Unipolar Hall Effect Switch

❖ GENERAL DESCRIPTION

MA7010 is an unipolar Hall effect sensor IC. The device 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 open-drain output. An internal band-gap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply range.

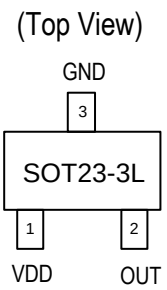
If a magnetic flux density larger than threshold Bop, OUT is turned on(low). The output state is held until a magnetic flux density reversal falls below Brp causing OUT to be turned off (high)..

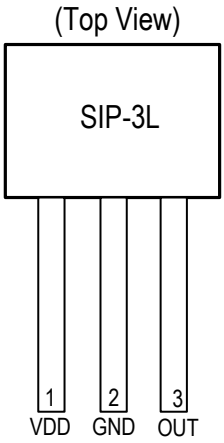
❖ FEATURES

- 2.5V to 26V DC operation voltage
- Temperature compensation
- Wide operating voltage range
- Open-Drain pre-driver
- 25mA maximum sinking output current.
- Low Profile SOT23-3L and SIP-3L(TO-92S) Package(Green and Lead Free)

❖ PIN ASSIGNMENT

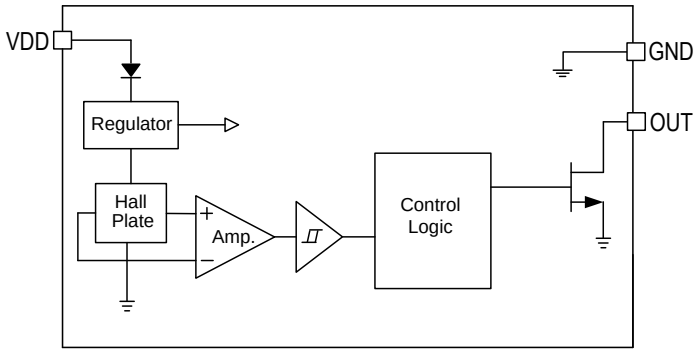
The package of MA7010 are SOT23-3L and SIP-3L ; the pin assignment is given by:





Name	Description
VDD	Supply Voltage
OUT	Output
GND	Ground.

❖ BLOCK DIAGRAM



❖ RDER/MARKING INFORMATION

Order Information	Top Marking (SIP-3L)
MA7010 XX X Package Type: P3: SIP-3L Packing: Blank: Bag, A : Taping	7010 → Part number YYWWX → ID code:internal WW:01~52 Year:16=2016
Order Information	**Top Marking (SOT23-3L)**
MA7010 X X Package Type: A:SOT23-3L Packing: Blank:Bag, A : Taping	H 8 Y W X → ID Code: Internal Week: 01~26(A~Z) 27~52(a~z) Year : 5 = 2015

❖ A BSOLUTE MAXIMUM RATINGS (at T_A=25°C)

Characteristics		Symbol	Rating	Unit
Supply Voltage		V_{CC}	28	V
Reverse VCC Polarity Voltage		V_{RCC}	-28	V
Magnetic Flux Density		B	Unlimited	Gauss
Output Current	Continuous	I_O	25	mA
Power Dissipation(SIP3/SOT23)		P_D	550/230	mW
Storage Temperature Range		T_{STG}	-65 to +150	°C
Thermal Resistance from Junction to case(SIP3/SOT23)		θ_{JC}	49/410	°C/W
Thermal Resistance from Junction to ambient(SIP3/SOT23)		θ_{JA}	227/543	°C/W
Junction temperature		T_J	150	°C
Operating temperature		T_O	-40 to 120	°C
Magnetic signal input frequency(note1)		Fsw	0~3	kHz

Note1 : Not subject to production test, verified by design/characterization.

❖ ELECTRICAL CHARACTERISTICS

(V_{DD} = 12V, T_A = +25°C, unless otherwise noted.)

