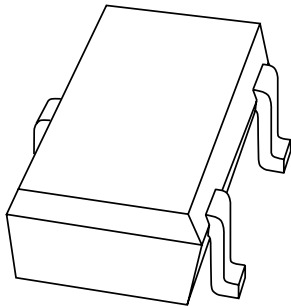


# DATA SHEET



## **PMST3904** NPN switching transistor

Product specification  
Supersedes data of 1997 Jul 04

1999 Apr 22

# NPN switching transistor

# PMST3904

### FEATURES

- Low current (max. 200 mA)
- Low voltage (max. 40 V).

### APPLICATIONS

- Telephony
- Professional communication equipment.

### DESCRIPTION

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

### MARKING

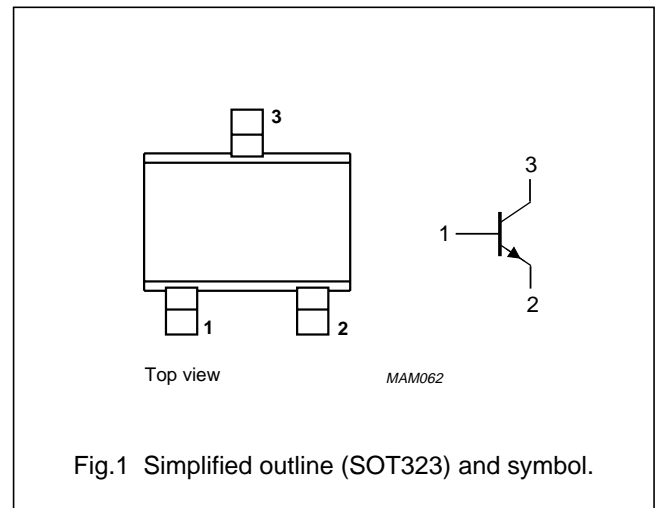
TYPE NUMBER	MARKING CODE <sup>(1)</sup>
PMST3904	*1A

### Note

- \* = - : 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	-	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		-	300	mA
$I_{BM}$	peak base current		-	100	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^\circ\text{C}$ ; note 1	-	200	mW
$T_{stg}$	storage temperature		-65	+150	$^\circ\text{C}$
$T_j$	junction temperature		-	150	$^\circ\text{C}$
$T_{amb}$	operating ambient temperature		-65	+150	$^\circ\text{C}$

### Note

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

## NPN switching transistor

## PMST3904

## 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.

## CHARACTERISTICS

$T_{amb} = 25\text{ °C}$  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
		$I_E = 0; V_{CB} = 30\text{ V}; T_j = 150\text{ °C}$	–	10	$\mu\text{A}$
$I_{EBO}$	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			
		$I_C = 0.1\text{ mA}$	60	–	
		$I_C = 1\text{ mA}$	80	–	
		$I_C = 10\text{ mA}$	100	300	
		$I_C = 50\text{ mA}$ ; note 1	60	–	
	$I_C = 100\text{ mA}$ ; note 1	30	–		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 1\text{ mA}$ ; note 1	–	200	mV
		$I_C = 50\text{ mA}; I_B = 5\text{ mA}$ ; note 1	–	200	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 1\text{ mA}$ ; note 1	650	850	mV
		$I_C = 50\text{ mA}; I_B = 5\text{ mA}$ ; note 1	–	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	$I_C = i_c = 0; V_{EB} = 500\text{ mV}; f = 1\text{ MHz}$	–	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.3

