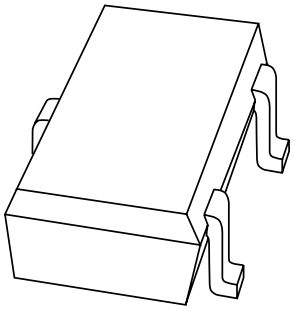
DATA SHEET



PMST2222; PMST2222A
NPN switching transistors

Product specification
Supersedes data of 1997 Jul 14

1999 Apr 22

Philips
Semiconductors

PHILIPS

NPN switching transistors PMST2222; PMST2222A

FEATURES

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

APPLICATIONS

- High-speed switching and linear amplification.

DESCRIPTION

NPN switching transistor in a SOT323 plastic package.
PNP complement: PMST2907A.

MARKING

TYPE NUMBER	MARKING CODE(1)
PMST2222	∗1B
PMST2222A	∗1P

Note

1. ∗ = - : Made in Hong Kong.
   ∗ = t : Made in Malaysia.

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector

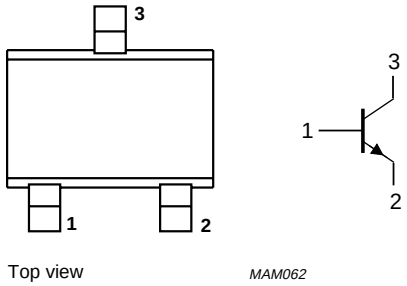


Fig.1 Simplified outline (SOT323) and symbol.

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			
	PMST2222		–	60	V
	PMST2222A		–	75	V
V_{CEO}	collector-emitter voltage	open base			
	PMST2222		–	30	V
	PMST2222A		–	40	V
V_{EBO}	emitter-base voltage	open collector			
	PMST2222		–	5	V
	PMST2222A		–	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	$T_{amb} \leq 25$ °C; note 1	–	200	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.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	note 1	625	K/W

Note

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

CHARACTERISTICS

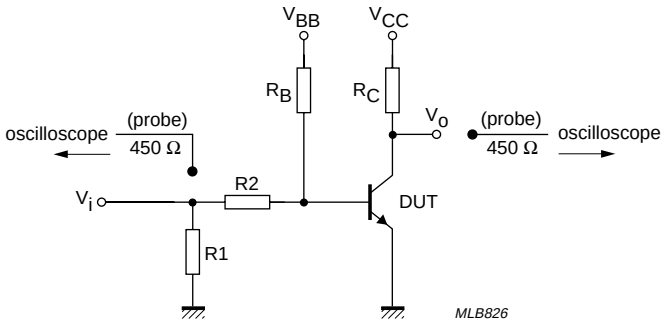
T_{amb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 50 V	–	10	nA
	PMST2222	I_E = 0; V_{CB} = 50 V; T_j = 125 °C	–	10	µA
	collector cut-off current	I_E = 0; V_{CB} = 60 V	–	10	nA
	PMST2222A	I_E = 0; V_{CB} = 60 V; T_j = 125 °C	–	10	µA
I_{EBO}	collector cut-off current	I_C = 0; V_{EB} = 3 V	–	10	nA
h_{FE}	DC current gain	I_C = 0.1 mA; V_{CE} = 10 V	35	–	
		I_C = 1 mA; V_{CE} = 10 V	50	–	
		I_C = 10 mA; V_{CE} = 10 V	75	–	
		I_C = 10 mA; V_{CE} = 10 V; T_{amb} = –55 °C	35	–	
		I_C = 150 mA; V_{CE} = 1 V; note 1	50	–	
		I_C = 150 mA; V_{CE} = 10 V; note 1	100	300	
	DC current gain	I_C = 500 mA; V_{CE} = 10 V; note 1			
	PMST2222		30	–	
	PMST2222A		40	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 150 mA; I_B = 15 mA; note 1	–	400	mV
	PMST2222	I_C = 500 mA; I_B = 50 mA; note 1	–	1.6	V
	collector-emitter saturation voltage	I_C = 150 mA; I_B = 15 mA; note 1	–	300	mV
	PMST2222A	I_C = 500 mA; I_B = 50 mA; note 1	–	1	V
V_{BEsat}	base-emitter saturation voltage	I_C = 150 mA; I_B = 15 mA; note 1	–	1.3	V
	PMST2222	I_C = 500 mA; I_B = 50 mA; note 1	–	2.6	V
	base-emitter saturation voltage	I_C = 150 mA; I_B = 15 mA; note 1	0.6	1.2	V
	PMST2222A	I_C = 500 mA; I_B = 50 mA; note 1	–	2	V
C_c	collector capacitance	I_E = i_e = 0; V_{CB} = 10 V; f = 1 MHz	–	8	pF
C_e	emitter capacitance	I_C = i_c = 0; V_{EB} = 0.5 V; f = 1 MHz			
	PMST2222		–	30	pF
	PMST2222A		–	25	pF
f_T	transition frequency	I_C = 20 mA; V_{CE} = 20 V; f = 100 MHz			
	PMST2222		250	–	MHz
	PMST2222A		300	–	MHz

