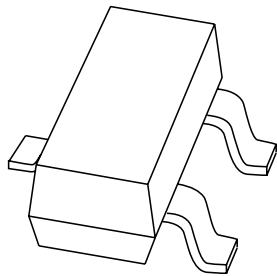


# DATA SHEET



## **PMBT2222; PMBT2222A** NPN switching transistors

Product specification  
Supersedes data of 1999 Apr 27

2004 Jan 22

# NPN switching transistors

# PMBT2222; PMBT2222A

### FEATURES

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

### APPLICATIONS

- Switching and linear amplification.

### DESCRIPTION

NPN switching transistor in a SOT23 plastic package.  
 PNP complements: PMBT2907 and PMBT2907A.

### MARKING

TYPE NUMBER	MARKING CODE <sup>(1)</sup>
PMBT2222	*1B
PMBT2222A	*1P

### Note

- \* = p : Made in Hong Kong.  
 \* = t : Made in Malaysia.  
 \* = W : Made in China.

### PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector

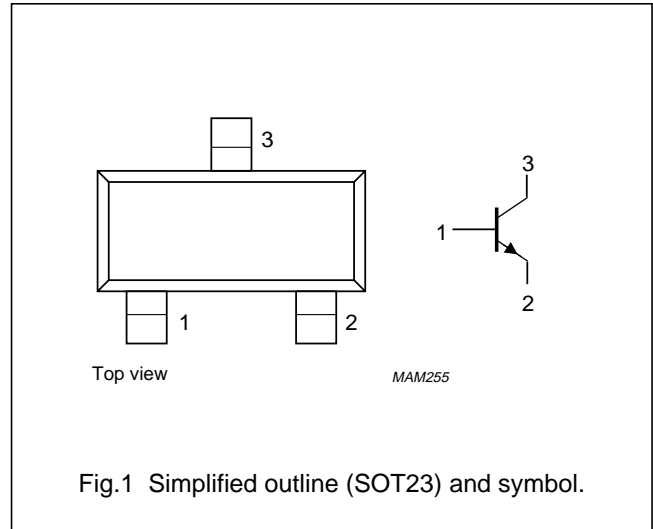


Fig.1 Simplified outline (SOT23) and symbol.

### ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PMBT2222	-	plastic surface mounted package; 3 leads	SOT23
PMBT2222A			

## NPN switching transistors

## PMBT2222; PMBT2222A

**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter			
	PMBT2222		–	60	V
	PMBT2222A		–	75	V
V <sub>CEO</sub>	collector-emitter voltage	open base			
	PMBT2222		–	30	V
	PMBT2222A		–	40	V
V <sub>EBO</sub>	emitter-base voltage	open collector			
	PMBT2222		–	5	V
	PMBT2222A		–	6	V
I <sub>C</sub>	collector current (DC)		–	600	mA
I <sub>CM</sub>	peak collector current		–	800	mA
I <sub>BM</sub>	peak base current		–	200	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C; note 1	–	250	mW
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	junction temperature		–	150	°C
T <sub>amb</sub>	operating ambient temperature		–65	+150	°C

**Note**

1. Transistor mounted on an FR4 printed-circuit board.

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	note 1	500	K/W

**Note**

1. Transistor mounted on an FR4 printed-circuit board.

**CHARACTERISTICS**T<sub>j</sub> = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT	
I <sub>CBO</sub>	collector cut-off current	I <sub>E</sub> = 0; V <sub>CB</sub> = 50 V				
			PMBT2222	–	10	nA
			I <sub>E</sub> = 0; V <sub>CB</sub> = 50 V; T <sub>j</sub> = 125 °C	–	10	μA
	collector cut-off current	I <sub>E</sub> = 0; V <sub>CB</sub> = 60 V				
PMBT2222A			–	10	nA	
		I <sub>E</sub> = 0; V <sub>CB</sub> = 60 V; T <sub>j</sub> = 125 °C	–	10	μA	
I <sub>EBO</sub>	emitter cut-off current	I <sub>C</sub> = 0; V <sub>EB</sub> = 5 V	–	10	nA	
	PMBT2222A					

