



Low Power Hall Switch YH4913

GENERAL DESCRIPTION

The YH4913 omnipolar Hall effect sensor IC is fabricated from mixed signal CMOS technology. It incorporates advanced chopper-stabilization techniques to provide accurate and stable magnetic switch points.

The circuit design provides an internally controlled clocking mechanism to cycle power to the Hall element and analog signal processing circuits. This serves to place the high current-consuming portions of the circuit into a "Sleep" mode. Periodically the device is "Awakened" by this internal logic and the magnetic flux from the Hall element is evaluated against the predefined thresholds. If the flux density is above or below the Bop/Brp thresholds then the output transistor is driven to change states accordingly.

While in the "Sleep" cycle the output transistor is latched in its previous state. The design has been optimized for service in applications requiring extended operating

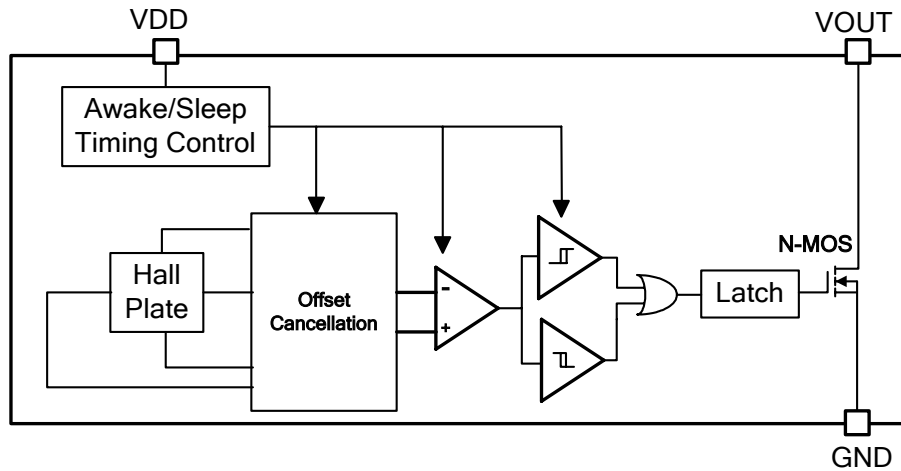
The output transistor of the YH4913 will be latched on (Bop) in the presence of a sufficiently strong South or North magnetic field facing the marked side of the package. The output will be latched off (Brp) in the absence of a magnetic field.

Features

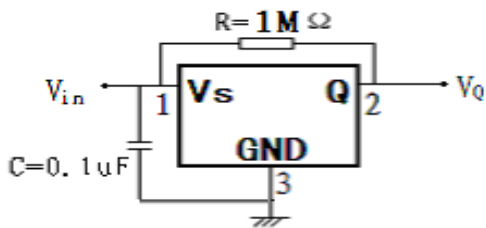
- 2.4V-5.5V battery operation
- High sensitivity and high stability of the magnetic switching
- High resistance to mechanical stress
- Digital output signal
- Switching for both poles of a magnet (omnipolar)



