

Ultra-sensitive Hall Effect Switch

❖ GENERAL DESCRIPTION

MA7002 is a three-terminal Hall effect sensor device with an output driver. The device is using CMOS process includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifies the Hall voltage, and a Schmitt trigger to provide switching hysteresis for noise rejection, and push-pull output, and an internal temperature compensated circuits. This method reduces the offset voltage normally caused by device over molding and thermal stress.

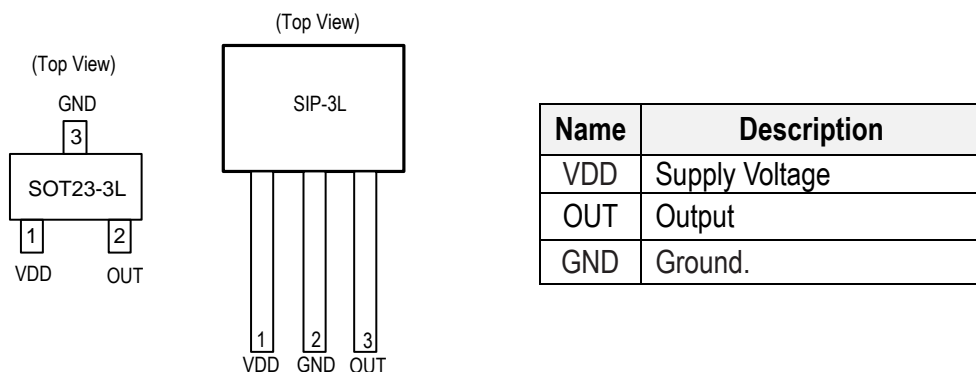
The output is switch with either north or South Pole of sufficient strength will turn the output on (low). The output will be turned off (high) under no magnetic field. While the magnetic flux density (B) is larger than operate point (Bop), the output will be turned on (low); the output is latched until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

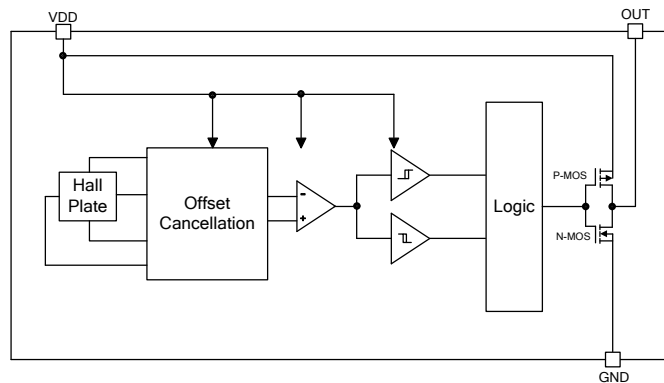
❖ FEATURES

- 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 and SIP-3L(TO-92S) Packages

❖ PIN ASSIGNMENT

The packages of MA7002; the pin assignment is given by:



❖ BLOCK DIAGRAM

❖ ORDER / MARKING INFORMATION

Order Information	Top Marking (SOT23)
MA7002X X Package Type: A: SOT23-3L Packing: Blank: Bag A : Taping	HE Y W X → ID Code: Internal → Week: 01~26(A~Z) 27~52(a~z) → Year : 7 = 2017
Order Information	Top Marking (SIP-3L)
MA7002X X Package Type: P3: SIP-3L Packing: Blank: Bag	7002 → Part number YYWWX → ID code: internal → WW: 01~52 → Year: 17=2017

❖ ABSOLUTE MAXIMUM RATINGS (at T_A=25°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}	10	mA
Storage Temperature Range	T _{ST}	-65 to +150	°C
Junction Temperature	T _J	+150	°C
Operating Temperature Range	T _{OP}	-40 to +125	°C
Thermal Resistance from Junction to case	θ _{JC}	140	°C/W
Thermal Resistance from Junction to ambient	θ _{JA}	250	°C/W
Power Dissipation [PD=(T _J -T _A) / θ _{JA}]	PD	400	mW

