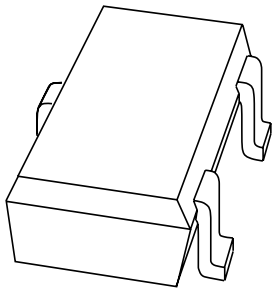


DATA SHEET



PMST3904 NPN switching transistor

Product data sheet
Supersedes data of 1999 Apr 22

2004 Jan 21

NPN switching transistor

PMST3904

FEATURES

- Collector current capability $I_C = 200\text{ mA}$
- Collector-emitter voltage $V_{CEO} = 40\text{ V}$.

APPLICATIONS

- General amplification and switching.

DESCRIPTION

NPN switching transistor in a SOT323 plastic package.
PNP complement: PMST3906.

MARKING

TYPE NUMBER	MARKING CODE ⁽¹⁾
PMST3904	*1A

Note

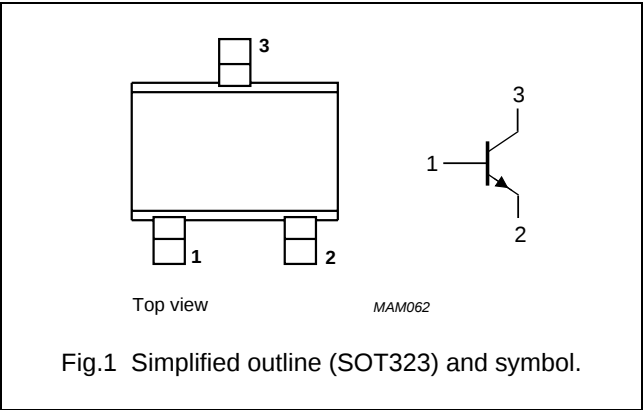
1. * = p: Made in Hong Kong.
* = t: Made in Malaysia.
* = W: Made in China.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{CEO}	collector-emitter voltage	40	V
I_C	collector current (DC)	200	mA

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PMST3904	–	plastic surface mounted package; 3 leads	SOT323

NPN switching transistor

PMST3904

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	–	60	V
V_{CEO}	collector-emitter voltage	open base	–	40	V
V_{EBO}	emitter-base voltage	open collector	–	6	V
I_C	collector current (DC)		–	200	mA
I_{CM}	peak collector current		–	200	mA
I_{BM}	peak base current		–	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$; 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
$R_{th(j-a)}$	thermal resistance from junction to ambient	note 1	625	K/W