Block Diagram



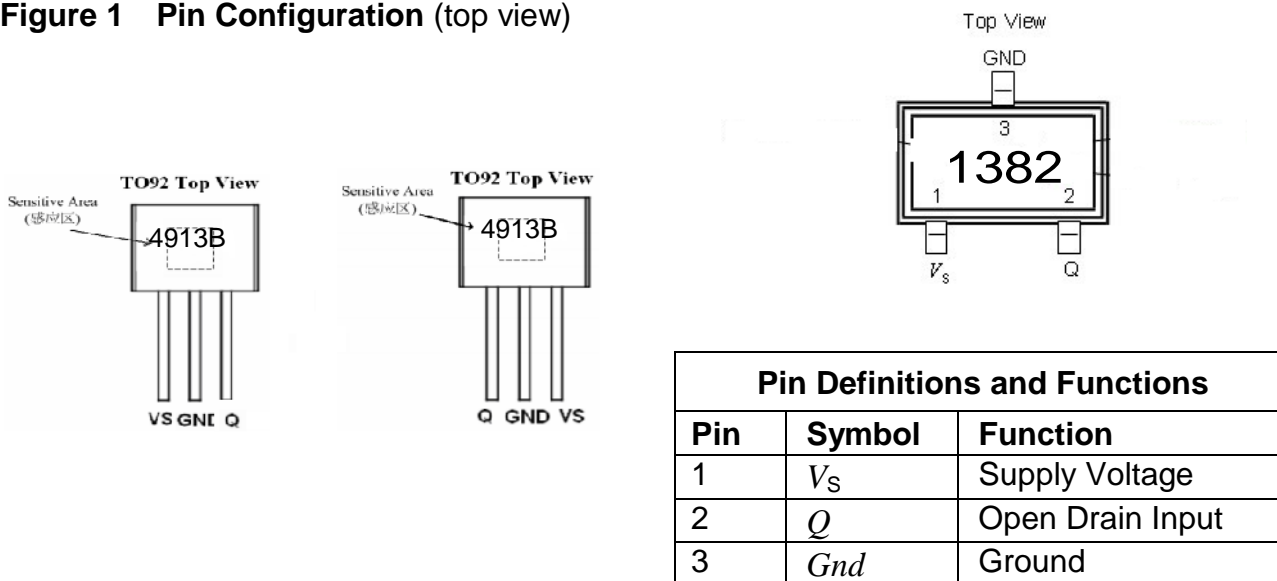
Application circuit YH4913



notes:

- 1、 the pull up resistor: 20K ~ 1M
- 2、 supply voltage V_{in} : 2.4V ~ 5.5

Figure 1 Pin Configuration (top view)



Absolute Maximum Ratings (at $T_A=25^{\circ}\text{C}$)

Characteristics	Symbol	Rating	Unit
VDD Pin Voltage	V_{DD}	- 0.3 to 6V	V
Output Pin Voltage	V_{OUT}	- 0.3 to 6V	V
Output Current	I_{OUT}	2	mA
Storage Temperature Range	T_{ST}	-65 to +150	$^{\circ}\text{C}$
Junction Temperature	T_J	+125	$^{\circ}\text{C}$
Operating Temperature Range	T_{OP}	-40 to +85	$^{\circ}\text{C}$
Thermal Resistance from Junction to ambient	θ_{JA}	550	$^{\circ}\text{C}/\text{W}$
Power Dissipation[$PD=(T_J-T_A) / \theta_{JA}$]	PD	230	mW

Note : θ_{JA} is measured with the PCB copper area of approximately 1 in²(Multi-layer).

Electrical Characteristics ($V_{DD} = 2.75\text{V}$, $T_A=25^{\circ}\text{C}$, unless otherwise specified)

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage	V_{DD}		2.4	-	5.5	V
Supply Current	I_{DD}	Awake state	-	2	4	mA
		Sleep state	-	2	6	μA
		Average	-	4	10	μA
Output Saturation Voltage	V_{OSAT}	$I_O=1\text{mA}$	-	0.1	0.3	V
Output Leakage Current	I_{O-LEAK}	$V_{OUT}=5.5\text{V}$, $B < B_{rp}$	-	0.01	1	μA
Output Wake-Up Time	$T_{\text{wake-up}}$		-	70	120	μs
Period	T_{Period}		-	70	120	ms
Duty Cycle	D.C		-	0.1	-	%

Magnetic Characteristics ($V_{DD} = 2.75\text{V}$, $T_A=25^{\circ}\text{C}$, unless otherwise specified)

