



PMBT2222; PMBT2222A

NPN switching transistors

Rev. 6 — 12 November 2010

Product data sheet

1. Product profile

1.1 General description

NPN switching transistors in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		PNP complement
	NXP	JEDEC	
PMBT2222	SOT23	TO-236AB	PMBT2907
PMBT2222A			PMBT2907A

1.2 Features and benefits

- High current (max. 600 mA)
- Low voltage (max. 40 V)

1.3 Applications

- Switching and linear amplification

1.4 Quick reference data

Table 2. Quick reference data

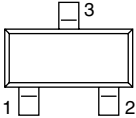
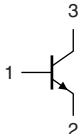
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CE0}	collector-emitter voltage	open base				
	PMBT2222		-	-	30	V
	PMBT2222A		-	-	40	V
I_C	collector current		-	-	600	mA
h_{FE}	DC current gain	$V_{CE} = 10\text{ V};$ $I_C = 150\text{ mA}$	[1] 100	-	300	
	PMBT2222	$V_{CE} = 10\text{ V};$ $I_C = 500\text{ mA}$	[1] 30	-	-	
	PMBT2222A	$V_{CE} = 10\text{ V};$ $I_C = 500\text{ mA}$	[1] 40	-	-	

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



2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base		 <small>sym021</small>
2	emitter		
3	collector		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PMBT2222	-	plastic surface-mounted package; 3 leads	SOT23
PMBT2222A			

4. Marking

Table 5. Marking codes

Type number	Marking code ^[1]
PMBT2222	*1B
PMBT2222A	*1P

[1] * = placeholder for manufacturing site code

5. Limiting values

Table 6. 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			
	PMBT2222		-	60	V
	PMBT2222A		-	75	V
V _{CEO}	collector-emitter voltage	open base			
	PMBT2222		-	30	V
	PMBT2222A		-	40	V
V _{EBO}	emitter-base voltage	open collector			
	PMBT2222		-	5	V
	PMBT2222A		-	6	V
I _C	collector current		-	600	mA
I _{CM}	peak collector current		-	800	mA
I _{BM}	peak base current		-	200	mA
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1] -	250	mW
T _j	junction temperature		-	150	°C
T _{amb}	ambient temperature		-65	+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.

6. Thermal characteristics

Table 7. 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.

7. Characteristics

Table 8. Characteristics
T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
I _{CBO}	collector-base cut-off current	PMBT2222	V _{CB} = 50 V; I _E = 0 A	-	-	10	nA
			V _{CB} = 50 V; I _E = 0 A; T _j = 125 °C	-	-	10	μA
	collector-base cut-off current	PMBT2222A	V _{CB} = 60 V; I _E = 0 A	-	-	10	nA
			V _{CB} = 60 V; I _E = 0 A; T _j = 125 °C	-	-	10	μA
I _{EBO}	emitter-base cut-off current	V _{EB} = 5 V; I _C = 0 A	-	-	10	nA	
h _{FE}	DC current gain		V _{CE} = 10 V; I _C = 0.1 mA	35			
			V _{CE} = 10 V; I _C = 1 mA	50	-	-	
			V _{CE} = 10 V; I _C = 10 mA	75	-	-	
			V _{CE} = 10 V; I _C = 10 mA; T _{amb} = -55 °C	35	-	-	
			V _{CE} = 10 V; I _C = 150 mA	[1] 100	-	300	
			V _{CE} = 1 V; I _C = 150 mA	[1] 50	-	-	
	DC current gain		V _{CE} = 10 V; I _C = 500 mA	[1]			
		PMBT2222		30	-	-	
		PMBT2222A		40	-	-	
V _{CEsat}	collector-emitter saturation voltage		I _C = 150 mA; I _B = 15 mA	[1]			
		PMBT2222		-	-	400	mV
	PMBT2222A		-	-	300	mV	
	collector-emitter saturation voltage		I _C = 500 mA; I _B = 50 mA	[1]			
		PMBT2222		-	-	1.6	V
		PMBT2222A		-	-	1	V

