

MicroPower, Ultra-sensitive Hall Effect Switch

❖ GENERAL DESCRIPTION

MA7001 is a three-terminal Hall Effect sensor device with an output driver, mainly designed for battery-operation, hand-held equipment (such as Cellular and Cordless Phone, PDA).

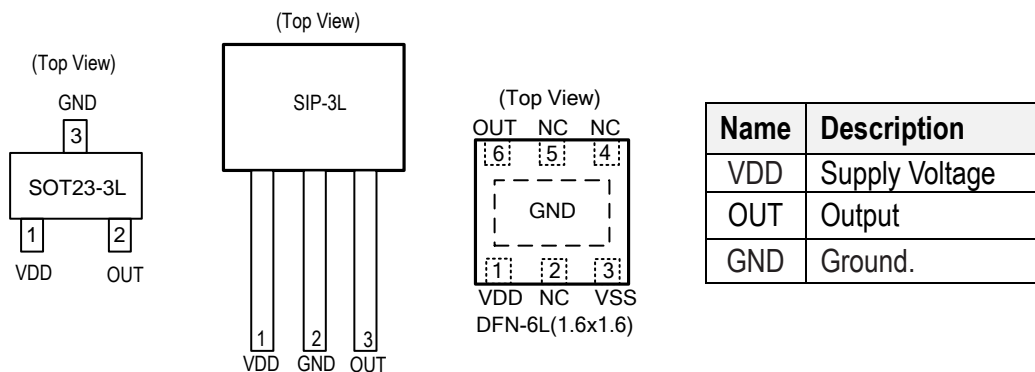
The output is switch with either north or South Pole of sufficient strength will turn the output on (low). The output will be turned off (high) under no magnetic field. While the magnetic flux density (B) is larger than operate point (Bop), the output will be turned on (low); the output is latched until B is lower than release point (Brp) and then turned off (high).

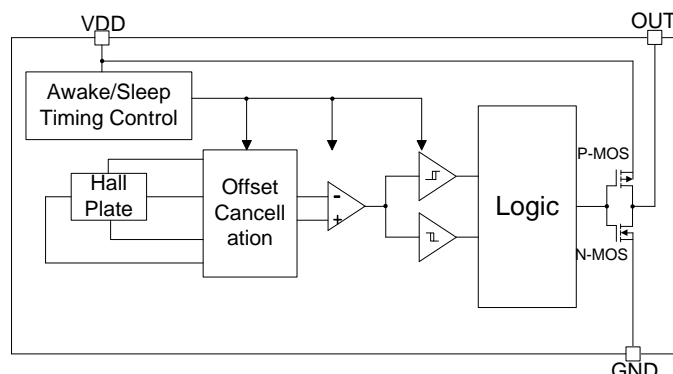
❖ FEATURES

- Micro Power Operation for Battery Applications
- 1.65V to 5.5V battery operation
- Chopper Stabilized Technology
- Operation with North or South Pole
- High sensitivity and high stability of the magnetic switching points
- Low Profile SOT23-3L ,SIP-3L(TO-92S) and DFN1.6x1.6-6L Packages.

❖ PIN ASSIGNMENT

The packages of MA7001; the pin assignment is given by:



❖ **BLOCK DIAGRAM**

❖ **RDER/MARKING INFORMATION**

Order Information	Top Marking (SOT)
<p>MA7001 X X</p> <p>Package Type: A: SOT23-3L D1: DFN1.6x1.6-6L P3: SIP-3L</p> <p>Packing: Blank: Bag A: Taping</p>	<p>H 2 Y W X</p> <p>ID Code: Internal Week: 01~26(A~Z) 27~52(a~z) Year: 7 = 2017</p>
Top Marking (SIP-3L)	Top Marking (DFN)
<p>7001 → Part number</p> <p>YYWWX → ID code: internal</p> <p>WW: 01~52</p> <p>Year: 17=2017</p>	<p>H 2 Y W X</p> <p>ID Code: Internal Week: 01~26(A~Z) 27~52(a~z) Year: 7 = 2017</p>

❖ **ABSOLUTE MAXIMUM RATINGS** (at $T_A=25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
VDD Pin Voltage	V_{DD}	- 0.3 to 7V	V
Output Pin Voltage	V_{OUT}	- 0.3 to 7V	V
Output Current	I_{OUT}	± 1	mA
Storage Temperature Range	T_{ST}	-65 to +150	$^\circ\text{C}$
Operating Junction Temperature	T_J	+125	$^\circ\text{C}$
Operating Temperature Range	T_{OP}	-40 to +125	$^\circ\text{C}$
Thermal Resistance from Junction to case	θ_{JC}	140	$^\circ\text{C/W}$
Thermal Resistance from Junction to ambient	θ_{JA}	250	$^\circ\text{C/W}$
Power Dissipation [$PD=(T_J-T_A)/\theta_{JA}$]	PD	400	mW

Note : θ_{JA} is measured with the PCB copper area of approximately 0.5 in²(Multi-layer).