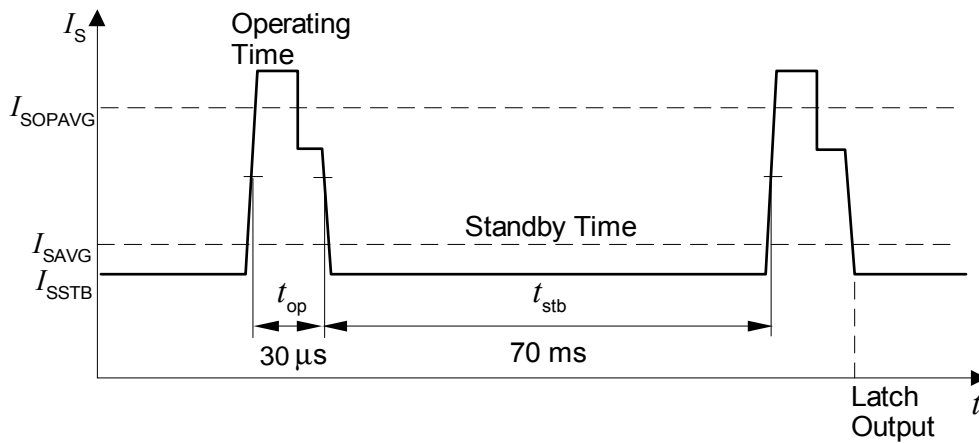
Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Operating Points	B_{OPS}		-	35	55	Gauss
	B_{OPN}		-55	-35	-	
Release Points	B_{RPS}		10	25	-	
	B_{RPN}			-25	-10	
Hysteresis	B_{Hys}		-	10	-	

ESD Protection

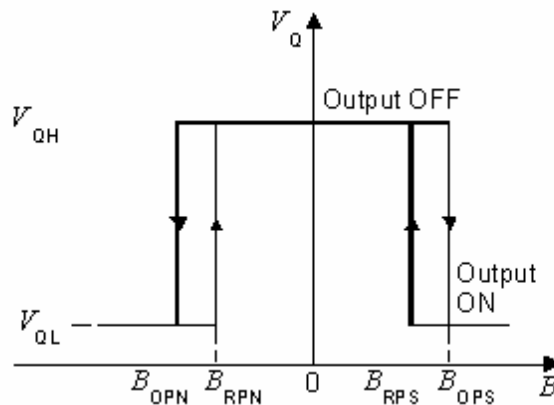
Human Body Model (HBM) tests according to: Mil. Std. 883F method 3015.7

Parameter	Symbol	Limit Values		Unit	Notes
		Min	Max		
ESD Voltage	V_{ESD}	-	± 4	kV	R=1.5K Ω C=100PF T=25 $^{\circ}$ C