## NPN switching transistors

## PMBT2222; PMBT2222A

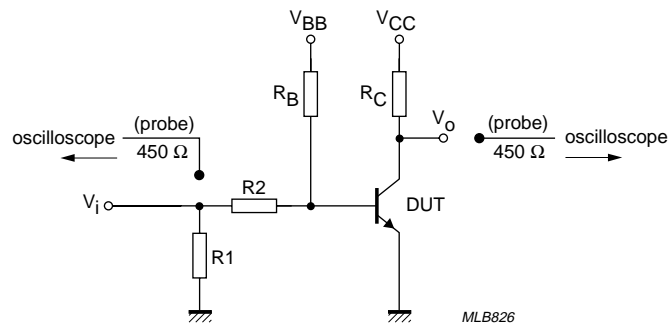
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$h_{FE}$	DC current gain	$I_C = 0.1 \text{ mA}; V_{CE} = 10 \text{ V}$	35	–	
		$I_C = 1 \text{ mA}; V_{CE} = 10 \text{ V}$	50	–	
		$I_C = 10 \text{ mA}; V_{CE} = 10 \text{ V}$	75	–	
		$I_C = 10 \text{ mA}; V_{CE} = 10 \text{ V};$ $T_{amb} = -55 \text{ }^\circ\text{C}$	35	–	
		$I_C = 150 \text{ mA}; V_{CE} = 10 \text{ V}$	100	300	
		$I_C = 150 \text{ mA}; V_{CE} = 1 \text{ V}$	50	–	
	DC current gain PMBT2222 PMBT2222A	$I_C = 500 \text{ mA}; V_{CE} = 10 \text{ V}$	30 40	– –	
$V_{CEsat}$	collector-emitter saturation voltage PMBT2222 PMBT2222A	$I_C = 150 \text{ mA}; I_B = 15 \text{ mA};$ note 1	– –	400 300	mV mV
	collector-emitter saturation voltage PMBT2222 PMBT2222A	$I_C = 500 \text{ mA}; I_B = 50 \text{ mA};$ note 1	– –	1.6 1	V V
$V_{BEsat}$	base-emitter saturation voltage PMBT2222 PMBT2222A	$I_C = 150 \text{ mA}; I_B = 15 \text{ mA};$ note 1	– 0.6	1.3 1.2	V V
	base-emitter saturation voltage PMBT2222 PMBT2222A	$I_C = 500 \text{ mA}; I_B = 50 \text{ mA};$ note 1	– –	2.6 2	V V
$C_c$	collector capacitance	$I_E = I_e = 0; V_{CB} = 10 \text{ V}; f = 1 \text{ MHz}$	–	8	pF
$C_e$	emitter capacitance PMBT2222 PMBT2222A	$I_C = I_c = 0; V_{EB} = 500 \text{ mV}; f = 1 \text{ MHz}$	– –	30 25	pF pF
	transition frequency PMBT2222 PMBT2222A	$I_C = 20 \text{ mA}; V_{CE} = 20 \text{ V}; f = 100 \text{ MHz}$	250 300	– –	MHz MHz
F	noise figure	$I_C = 100 \text{ } \mu\text{A}; V_{CE} = 5 \text{ V}; R_S = 1 \text{ k}\Omega;$ $f = 1 \text{ kHz}$	–	4	dB
<b>Switching times (between 10% and 90% levels); (see Fig.2)</b>					
$t_{on}$	turn-on time	$I_{Con} = 150 \text{ mA}; I_{Bon} = 15 \text{ mA};$ $I_{Boff} = -15 \text{ mA}$	–	35	ns
$t_d$	delay time		–	15	ns
$t_r$	rise time		–	20	ns
$t_{off}$	turn-off time		–	250	ns
$t_s$	storage time		–	200	ns
$t_f$	fall time		–	60	ns

**Note**

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

## NPN switching transistors

## PMBT2222; PMBT2222A



$V_i = 9.5 \text{ V}$ ;  $T = 500 \mu\text{s}$ ;  $t_p = 10 \mu\text{s}$ ;  $t_r = t_f \leq 3 \text{ ns}$ .  
 $R_1 = 68 \Omega$ ;  $R_2 = 325 \Omega$ ;  $R_B = 325 \Omega$ ;  $R_C = 160 \Omega$ .  
 $V_{BB} = -3.5 \text{ V}$ ;  $V_{CC} = 29.5 \text{ V}$ .  
Oscilloscope: input impedance  $Z_i = 50 \Omega$ .