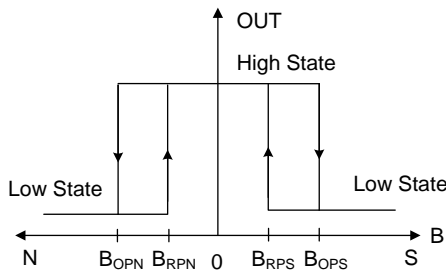
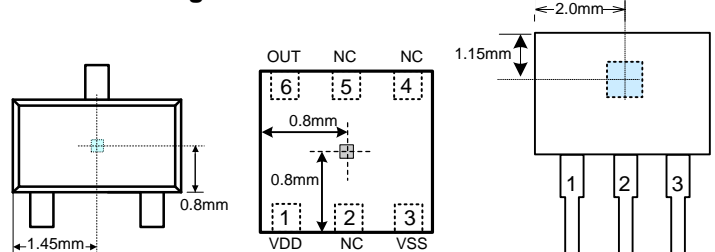
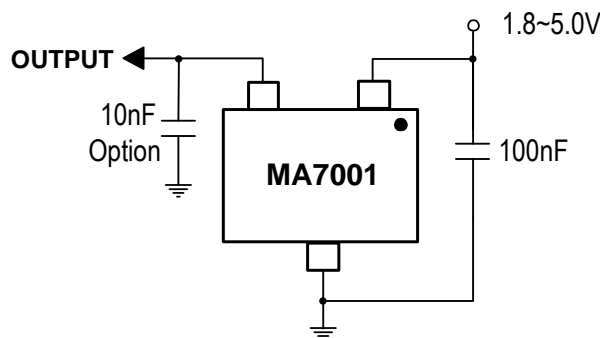
❖ ELECTRICAL CHARACTERISTICS

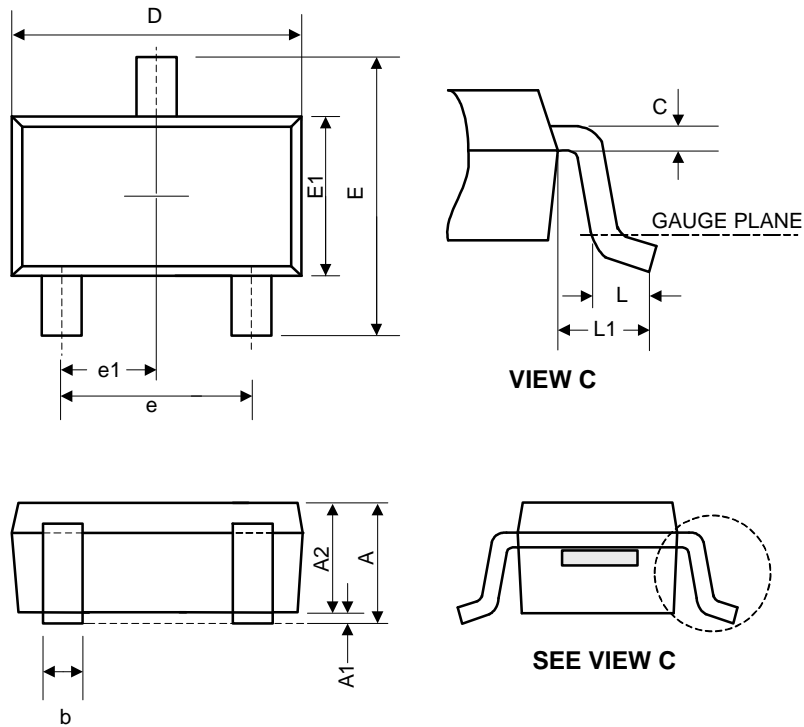
 (V_{DD} = 1.8V, T_A = +25°C, unless otherwise noted.)

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage	V _{DD}		1.65	1.8	5.5	V
Supply Current	I _{DD}	Awake state	-	1.5	3	mA
		Sleep state	-	3.5	7	µA
		Average	-	5.0	10	µA
Output High Voltage	V _{OH}	I _{OUT} = 1mA (Source)	V _{DD} - 0.2	-	-	V
Output Low Voltage	V _{OL}	I _{OUT} = 1mA (Sink)	-	-	0.2	V
Output Wake-Up Time	T _{wake-up}		-	40	80	µs
Period	T _{Period}		-	40	80	ms
Hall Sense Detect out time	H _{SDT}			81	161	ms
Duty Cycle	D.C		-	0.1	-	%

 MAGNETIC CHARACTERISTICS (V_{DD} = 1.8V, T_A = 25°C, unless otherwise specified)