Timing Diagram



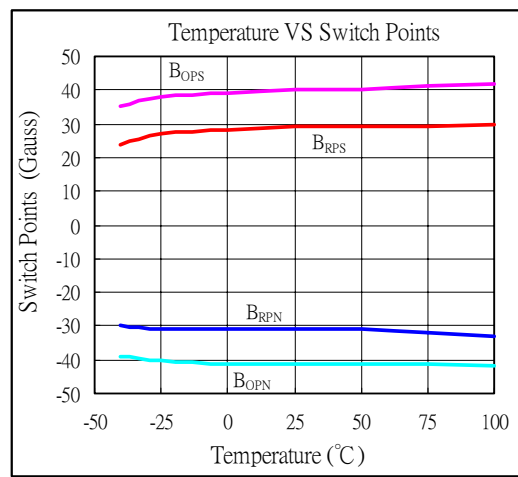
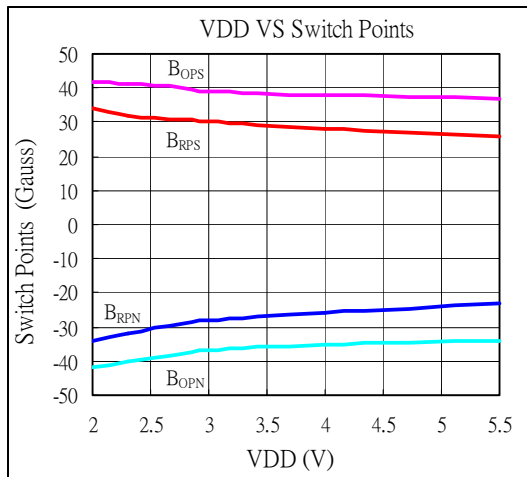
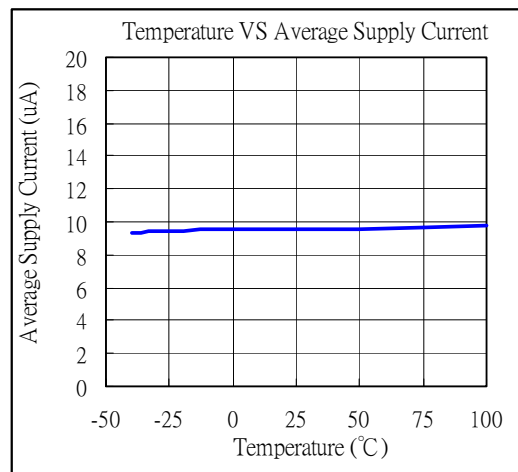
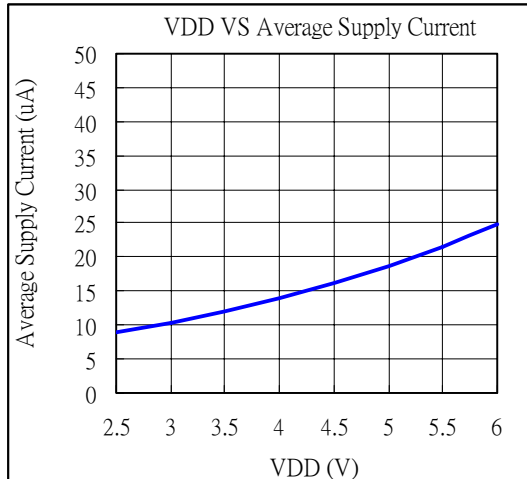
Output <0096> Signal YH4913