Table 8. Characteristics ...continued
 $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
V_{BEsat}	base-emitter saturation voltage	$I_C = 150\text{ mA};$ $I_B = 15\text{ mA}$	[1]				
			PMBT2222	-	-	1.3	V
	PMBT2222A	0.6	-	1.2	V		
	base-emitter saturation voltage	$I_C = 500\text{ mA};$ $I_B = 50\text{ mA}$	[1]				
			PMBT2222	-	-	2.6	V
	PMBT2222A	-	-	2	V		
C_c	collector capacitance	$V_{CB} = 10\text{ V};$ $I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	-	8	pF	
C_e	emitter capacitance	$V_{EB} = 500\text{ mV};$ $I_C = i_c = 0\text{ A};$ $f = 1\text{ MHz}$					
			PMBT2222	-	-	30	pF
			PMBT2222A	-	-	25	pF
f_T	transition frequency	$V_{CE} = 20\text{ V};$ $I_C = 20\text{ mA};$ $f = 100\text{ MHz}$					
			PMBT2222	250	-	-	MHz
			PMBT2222A	300	-	-	MHz
NF	noise figure	$V_{CE} = 5\text{ V};$ $I_C = 100\text{ }\mu\text{A};$ $R_S = 1\text{ k}\Omega;$ $f = 1\text{ kHz}$	-	-	4	dB	
t_d	delay time	$V_{CC} = 10\text{ V};$	-	-	15	ns	
t_r	rise time	$I_C = 150\text{ mA};$	-	-	20	ns	
t_{on}	turn-on time	$I_{Bon} = 15\text{ mA};$	-	-	35	ns	
t_s	storage time	$I_{Boff} = -15\text{ mA}$	-	-	200	ns	
t_f	fall time		-	-	60	ns	
t_{off}	turn-off time		-	-	250	ns	

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

8. Test information

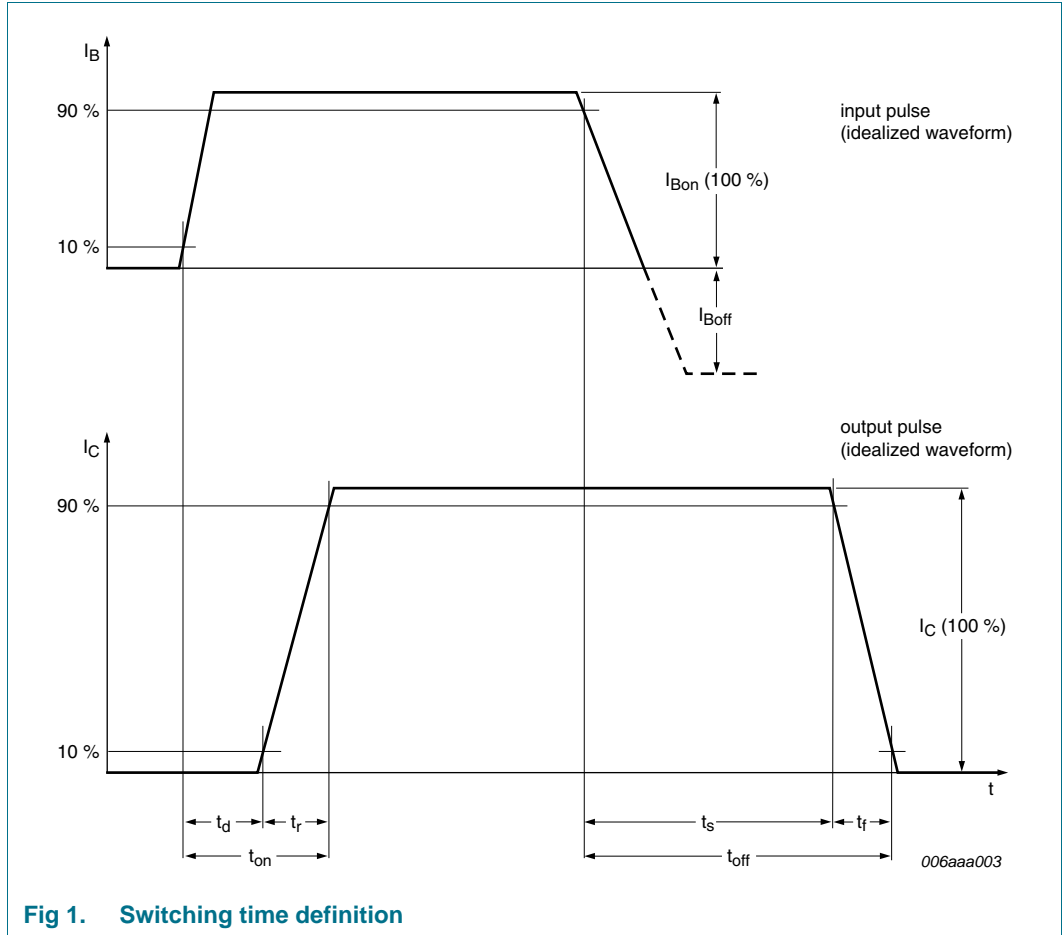
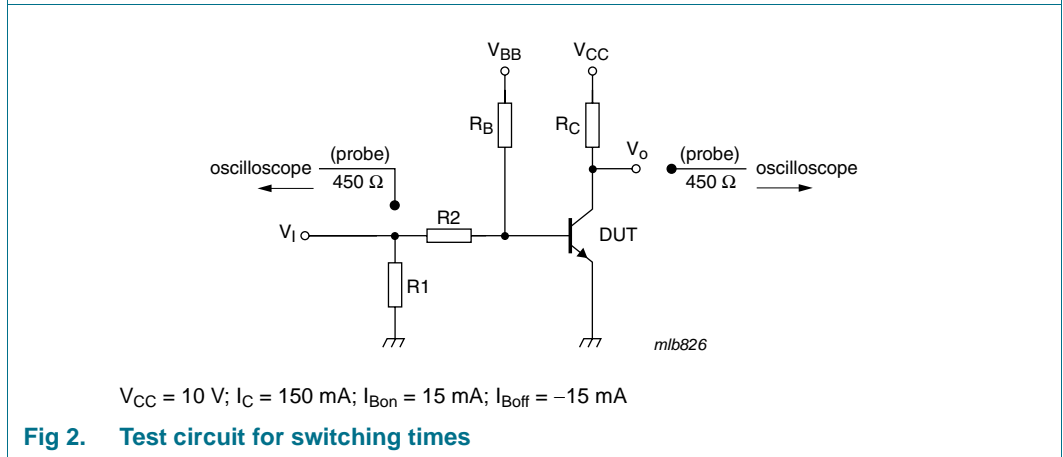