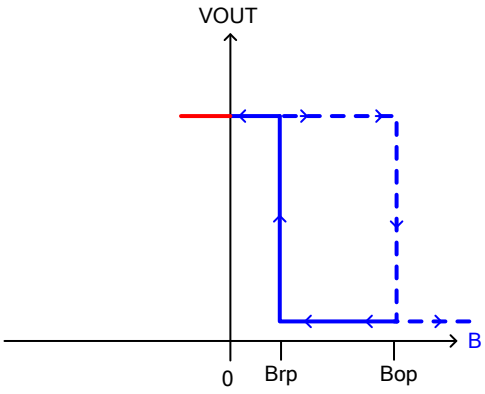
Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage	V_{DD}	Operating	2.5	-	26	V
Supply current	I_{DD}	Operating	-	2.0	3.0	mA
Output Leakage Current	I_{OFF}	V_{OUT}=12V	-	< 0.1	10	μA
Output Saturation Voltage	$Vds_{(sat)}$	I_{OUT}=20mA	-	0.3	-	V
Chopper frequency(note2)	fosc			50		kHz
Magnetic						(1mT=10 Gauss)
Operate Point	B_{OP}		60	90	120	Gauss
Release Point	B_{RP}		20	50	80	Gauss
Hysteresis	B_{HYS}		-	40	-	Gauss

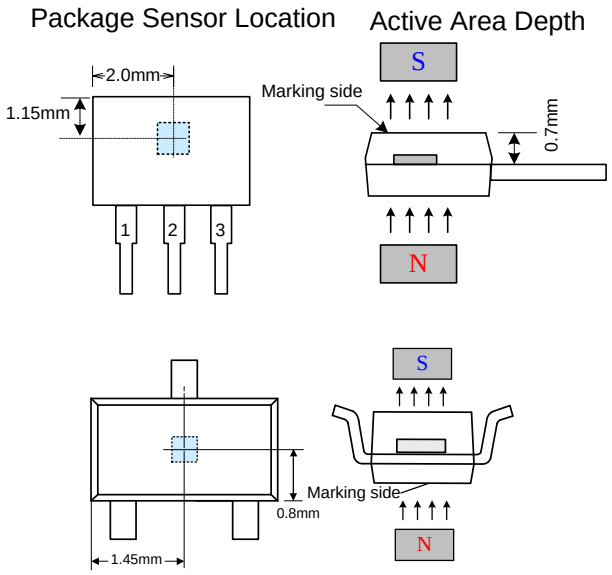
Note2: Not subject to production test, verified by design/characterization.

Driver output vs. magnetic pole(SIP3)

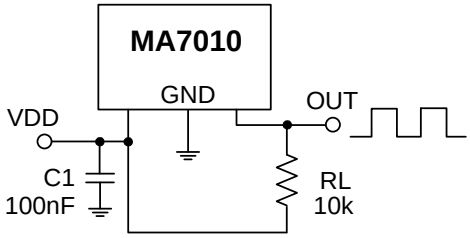
Characteristics	Test Conditions	OUT
North pole & South pole	B < Brp	High
South pole	B > Bop	Low

Note: The magnetic pole is applied facing the branded side of the SIP3 package





❖ TEST CIRCUIT

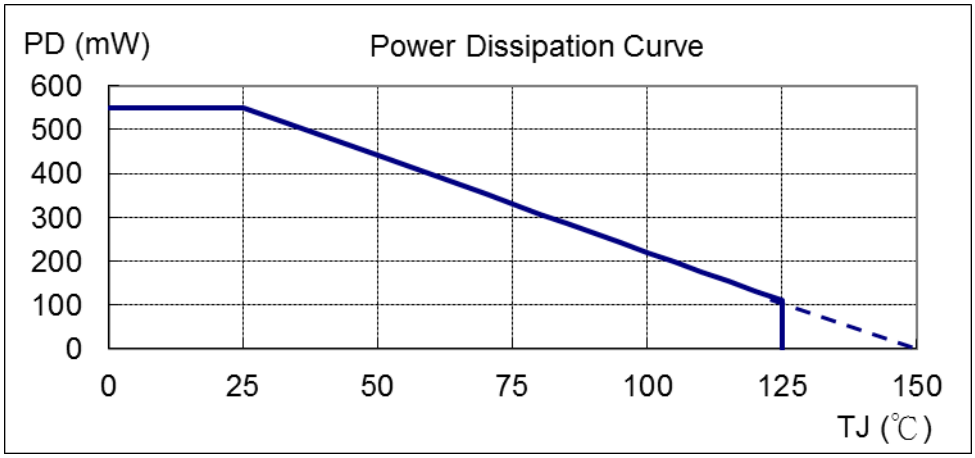


Note : C1 is for power stabilization and to strengthen the noise immunity. RL is the pull-up resistor.