V_Q as function of the applied B-Field

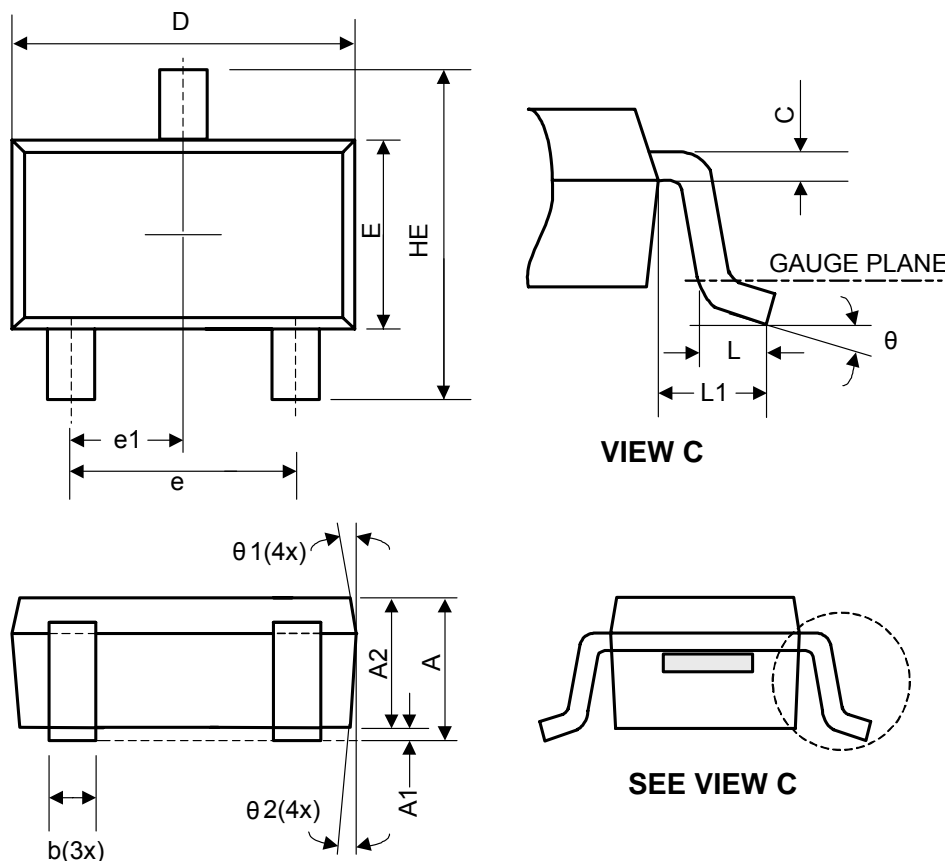


Typical Characteristics



Package Outlines

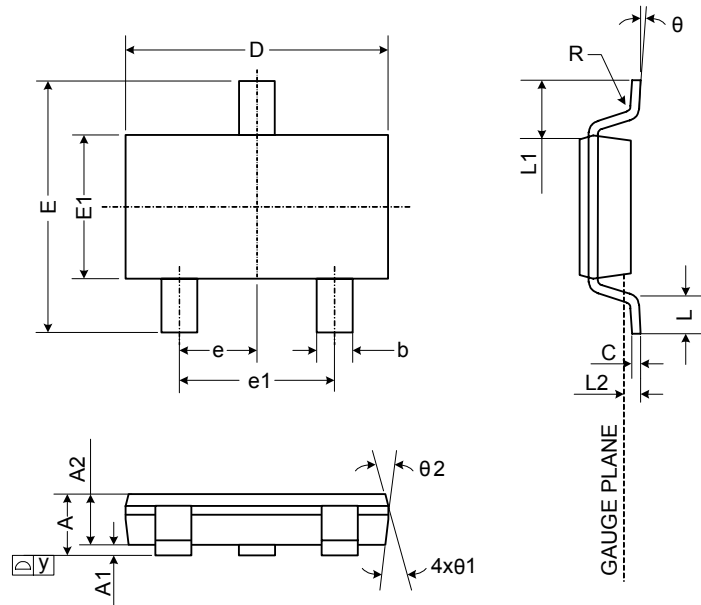
(1) SOT23-3L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.		Min.	Nom.	
A	1.05	-	A	1.05	-	A
A1	0.05	-	A1	0.05	-	A1
A2	1.00	1.10	A2	1.00	1.10	A2
b	0.25	-	b	0.25	-	b
C	0.08	-	C	0.08	-	C
D	2.70	2.90	D	2.70	2.90	D
E	1.50	1.60	E	1.50	1.60	E
HE	2.60	2.80	HE	2.60	2.80	HE
L	0.30	-	L	0.30	-	L
L1	0.50	0.60	L1	0.50	0.60	L1
e	1.80	1.90	e	1.80	1.90	e
e1	0.85	0.95	e1	0.85	0.95	e1
theta	0°	5°	theta	0°	5°	theta
theta1	3°	5°	theta1	3°	5°	theta1
theta2	6°	8°	theta2	6°	8°	theta2



