



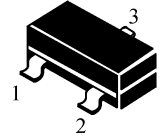
THE DATASHEET OF MMBT3906



PNP Switching Transistor

SOT-23

1. BASE
2. EMITTER
3. COLLECTOR



■ MAXIMUM RATINGS

Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage	V_{CEO}	-40	Vdc
Collector-Base Voltage	V_{CBO}	-40	Vdc
Emitter-Base Voltage	V_{EBO}	-6.0	Vdc
Collector Current-Continuous	I_c	-200	mAdc

■ THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board(1) $T_A=25^\circ\text{C}$ Derate above 25°C	P_D	225 1.8	mW mW/ $^\circ\text{C}$
Total Device Dissipation Alumina Substrate, $T_A=25^\circ\text{C}$ Derate above 25°C	P_D	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	T_J, T_{stg}	150 $^\circ\text{C}$, -55to+150 $^\circ\text{C}$	

■ ELECTRICAL CHARACTERISTICS
($T_A = 25^\circ\text{C}$ unless otherwise noted)
■ OFF CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit
Collector-Emitter Breakdown Voltage(3) ($I_C = -1.0\text{mA dc}, I_B = 0$)	$V_{(BR)CEO}$	-40	—	Vdc
Collector-Base Breakdown Voltage ($I_C = -10\ \mu\text{A dc}, I_E = 0$)	$V_{(BR)CBO}$	-40	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = -10\ \mu\text{A dc}, I_C = 0$)	$V_{(BR)EBO}$	-6.0	—	Vdc
Base Cutoff Current ($V_{CE} = -30\text{Vdc}, V_{EB} = -3.0\text{Vdc}$)	I_{BEX}	—	-50	nAdc
Collector Cutoff Current ($V_{CE} = -30\text{Vdc}, V_{EB} = -3.0\text{Vdc}$)	I_{CEX}	—	-50	nAdc

■ ON CHARACTERISTICS(2)

Characteristic	Symbol	Min	Max	Unit
DC Current Gain	h_{FE}			—
($I_C = -0.1\text{mA dc}, V_{CE} = -1.0\text{Vdc}$)		40	—	
($I_C = -1.0\text{mA dc}, V_{CE} = -1.0\text{Vdc}$)		70	—	
($I_C = -10\text{mA dc}, V_{CE} = -1.0\text{Vdc}$)		100	300	
($I_C = -50\text{mA dc}, V_{CE} = -1.0\text{Vdc}$)		60	—	
($I_C = -100\text{mA dc}, V_{CE} = -1.0\text{Vdc}$)		30	—	
Collector-Emitter Saturation Voltage ($I_C = -10\text{mA dc}, I_B = -1.0\text{mA dc}$) ($I_C = -50\text{mA dc}, I_B = -5.0\text{mA dc}$)	$V_{CE(sat)}$	— —	-0.25 -0.4	Vdc
Base-Emitter Saturation Voltage ($I_C = -10\text{mA dc}, I_B = -1.0\text{mA dc}$) ($I_C = -50\text{mA dc}, I_B = -5.0\text{mA dc}$)	$V_{BE(sat)}$	-0.65 —	-0.85 -0.95	Vdc

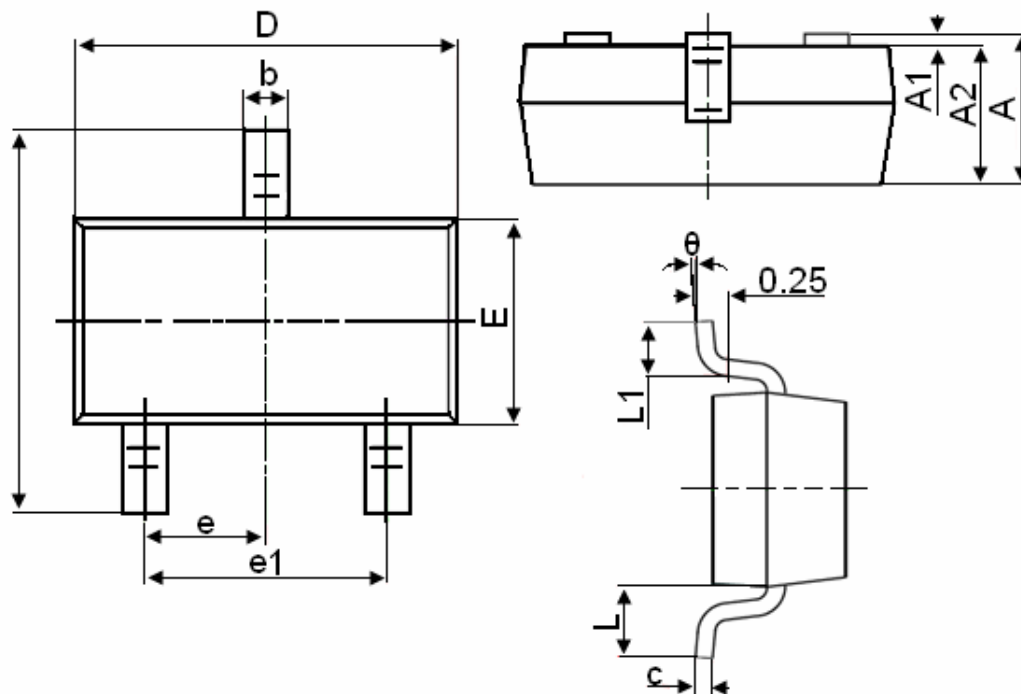
SMALL-SIGNAL CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit
Current-Gain-Bandwidth Product ($I_C=-10\text{mA dc}$, $V_{CE}=-20\text{V dc}$, $f=100\text{MHz}$)	f_T	300	—	MHz
Output Capacitance ($V_{CB}=-5.0\text{V dc}$, $I_E=0$, $f=1.0\text{MHz}$)	C_{obo}	—	4.0	pF
Input Capacitance ($V_{EB}=-0.5\text{V dc}$, $I_C=0$, $f=1.0\text{MHz}$)	C_{ibo}	—	8.0	pF
Input Impedance ($V_{CE}=-10\text{V dc}$, $I_C=-1.0\text{mA dc}$, $f=1.0\text{KHz}$)	h_{ie}	1.0	10	$k\Omega$
Voltage Feedback Ratio ($V_{CE}=-10\text{V dc}$, $I_C=-1.0\text{mA dc}$, $f=1.0\text{KHz}$)	h_{re}	0.5	8.0	$\times 10^{-4}$
Small-Signal Current Gain ($V_{CE}=-10\text{V dc}$, $I_C=-1.0\text{mA dc}$, $f=1.0\text{KHz}$)	h_{fe}	100	400	—
Output Admittance ($V_{CE}=-10\text{V dc}$, $I_C=-1.0\text{mA dc}$, $f=1.0\text{KHz}$)	h_{oe}	1.0	40	$\mu\text{ mhos}$
Noise Figure ($V_{CE}=-5.0\text{V dc}$, $I_C=-100\mu\text{A dc}$, $R_s=1.0\text{ k}\Omega$, $f=1.0\text{KHz}$)	NF	—	5.0	dB

SWITCHING CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit
Delay Time	t_d	—	35	ns
Rise Time				
Storage Time	t_s	—	225	ns
Fall Time				
	t_f	—	75	

- FR-5=1.0×0.75×0.062in.
- Alumina=0.4×0.3×0.024in.99.5%alumina.
- Pulse Width≤300us;Duty Cycle≤2.0%.
- Pulse Test: Pulse Width≤300us;Duty Cycle≤2.0%.

SOT-23 Package Information


Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

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