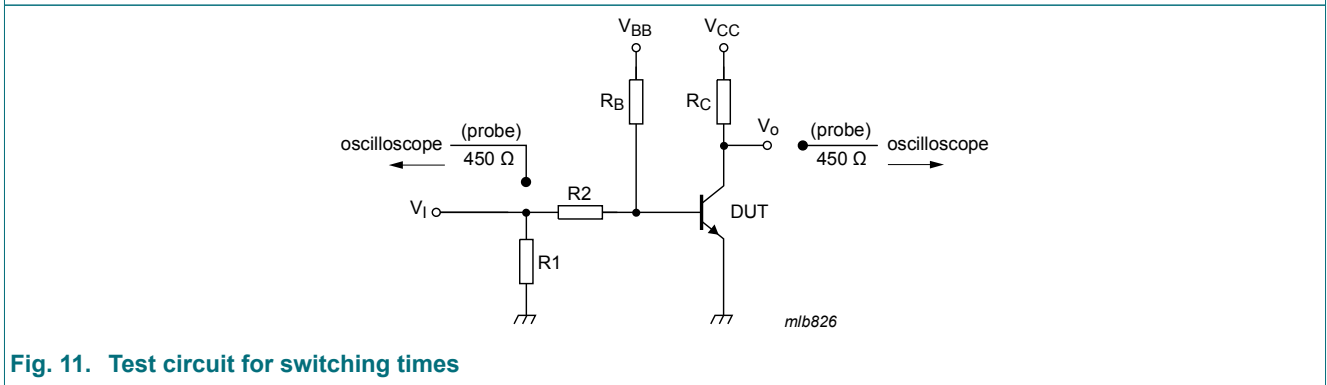


Fig. 11. Test circuit for switching times

12. Package outline

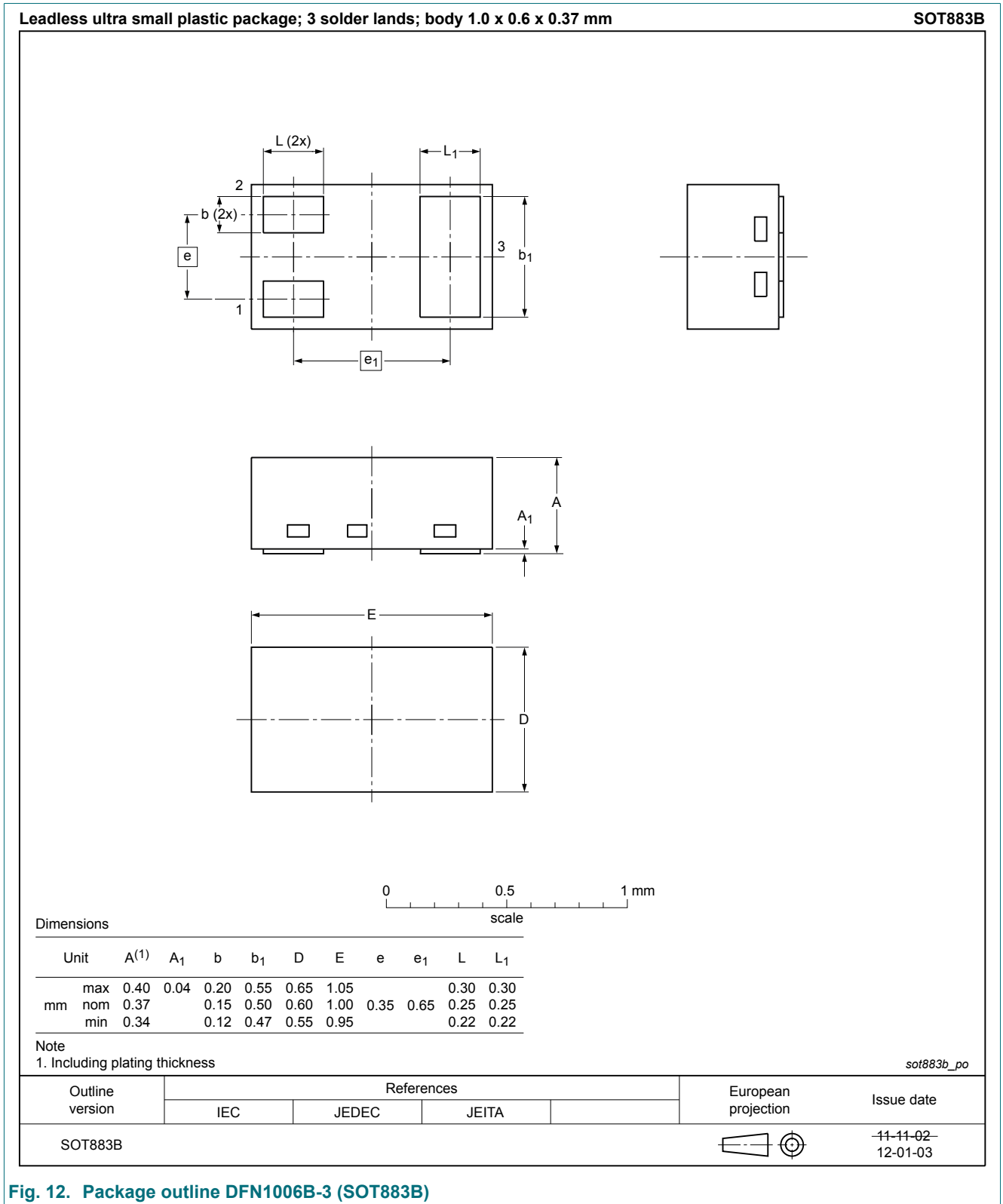


Fig. 12. Package outline DFN1006B-3 (SOT883B)

13. Soldering

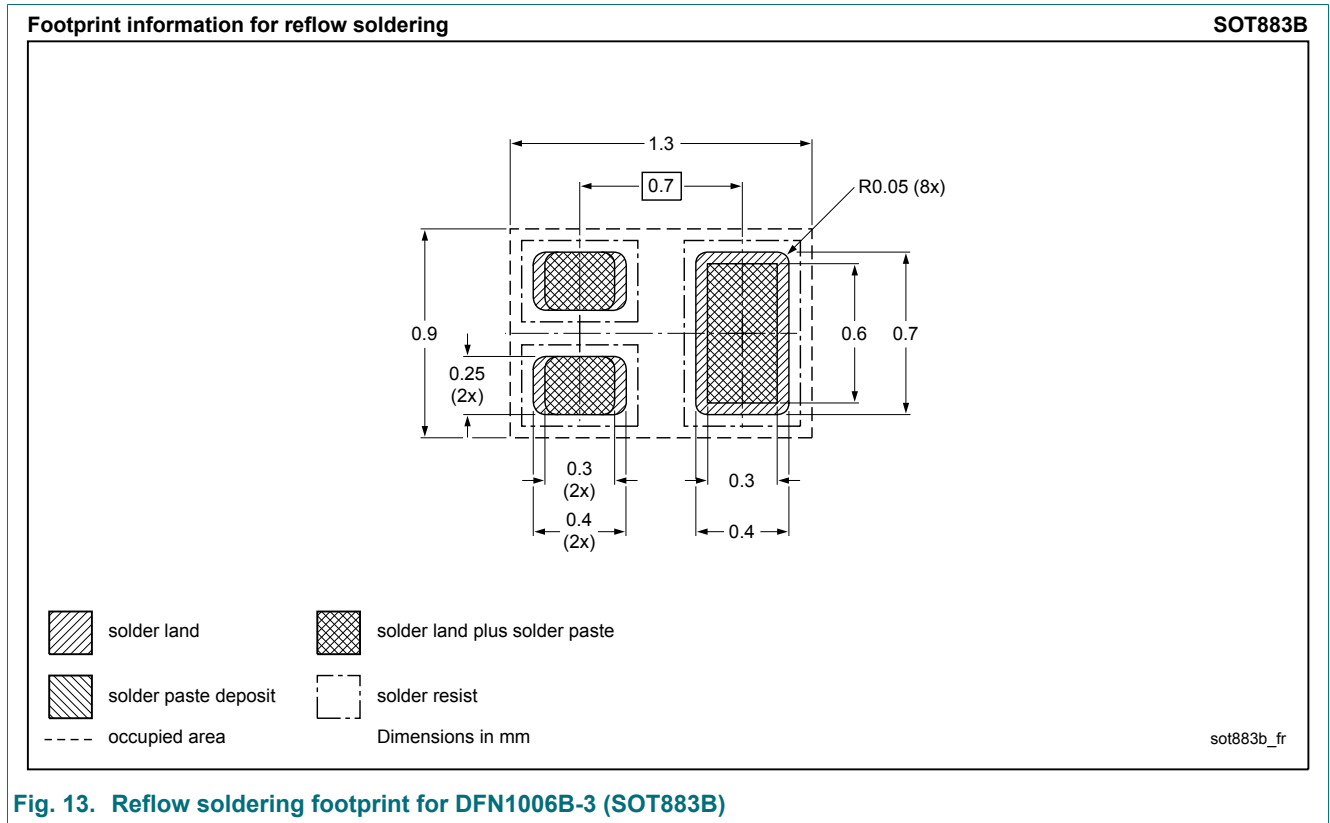


Fig. 13. Reflow soldering footprint for DFN1006B-3 (SOT883B)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMBT2222AMB v.1	20180921	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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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