Note

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

NPN switching transistor

PMST3904

CHARACTERISTICS

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

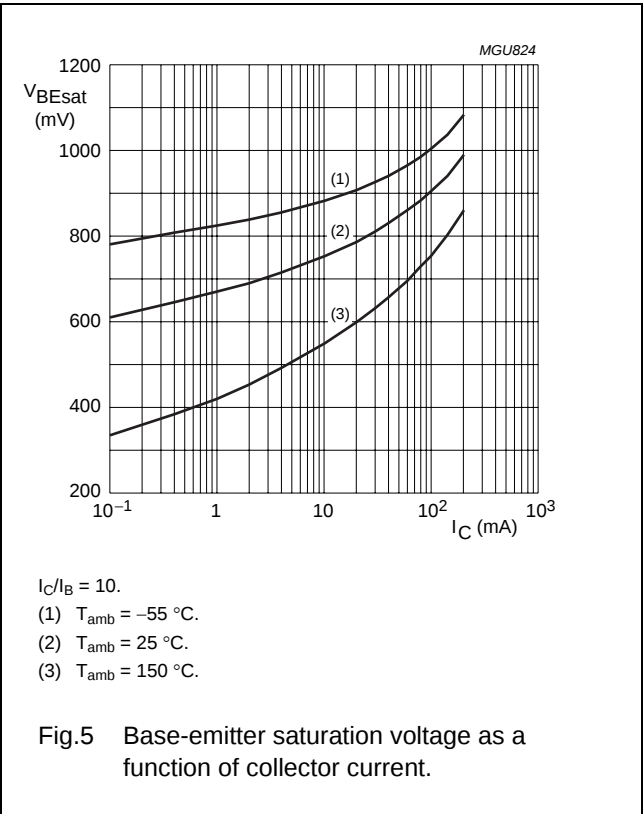
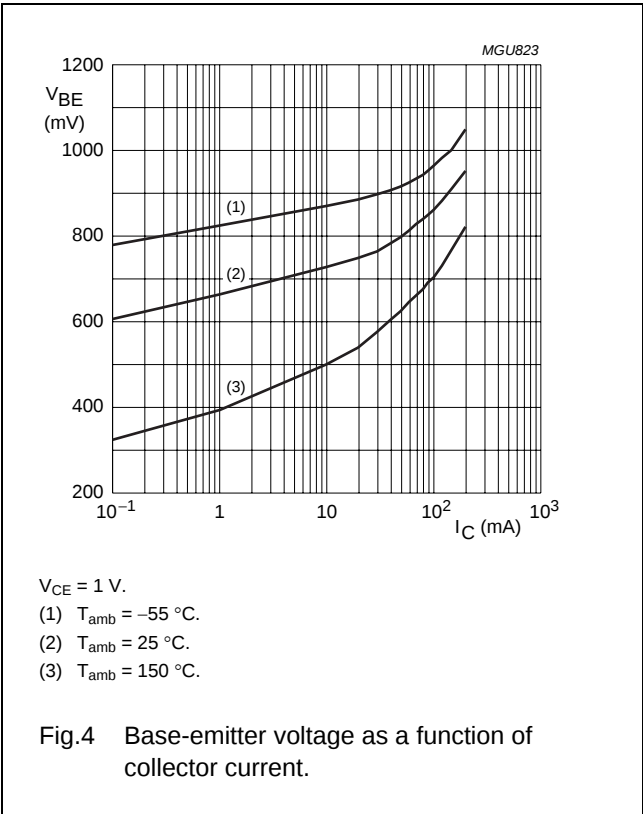
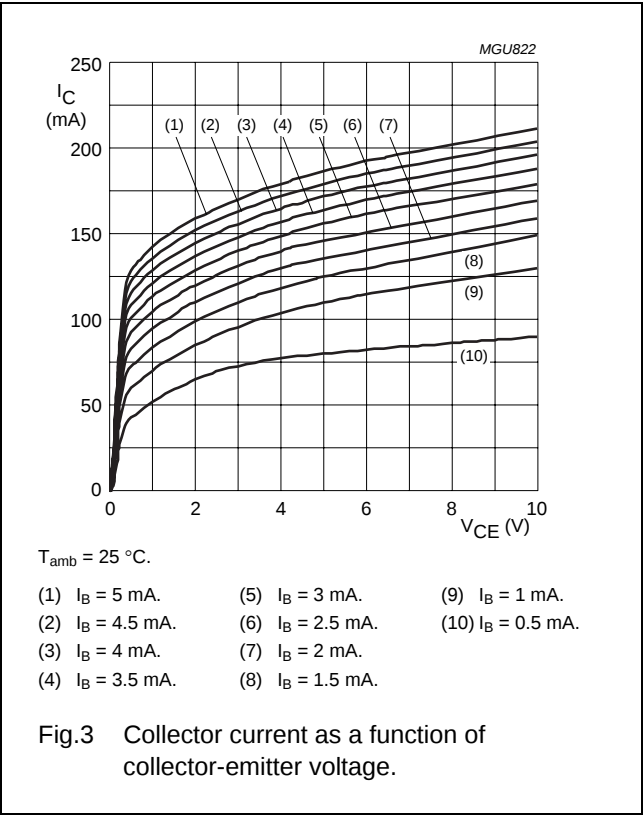
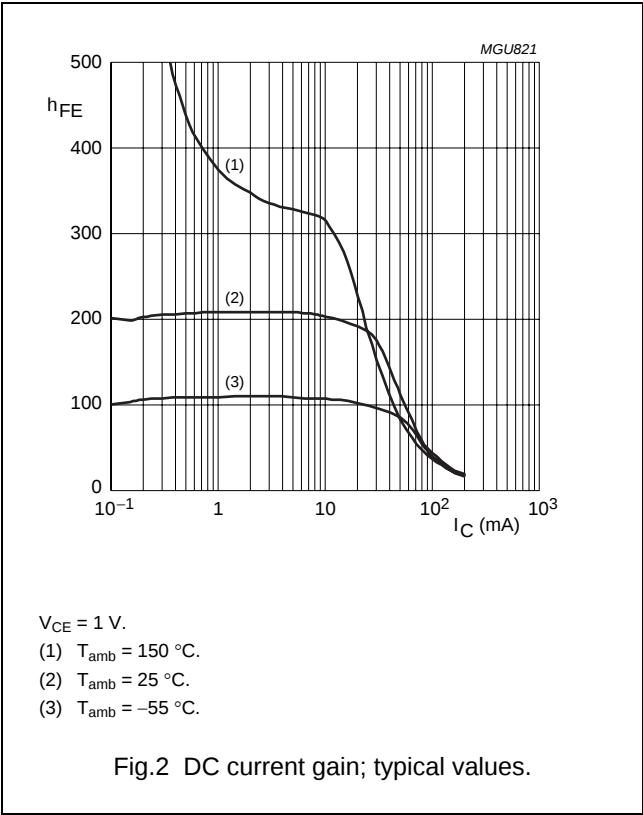
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 30\text{ V}$	–	50	nA
I_{EBO}	emitter cut-off current	$I_C = 0$; $V_{EB} = 6\text{ V}$	–	50	nA
h_{FE}	DC current gain	$V_{CE} = 1\text{ V}$; see Fig.2; note 1 $I_C = 0.1\text{ mA}$ $I_C = 1\text{ mA}$ $I_C = 10\text{ mA}$ $I_C = 50\text{ mA}$ $I_C = 100\text{ mA}$	60 80 100 60 30	– – 300 – –	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA}$; $I_B = 1\text{ mA}$	–	200	mV
		$I_C = 50\text{ mA}$; $I_B = 5\text{ mA}$	–	300	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10\text{ mA}$; $I_B = 1\text{ mA}$	650	850	mV
		$I_C = 50\text{ mA}$; $I_B = 5\text{ mA}$	–	950	mV
C_c	collector capacitance	$I_E = I_e = 0$; $V_{CB} = 5\text{ V}$; $f = 1\text{ MHz}$	–	4	pF
C_e	emitter capacitance	$I_C = I_c = 0$; $V_{BE} = 500\text{ mV}$; $f = 1\text{ MHz}$	–	8	pF
f_T	transition frequency	$I_C = 10\text{ mA}$; $V_{CE} = 20\text{ V}$; $f = 100\text{ MHz}$	300	–	MHz
F	noise figure	$I_C = 100\text{ }\mu\text{A}$; $V_{CE} = 5\text{ V}$; $R_S = 1\text{ k}\Omega$; $f = 10\text{ Hz to }15.7\text{ kHz}$	–	5	dB
Switching times (between 10% and 90% levels); see Fig.7					
t_d	delay time	$I_{Con} = 10\text{ mA}$; $I_{Bon} = 1\text{ mA}$; $I_{Boff} = -1\text{ mA}$	–	35	ns
t_r	rise time		–	35	ns
t_s	storage time		–	200	ns
t_f	fall time		–	50	ns