Fig 1. Switching time definition



$V_{CC} = 10\text{ V}; I_C = 150\text{ mA}; I_{Bon} = 15\text{ mA}; I_{Boff} = -15\text{ mA}$

Fig 2. Test circuit for switching times

8.1 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.

9. Package outline

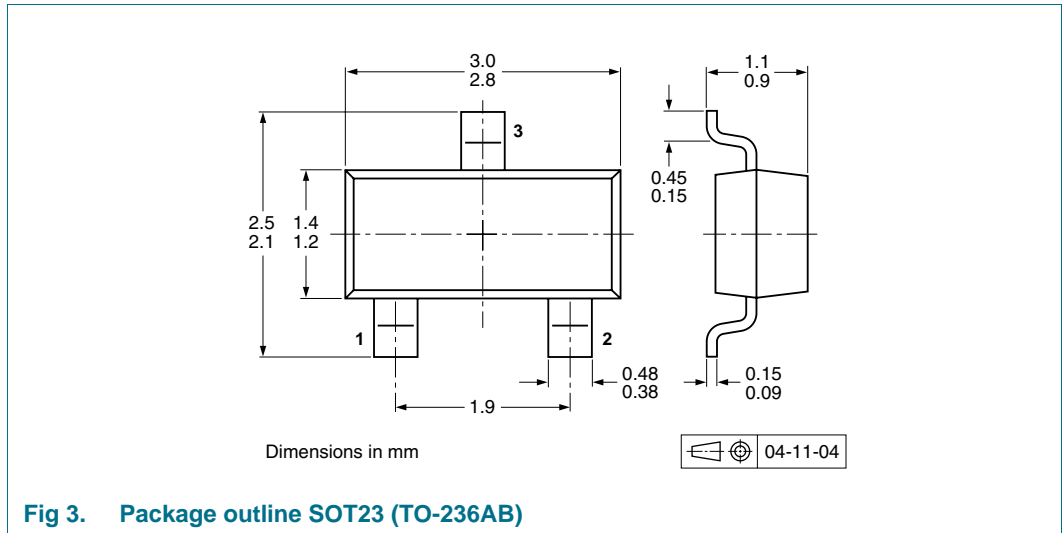


Fig 3. Package outline SOT23 (TO-236AB)

10. Packing information

Table 9. Packing methods

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

Type number	Package	Description	Packing quantity	
			3000	10000
PMBT2222	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
PMBT2222A				

