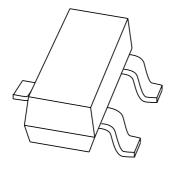
DISCRETE SEMICONDUCTORS

DATA SHEET



MMBT3906 PNP switching transistor

Product specification Supersedes data of 2000 Apr 11 2003 Mar 18





PNP switching transistor

MMBT3906

FEATURES

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

APPLICATIONS

· General switching and amplification.

DESCRIPTION

PNP switching transistor in a SOT23 plastic package. NPN complement: MMBT3904.

MARKING

TYPE NUMBER	MARKING CODE(1)
MMBT3906	7B*

Note

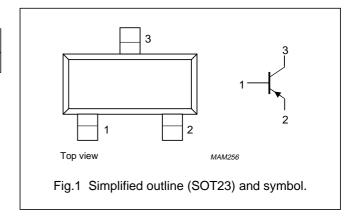
- 1. * = p: Made in Hong Kong.
 - * = t: Made in Malaysia.
 - * = W: Made in China.

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



LIMITING VALUES

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

SYMBOL	PARAMETER	PARAMETER CONDITIONS		MAX.	UNIT
V _{CBO}	collector-base voltage	open emitter	_	-40	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} ≤ 25 °C; note 1	_	250	mW
T _{stg}	storage temperature		-65	+150	°C
Tj	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.

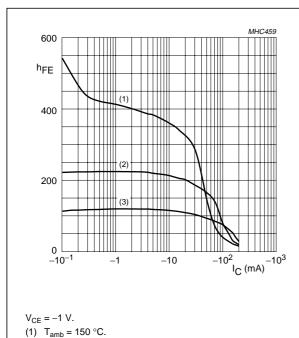
CHARACTERISTICS

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

SYMBOL	PARAMETER CONDITIONS		MIN.	MAX.	UNIT
I _{CBO}	collector cut-off current	I _E = 0; V _{CB} = -30 V	_	-50	nA
I _{EBO}	emitter cut-off current	I _C = 0; V _{EB} = -6 V	_	-50	nA
h _{FE}	DC current gain	V _{CE} = −1 V; see Fig.2			
		$I_{\rm C} = -0.1 \text{mA}$	60	_	
		$I_C = -1 \text{ mA}$	80	_	
		$I_{\rm C} = -10 {\rm mA}$	100	300	
		$I_{\rm C} = -50 \; {\rm mA}$	60	_	
		$I_{\rm C} = -100 \text{ mA}$	30	_	
V _{CEsat}	collector-emitter saturation	$I_C = -10 \text{ mA}; I_B = -1 \text{ mA}$	_	-250	mV
	voltage	$I_C = -50 \text{ mA}; I_B = -5 \text{ mA}$	_	-400	mV
V _{BEsat}	base-emitter saturation voltage	$I_C = -10 \text{ mA}; I_B = -1 \text{ mA}$	_	-850	mV
		$I_C = -50 \text{ mA}; I_B = -5 \text{ mA}$	_	-950	mV
C _c	collector capacitance	$I_E = i_e = 0$; $V_{CB} = -5$ V; $f = 1$ MHz	_	4.5	pF
C _e	emitter capacitance	$I_C = I_C = 0$; $V_{EB} = -500 \text{ mV}$; $f = 1 \text{ MHz}$	_	10	pF
f _T	transition frequency	$I_C = -10 \text{ mA}; V_{CE} = -20 \text{ V};$ f = 100 MHz	250	_	MHz
F	noise figure $I_{C} = -100 \ \mu\text{A}; \ V_{CE} = -5 \ V; \\ R_{S} = 1 \ k\Omega; \ f = 10 \ \text{Hz} \ \text{to} \ 15.7 \ \text{kHz}$		_	4	dB
Switching ti	imes (between 10% and 90% lev	els); see Fig.7			
t _d	delay time	I _{Con} = -10 mA; I _{Bon} = -1 mA;	_	35	ns
t _r	rise time	I _{Boff} = 1 mA	_	35	ns
t _s	storage time		_	225	ns
t _f	fall time		_	75	ns

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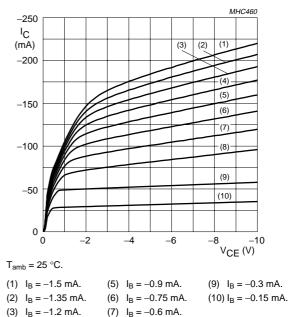
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(2) $T_{amb} = 25 \, ^{\circ}C$.