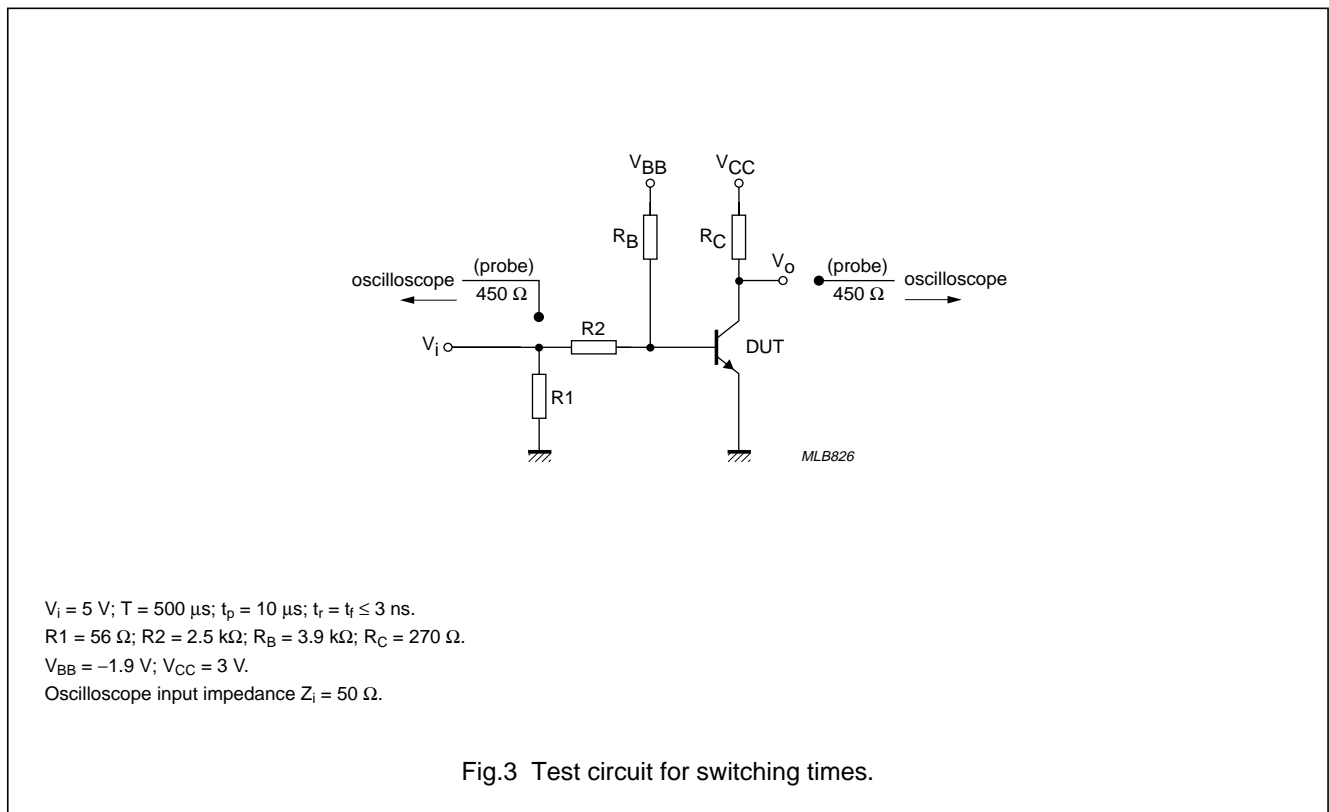
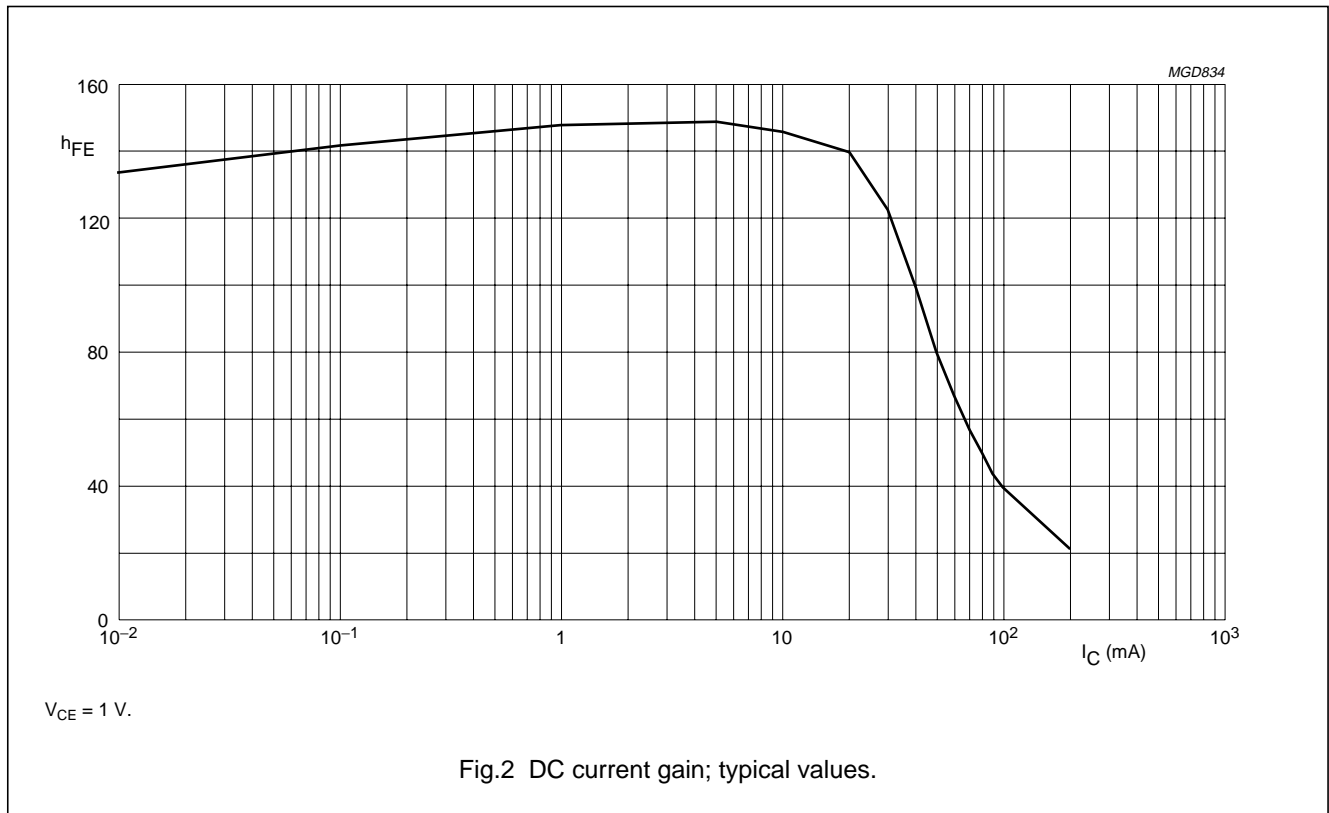
$t_{on}$	turn-on time	$I_{Con} = 10\text{ mA}; I_{Bon} = 1\text{ mA}; I_{Boff} = -1\text{ mA}$	–	65	ns
$t_d$	delay time		–	35	ns
$t_r$	rise time		–	35	ns
$t_{off}$	turn-off time		–	240	ns
$t_s$	storage time		–	200	ns
$t_f$	fall time		–	50	ns