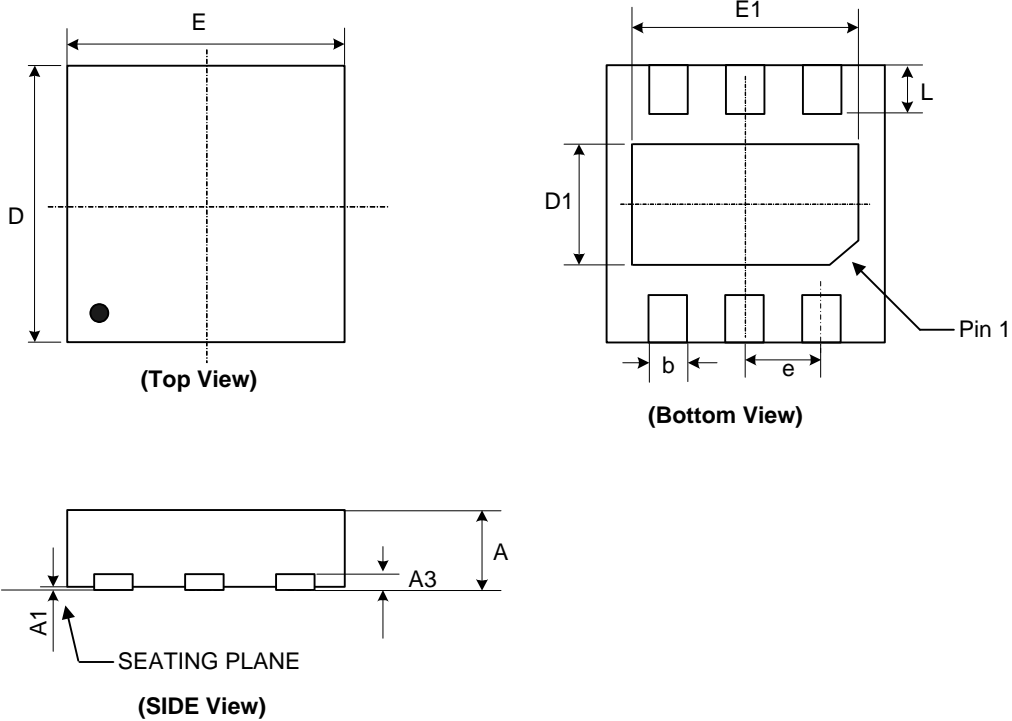
Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Operating Points	B _{OPS}		-	30	50	Gauss
	B _{OPN}		-50	-30	-	
Release Points	B _{RPS}		10	20	-	
	B _{RPN}		-	-20	-10	
Hysteresis	B _{Hys}		-	10	-	


Package Sensor Location

❖ TEST CIRCUIT


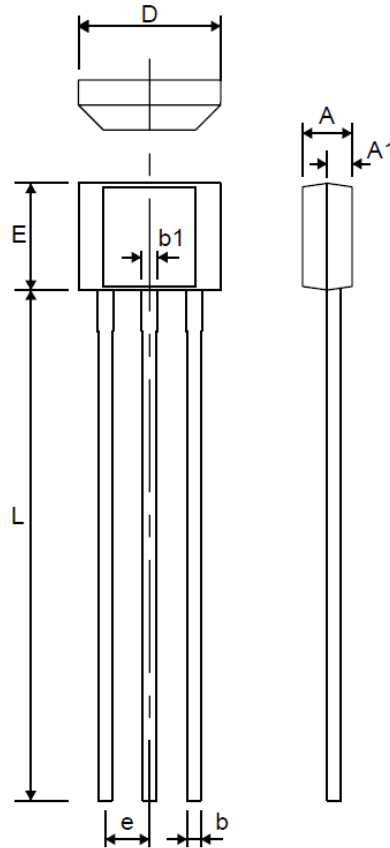
❖ PACKAGE OUTLINES
(1) SOT-23-3L


Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.45	-	-	0.057
A1	0	0.08	0.15	-	-	0.006
A2	0.9	1.1	1.3	0.035	0.043	0.051
b	0.3	0.4	0.5	0.012	0.016	0.02
C	0.08	0.15	0.22	0.003	0.006	0.009
D	2.7	2.9	3.1	0.106	0.114	0.122
E	2.6	2.8	3	0.102	0.11	0.118
E1	1.4	1.6	1.8	0.055	0.063	0.071
L	0.3	0.45	0.6	0.012	0.018	0.024
L1	0.5	0.6	0.7	0.02	0.024	0.028
e	1.9 BSC			0.075 BSC		
e1	0.95 BSC			0.037 BSC		

JEDEC outline: NA

2. DFN1.6X1.6-6L


Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	0.4	0.45	0.5	0.016	0.018	0.020
A1	0	0.02	0.05	0.000	0.001	0.002
A3	0.15 REF.			0.006 REF.		
b	0.15	0.2	0.25	0.006	0.008	0.010
D	1.55	1.6	1.65	0.061	0.063	0.065
D1	0.65	0.7	0.75	0.026	0.028	0.030
E	1.55	1.6	1.65	0.061	0.063	0.065
E1	1.25	1.3	1.35	0.049	0.051	0.053
e	0.5 BSC.			0.020 BSC.		
L	0.2	0.25	0.3	0.008	0.010	0.012

3. SIP-3L


Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.20	1.48	1.76	0.047	0.058	0.069
A1	0.75 REF.			0.030 REF.		
b	0.33	0.38	0.43	0.013	0.015	0.017
b1	0.40	0.45	0.50	0.016	0.018	0.020
D	3.90	4.10	4.30	0.154	0.161	0.169
e1	1.27 BSC			0.050 BSC		
E	2.80	3.00	3.20	0.110	0.118	0.126
L	13.60	14.60	15.60	0.535	0.575	0.614