❖ THERMAL PERFORMANCE CHARACTERISTICS

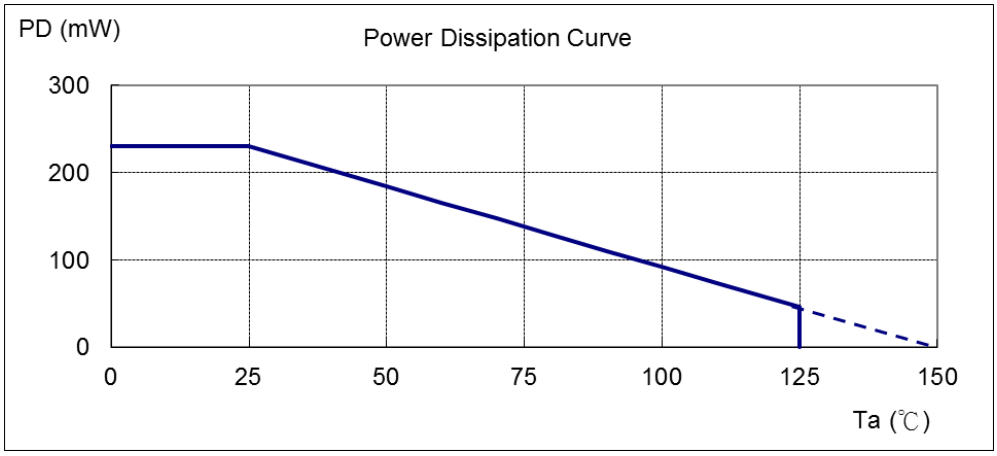
SIP-3L

T_A (°C)	25	50	60	70	80	85	90	95	100
PD (mW)	550	440	396	352	308	286	264	242	220
T_A (°C)	**105**	**110**	**115**	**120**	**125**	**130**	**135**	**140**	**150**
PD (mW)	198	176	154	132	110	88	66	44	0

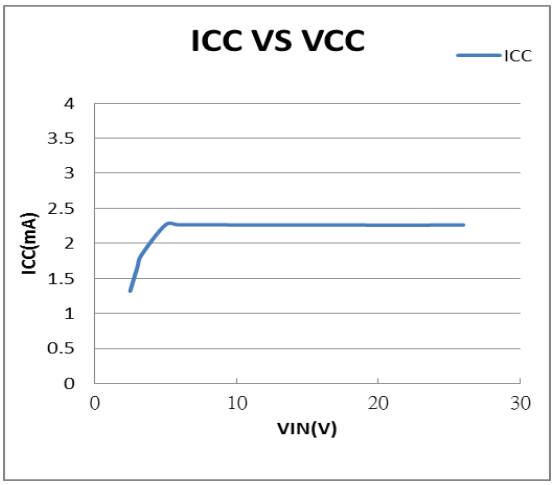


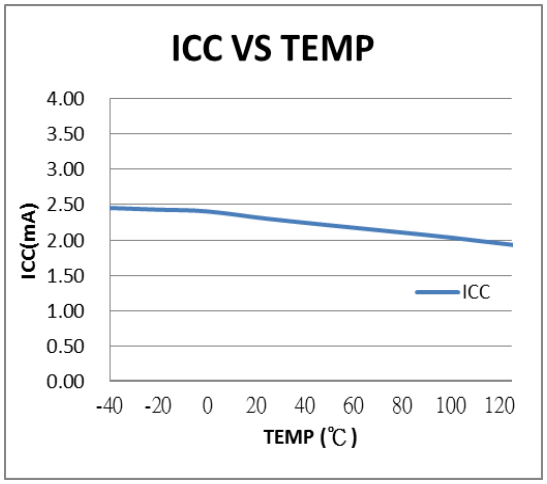
SOT-23-3L

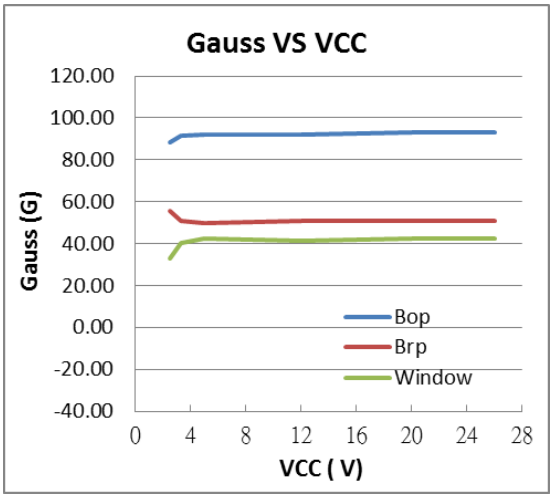
T_A (°C)	25	50	60	70	80	85	90	95	100
PD (mW)	230	230	184	166	147	129	120	110	101
T_A (°C)	**105**	**110**	**115**	**120**	**125**	**130**	**135**	**140**	**150**
PD (mW)	83	74	64	55	46	37	27	18	0

