

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

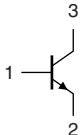
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CE0}	collector-emitter voltage	open base				
	PMBT2222		-	-	30	V
	PMBT2222A		-	-	40	V
I_C	collector current		-	-	600	mA
h_{FE}	DC current gain	$V_{CE} = 10\text{ V};$ $I_C = 150\text{ mA}$	[1] 100	-	300	
	PMBT2222	$V_{CE} = 10\text{ V};$ $I_C = 500\text{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

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



2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base		 <i>sym021</i>
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	$T_{amb} \leq 25\text{ °C}$	[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

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

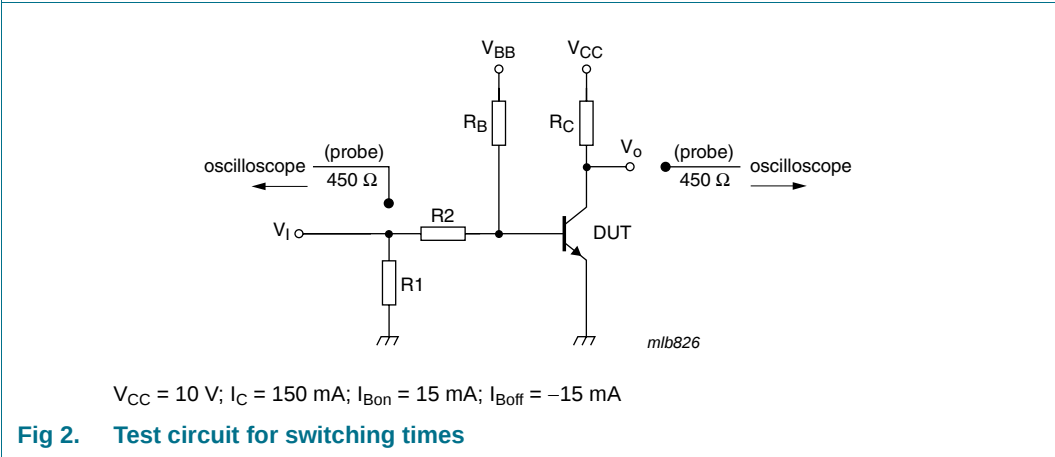
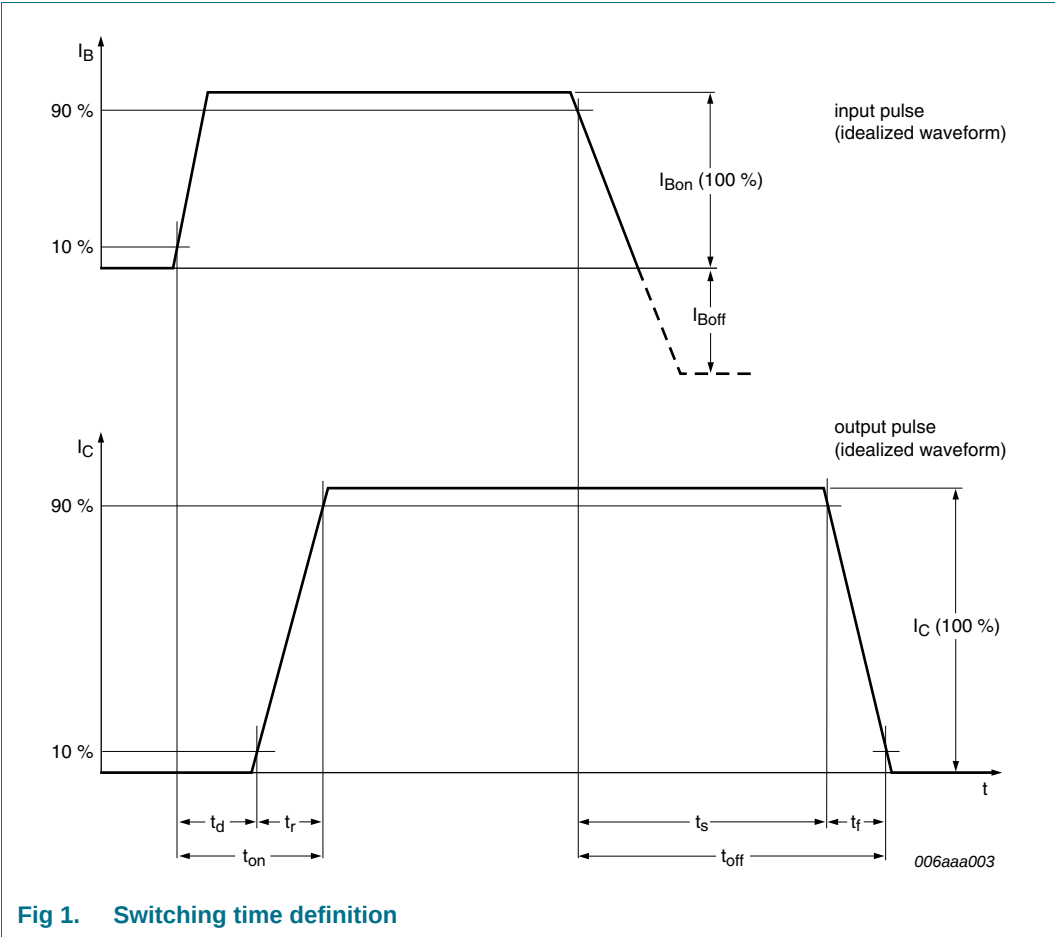
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current					
	PMBT2222	$V_{CB} = 50\text{ V}; I_E = 0\text{ A}$	-	-	10	nA
		$V_{CB} = 50\text{ V}; I_E = 0\text{ A}; T_j = 125\text{ }^{\circ}\text{C}$	-	-	10	μA
	collector-base cut-off current					
	PMBT2222A	$V_{CB} = 60\text{ V}; I_E = 0\text{ A}$	-	-	10	nA
		$V_{CB} = 60\text{ V}; I_E = 0\text{ A}; T_j = 125\text{ }^{\circ}\text{C}$	-	-	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	$V_{CE} = 10\text{ V}; I_C = 0.1\text{ mA}$	35			
		$V_{CE} = 10\text{ V}; I_C = 1\text{ mA}$	50	-	-	
		$V_{CE} = 10\text{ V}; I_C = 10\text{ mA}$	75	-	-	
		$V_{CE} = 10\text{ V}; I_C = 10\text{ mA}; T_{amb} = -55\text{ }^{\circ}\text{C}$	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	-	-	
	DC current gain	$V_{CE} = 10\text{ V}; I_C = 500\text{ mA}$	[1]			
		PMBT2222	30	-	-	
		PMBT2222A	40	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 150\text{ mA}; I_B = 15\text{ mA}$	[1]			
		PMBT2222	-	-	400	mV
	collector-emitter saturation voltage		-	-	300	mV
		PMBT2222A				
	collector-emitter saturation voltage	$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	[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: $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$.