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering

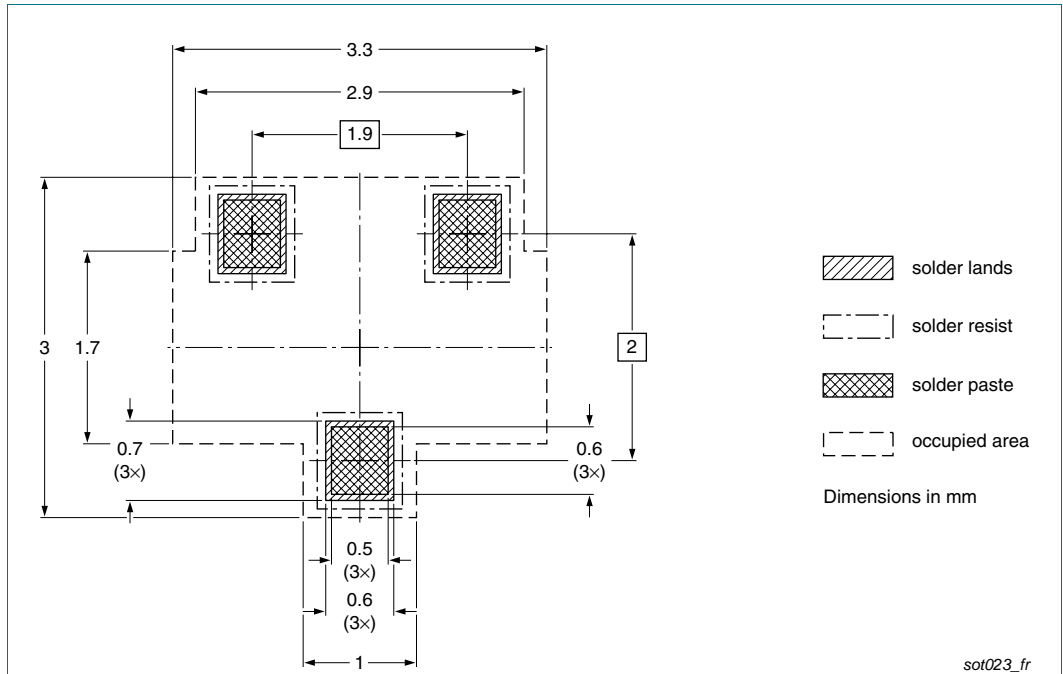


Fig 4. Reflow soldering footprint SOT23 (TO-236AB)

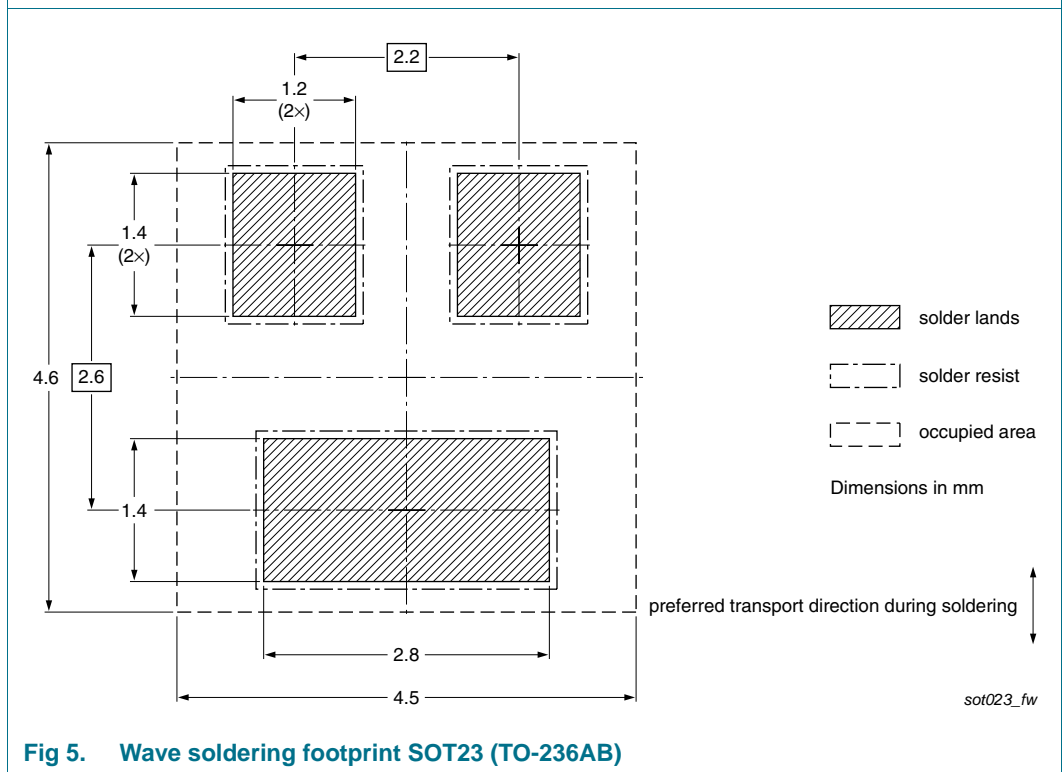


Fig 5. Wave soldering footprint SOT23 (TO-236AB)