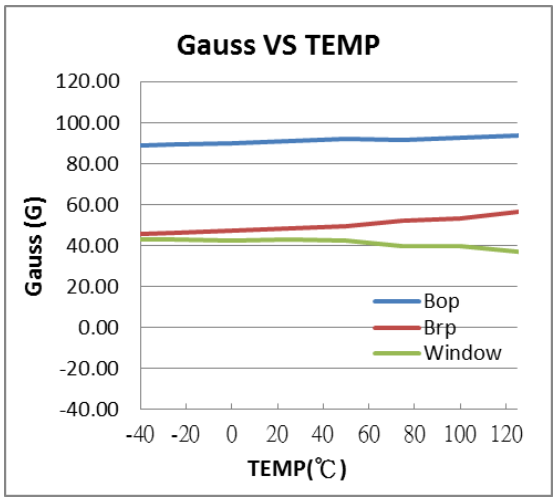


❖ TYPICAL CHARACTERISTICS



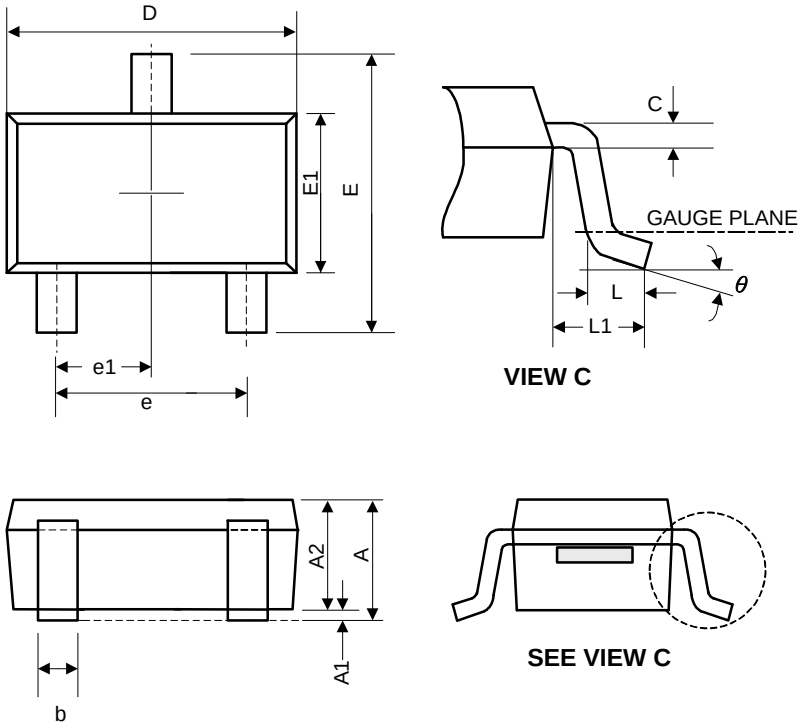






❖ PACKAGE OUTLINES

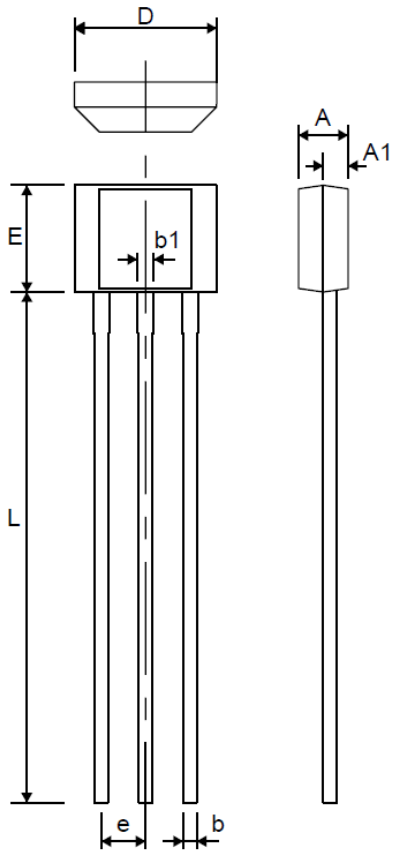
(1) SOT-23-3L



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		
θ	0°	4°	8°	0°	4°	8°

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	13.60	14.60	15.60	0.535	0.575	0.614