

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

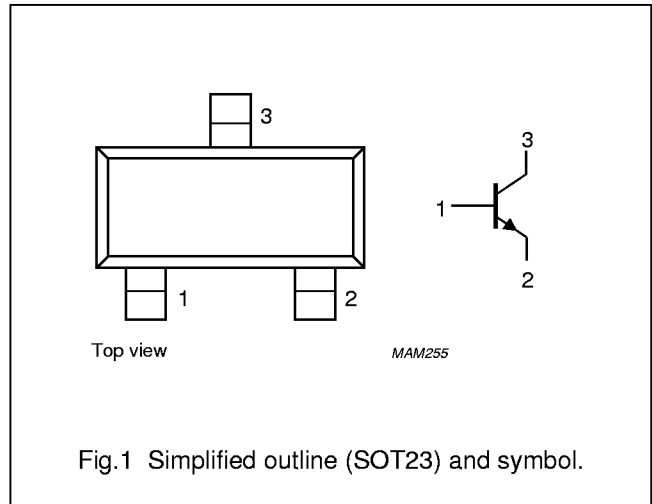
TYPE NUMBER	MARKING CODE ⁽¹⁾
PMBT2222	*1B
PMBT2222A	*1P

Note

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

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

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 (DC)		–	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; note 1	–	250	mW
T _{stg}	storage temperature		–65	+150	°C
T _j	junction temperature		–	150	°C
T _{amb}	operating ambient temperature		–65	+150	°C

Note

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

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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	note 1	500	K/W

Note

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

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current PMBT2222	$I_E = 0; V_{CB} = 50\text{ V}$	–	10	nA
		$I_E = 0; V_{CB} = 50\text{ V}; T_j = 125\text{ °C}$	–	10	μA
	collector cut-off current PMBT2222A	$I_E = 0; V_{CB} = 60\text{ V}$	–	10	nA
		$I_E = 0; V_{CB} = 60\text{ V}; T_j = 125\text{ °C}$	–	10	μA
I_{EBO}	emitter cut-off current PMBT2222A	$I_C = 0; V_{EB} = 5\text{ V}$	–	10	nA
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	–	
		$I_C = 10\text{ mA}; V_{CE} = 10\text{ V}; T_{amb} = -55\text{ °C}$	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	$I_C = 150\text{ mA}; I_B = 15\text{ mA}; \text{note 1}$	– –	400 300	mV mV
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}; \text{note 1}$	– –	1.6 1	V V
V_{BEsat}	base-emitter saturation voltage PMBT2222 PMBT2222A	$I_C = 150\text{ mA}; I_B = 15\text{ mA}; \text{note 1}$	– 0.6	1.3 1.2	V V
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}; \text{note 1}$	– –	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

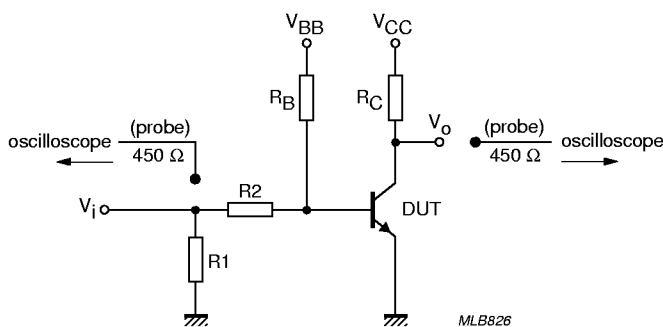
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SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
C_e	emitter capacitance	$I_C = I_c = 0; V_{EB} = 500 \text{ mV}; f = 1 \text{ MHz}$	-	30	
	PMBT2222			25	
f_T	transition frequency	$I_C = 20 \text{ mA}; V_{CE} = 20 \text{ V}; f = 100 \text{ MHz}$	250	-	MHz
	PMBT2222A		300	-	MHz
F	noise figure	$I_C = 100 \mu\text{A}; V_{CE} = 5 \text{ V}; R_S = 1 \text{ k}\Omega; f = 1 \text{ kHz}$	-	4	dB
Switching times (between 10% and 90% levels); (see Fig.2)					
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: $t_p \leq 300 \mu\text{s}; \delta \leq 0.02$.



$V_i = 9.5 \text{ V}; T = 500 \mu\text{s}; t_p = 10 \mu\text{s}; t_r = t_f \leq 3 \text{ ns}.$
 $R1 = 68 \Omega; R2 = 325 \Omega; R_B = 325 \Omega; R_C = 160 \Omega.$
 $V_{BB} = -3.5 \text{ V}; V_{CC} = 29.5 \text{ V}.$
 Oscilloscope: input impedance $Z_i = 50 \Omega.$

Fig.2 Test circuit for switching times.

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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23