## Note

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

NPN switching transistor

PMST3904



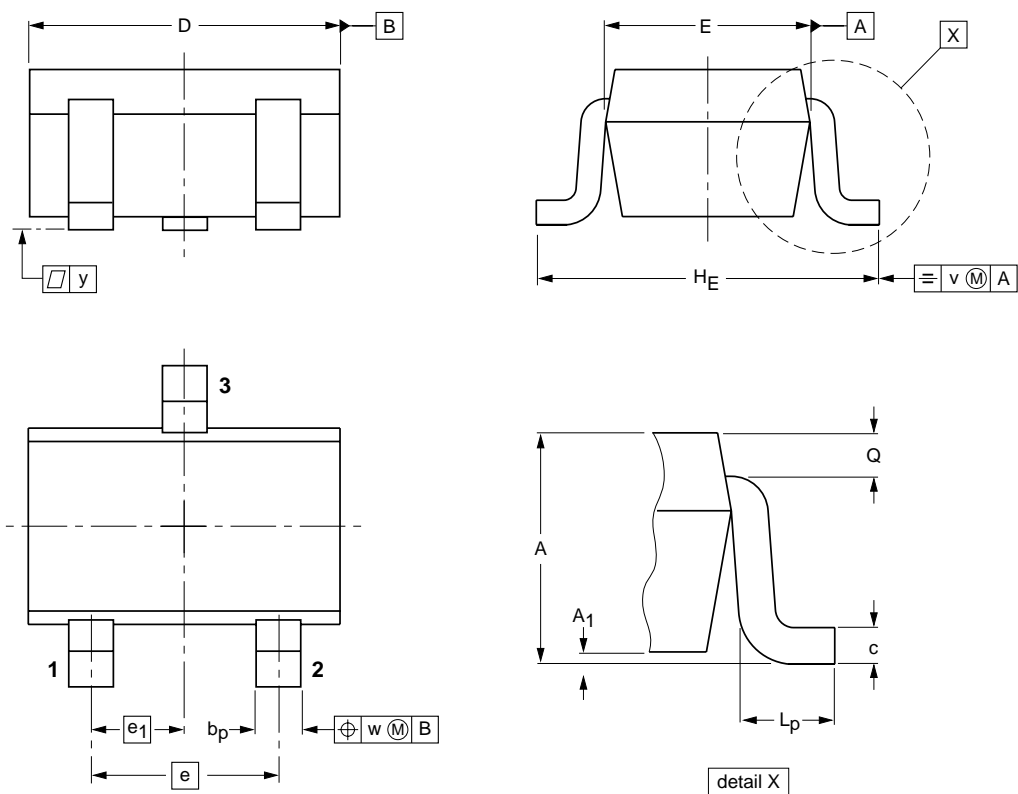
NPN switching transistor

PMST3904

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT323



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> max	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	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

## NPN switching transistor

PMST3904

**DEFINITIONS**

<b>Data sheet status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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NPN switching transistor

PMST3904

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