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

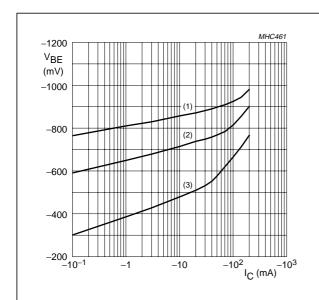
Fig.2 DC current gain; typical values.



(4) $I_B = -1.05 \text{ mA}.$

(8) $I_B = -0.45 \text{ mA}.$

Fig.3 Collector current as a function of collector-emitter voltage.



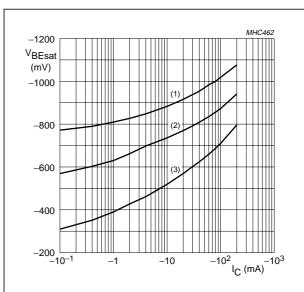
 $V_{CE} = -1 V$.

(1) $T_{amb} = -55 \, ^{\circ}C$.

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

(3) $T_{amb} = 150 \, ^{\circ}C$.

Fig.4 Base-emitter voltage as a function of collector current.



 $I_{\rm C}/I_{\rm B}=10.$

(1) $T_{amb} = -55 \, ^{\circ}C$.

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

(3) $T_{amb} = 150 \, ^{\circ}C$.

Fig.5 Base-emitter saturation voltage as a function of collector current.

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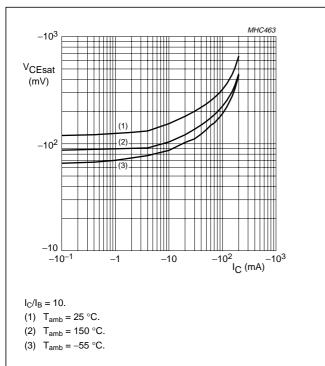


Fig.6 Collector-emitter saturation voltage as a function of collector current.

oscilloscope $\frac{(\text{probe})}{450\,\Omega}$ $\frac{\text{V}_{\text{BB}}}{450\,\Omega}$ $\frac{\text{V}_{\text{CC}}}{450\,\Omega}$ oscilloscope $\frac{(\text{probe})}{450\,\Omega}$ oscilloscope \frac

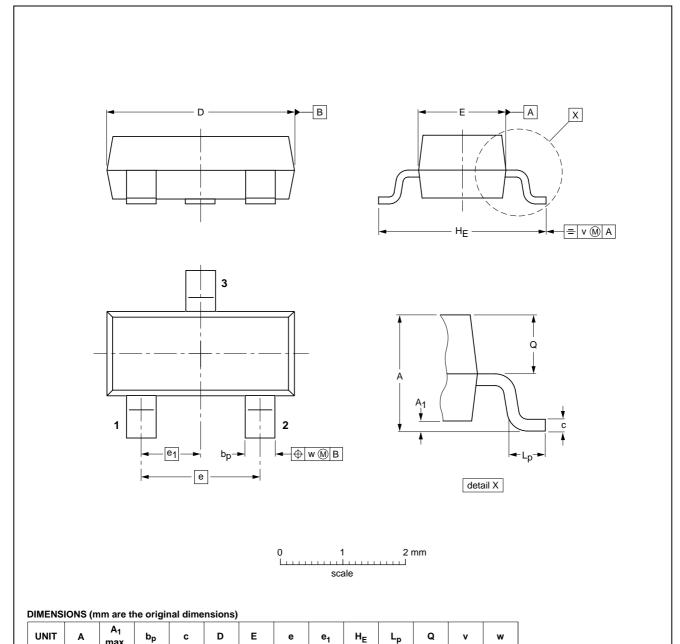
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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



OUTLINE	REFERENCES			EUROPEAN	ISSUE DATE	
VERSION	IEC	JEDEC	EIAJ		PROJECTION	ISSUE DATE
SOT23		TO-236AB				97-02-28 99-09-13

0.95

0.45 0.15 0.55 0.45

0.1

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0.48

0.38

0.1

mm

0.15

0.09

3.0 2.8 1.4 1.2

1.9

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LEVEL	DATA SHEET STATUS ⁽¹⁾	PRODUCT STATUS(2)(3)	DEFINITION
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