Fig.2 Test circuit for switching times.

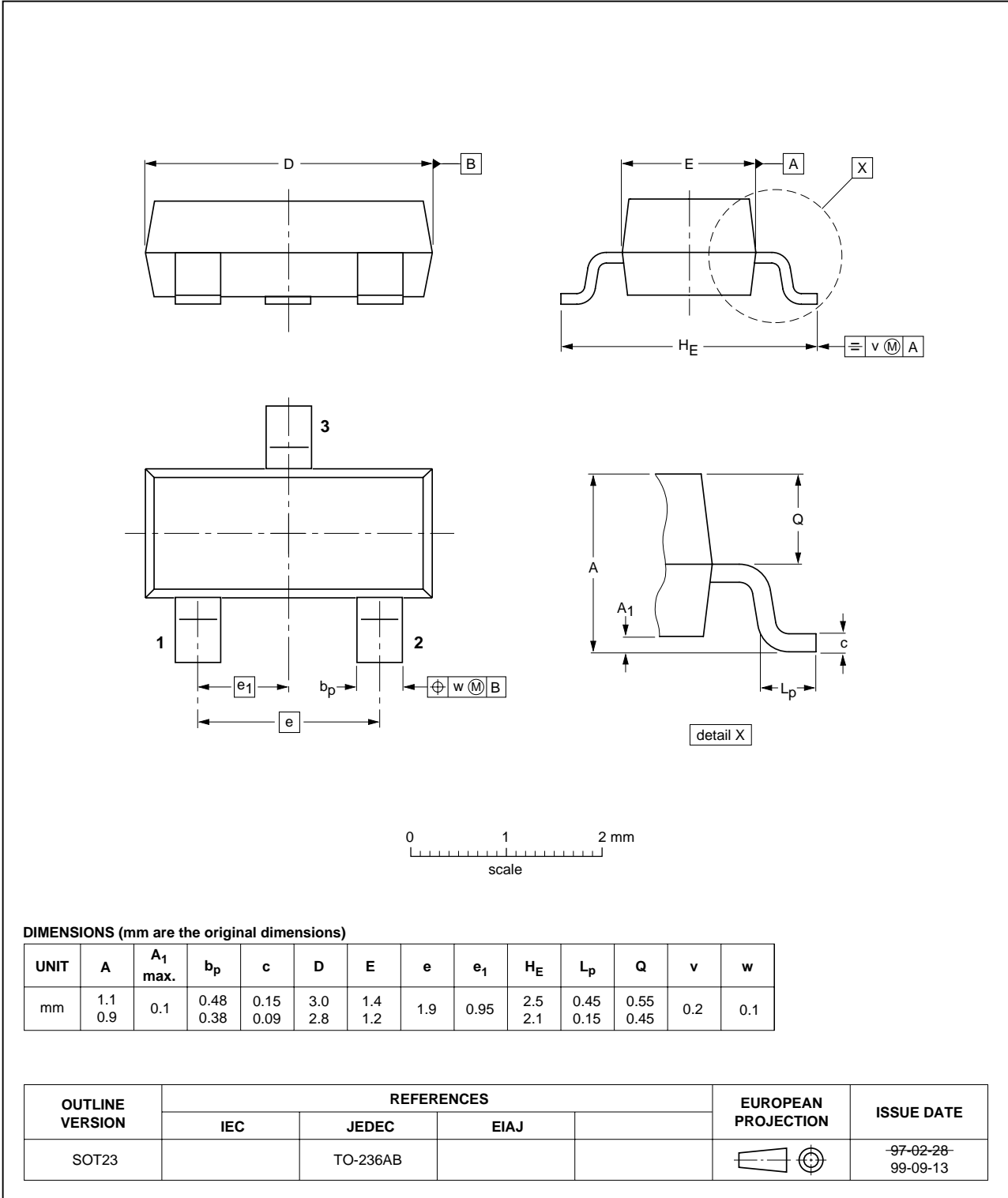
NPN switching transistors

PMBT2222; PMBT2222A

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



## NPN switching transistors

## PMBT2222; PMBT2222A

## DATA SHEET STATUS

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## **Contact information**

For additional information please visit <http://www.semiconductors.philips.com>. Fax: +31 40 27 24825

For sales offices addresses send e-mail to: [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com).

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