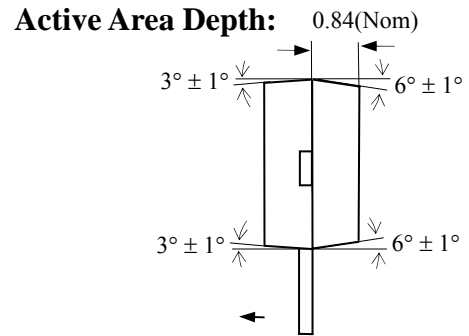
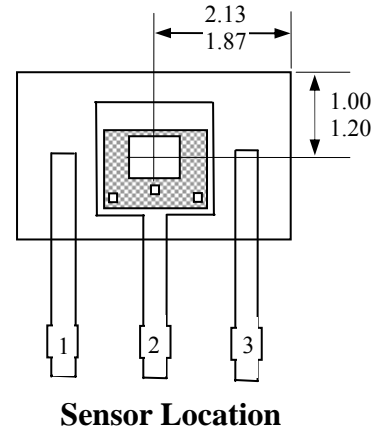
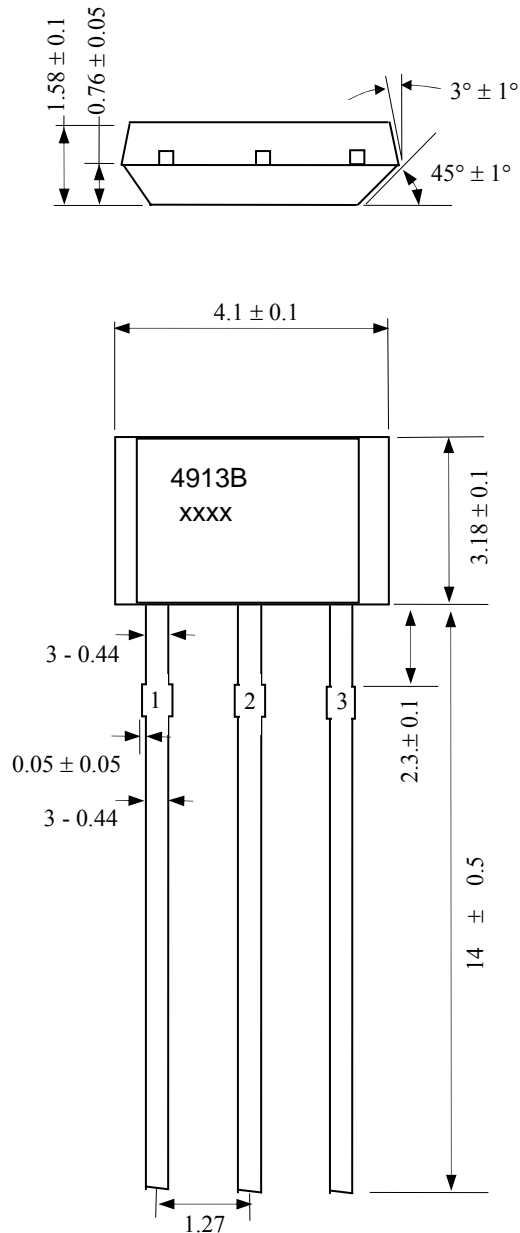
(2) TSOT23-3L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	0.75	-	0.90	0.030	-	0.035
A1	0.00	-	0.10	0.000	-	0.004
A2	0.70	0.75	0.80	0.028	0.030	0.031
b	0.35	-	0.51	0.014	-	0.020
C	0.10	-	0.25	0.004	-	0.010
D	2.80	2.90	3.00	0.110	0.114	0.118
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
e	0.95 BSC.			0.037		
e1	1.90 BSC.			0.075		
L	0.37	-	-	0.015	-	-
L1	0.60 REF.			0.024		
L2	0.25 BSC.			0.010		
y	-	-	0.10	-	-	0.004
R	0.10	-	-	0.004	-	-
θ	0°	-	8°	0°	-	8°
θ1	7° NOM.			7° NOM.		
θ2	5° NOM.			5° NOM.		



15.3 TO-92 Package Physical Characteristics



Notes:

- 1). Controlling dimension : mm ;
- 2). Lesds must be free of flash and plating voids ;
- 3). Do not bend leads within 1 mm of lead to package interface ;
- 4). PINOUT: Pin 1 VDD
Pin 2 GND
Pin 3 Output

16. Ordering Information

Part No.	Temperature	Suffix	Package Code
YH	0°C to 85°C)		UA(TO-92S) SO(SOT-23) ST(TSOT-23)