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

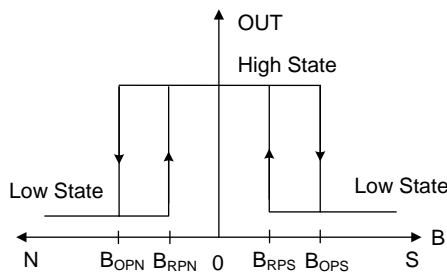
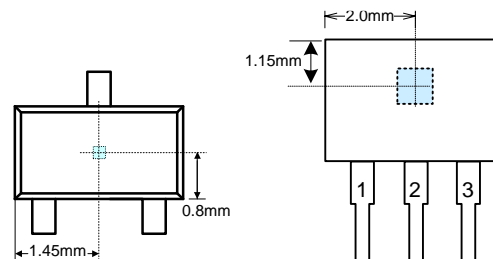
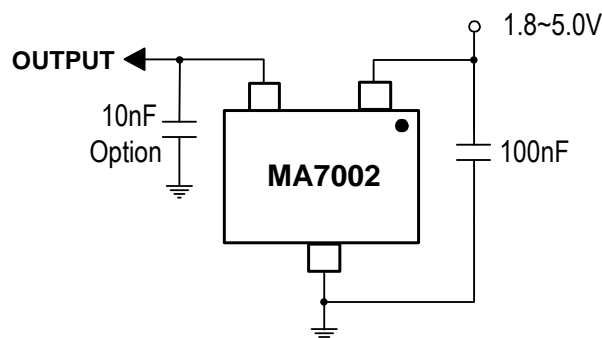
❖ ELECTRICAL CHARACTERISTICS

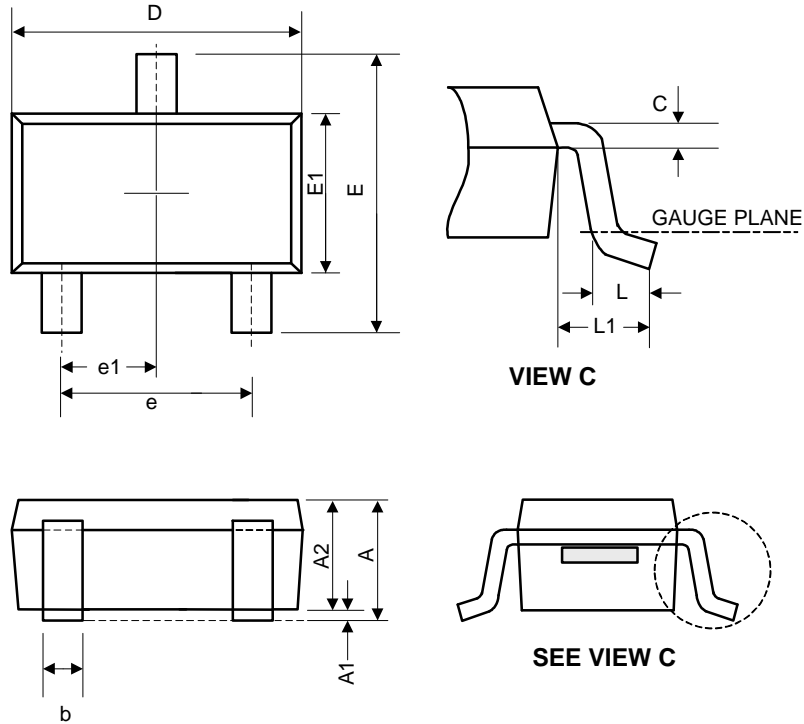
 ($V_{DD} = 1.8V$, $T_A = +25^\circ C$, unless otherwise noted.)

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage	V_{DD}		1.65	1.8	5.5	V
Supply Current	I_{DD}	$V_{DD}=1.8V$	-	1.5	2.5	mA
		$V_{DD}=3.3V$	-	2.8	4	mA
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

 MAGNETIC CHARACTERISTICS ($V_{DD} = 1.8V$, $T_A = 25^\circ C$, unless otherwise specified)

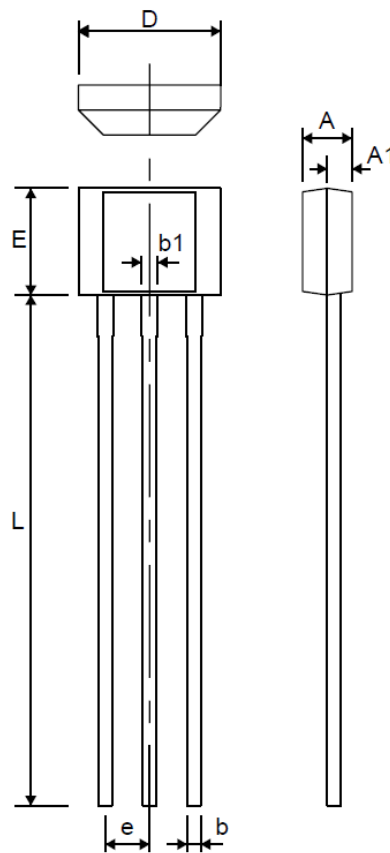
Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Operating Points	B_{OPS}		-	30	50	Gauss
	B_{OPN}		-50	-30	-	
Release Points	B_{RPS}		10	20	-	
	B_{RPN}		-	-20	-10	
Hysteresis	B_{Hys}		-	10	-	


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	-	-	1.3	-	-	0.051
A1	0	0.08	0.15	0	0.003	0.006
A2	0.9	1.1	1.2	0.035	0.043	0.047
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) 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	13.6	14.6	15.6	0.535	0.575	0.614