Note

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

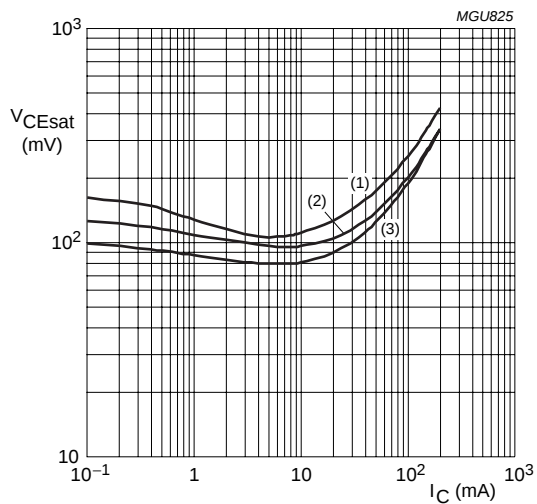
NPN switching transistor

PMST3904



NPN switching transistor

PMST3904



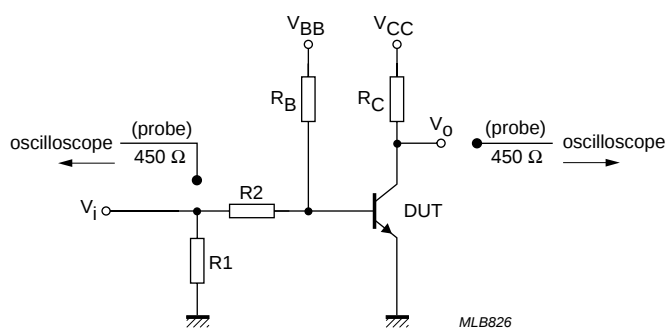
$I_C/I_B = 10$.