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
F	noise figure	I_C = 200 μA; V_{CE} = 5 V; R_S = 2 kΩ; f = 1 kHz; B = 200 Hz	–	4	dB
Switching times (between 10% and 90% levels); (see Fig.2)					
t_{on}	turn-on time	I_{Con} = 150 mA; I_{Bon} = 15 mA; I_{Boff} = −15 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: $t_p \leq 300$ μs; $\delta \leq 0.02$.

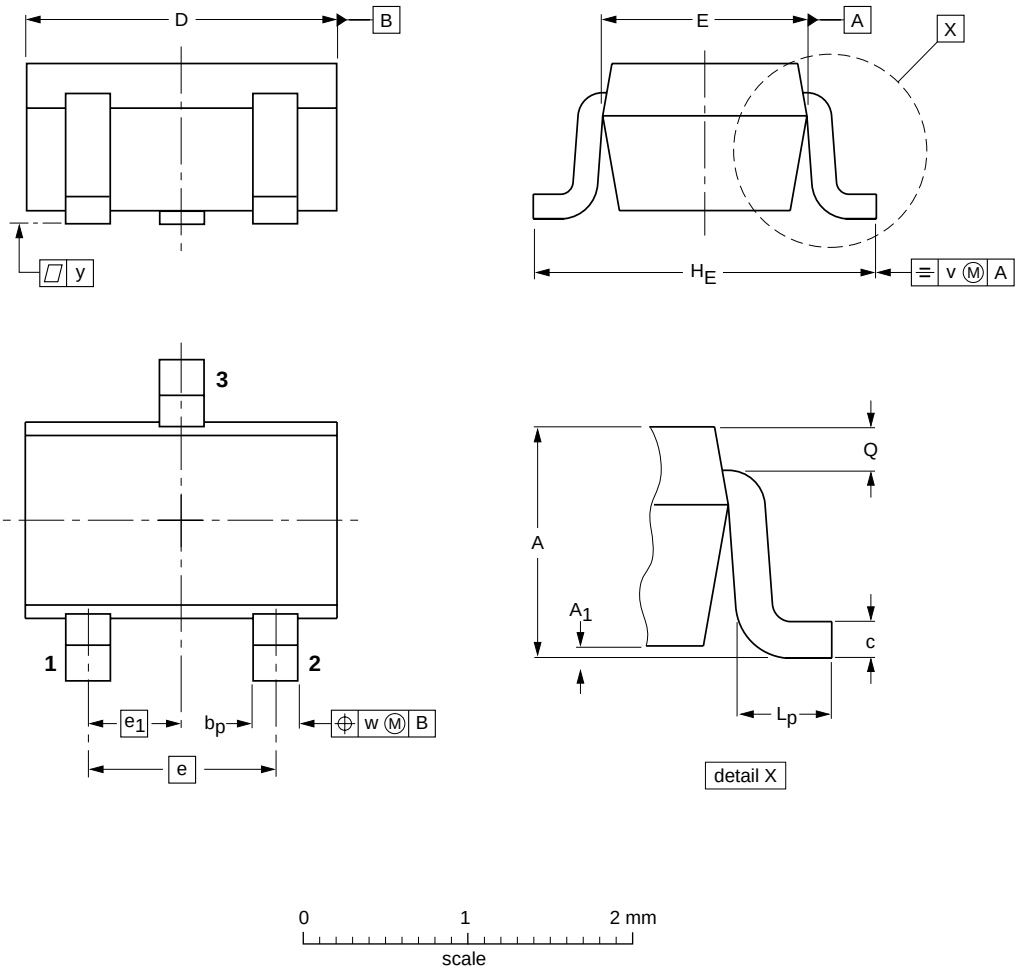


V_i = 9.5 V; T = 500 μs; t_p = 10 μs; $t_r = t_f \leq 3$ ns.
R1 = 68 Ω; R2 = 325 Ω; R_B = 325 Ω; R_C = 160 Ω.
V_{BB} = −3.5 V; V_{CC} = 29.5 V.
Oscilloscope input impedance Z_i = 50 Ω.

Fig.2 Test circuit for switching times.

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads **SOT323**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.8	0.1	0.4 0.3	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT323			SC-70			97-02-28

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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