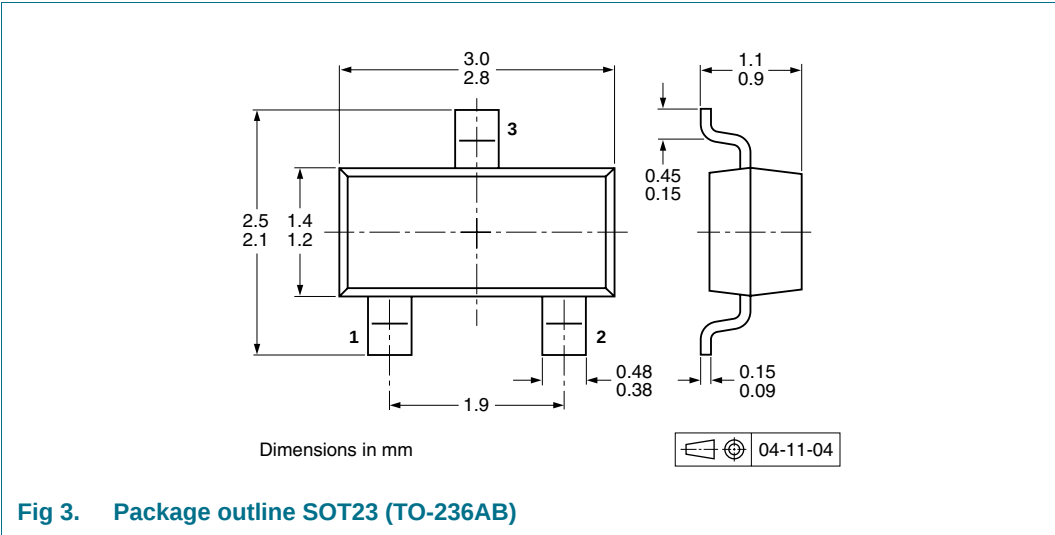
8. Test information



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



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](#).

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMBT2222_PMBT2222A v.6	20101112	Product data sheet	-	PMBT2222_2222A_5
Modifications:				
• Section 4 "Marking": updated • Figure 1 "Switching time definition": added • Section 8 "Test information": updated • Section 10 "Packing information": added • Section 11 "Soldering": added • Section 13 "Legal information": updated				
PMBT2222_2222A_5	20040122	Product specification	-	PMBT2222_2222A_4
PMBT2222_2222A_4	19990427	Product specification	-	PMBT2222_3
PMBT2222_3	19970909	Product specification	-	-

13. Legal information

13.1 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.

[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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