(1) $T_{amb} = 150\text{ }^{\circ}\text{C}$.

(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$.

(3) $T_{amb} = -55\text{ }^{\circ}\text{C}$.

Fig.6 Collector-emitter saturation voltage as a function of collector current.



$V_i = 5\text{ V}$; $T = 500\text{ }\mu\text{s}$; $t_p = 10\text{ }\mu\text{s}$; $t_r = t_f \leq 3\text{ ns}$.

$R1 = 56\text{ }\Omega$; $R2 = 2.5\text{ k}\Omega$; $R_B = 3.9\text{ k}\Omega$; $R_C = 270\text{ }\Omega$.

$V_{BB} = -1.9\text{ V}$; $V_{CC} = 3\text{ V}$.

Oscilloscope: input impedance $Z_i = 50\text{ }\Omega$.

Fig.7 Test circuit for switching times.

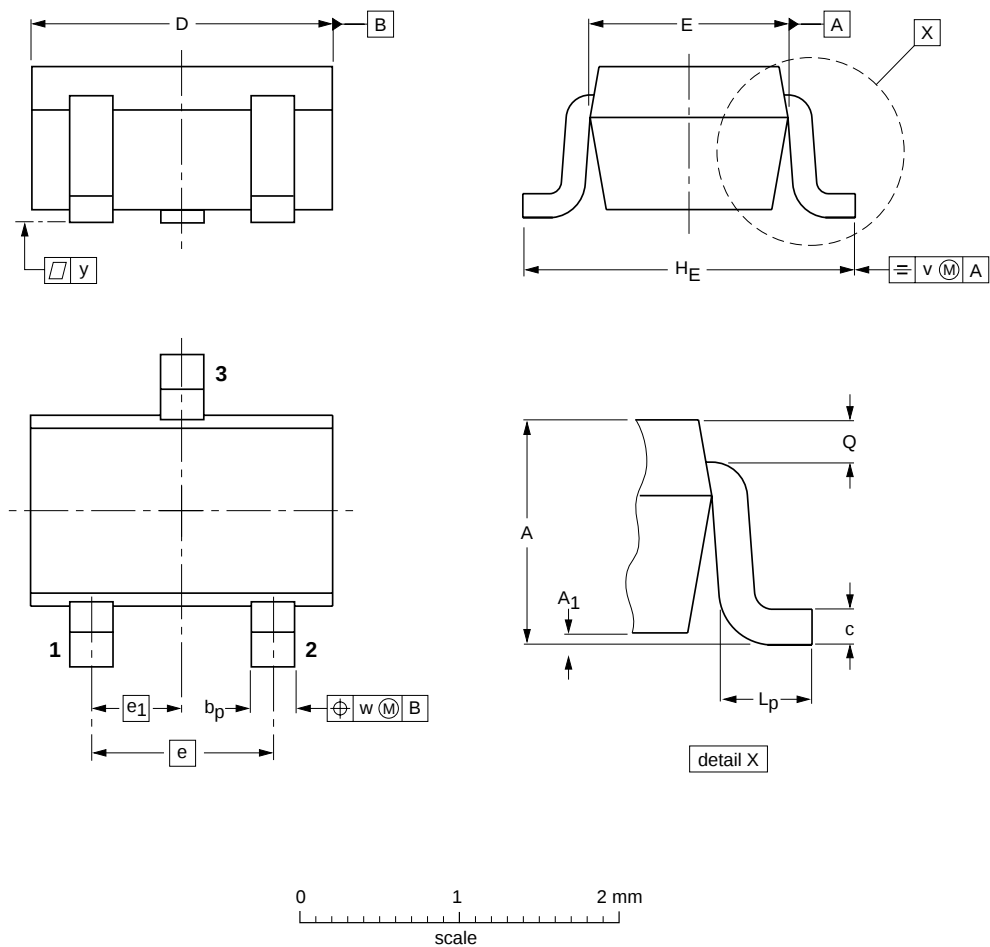
NPN switching transistor

PMST3904

PACKAGE OUTLINE

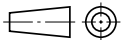
Plastic surface-mounted package; 3 leads

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	JEITA			
SOT323			SC-70			04-11-04 06-03-16