

HIGH SENSITIVITY MICROPOWER OMNIPOLAR HALL-EFFECT SWITCH

Description

The AH1812 is a high sensitivity micropower Omnipolar Hall effect switch IC with an open drain output. Designed for portable and battery powered equipment such as cellular phones and portable PCs, the average supply current is only 4.3μA at 1.85V. To support portable equipment the AH1812 can operate over the supply range of 1.6V to 3.6V and uses a hibernating clocking system to minimize the power consumption. To minimize PCB space the AH1812 is available in small low profile X1-DFN1216-4 package

The open drain output is activated with either a North or South pole of sufficient magnetic field strength. When the magnetic flux density (B) perpendicular to the package is larger than operate point (Bop), the output will be turned on (pulled low). The output is turned off when B becomes lower than the release point (Brp). The output will remain off when there is no magnetic field.

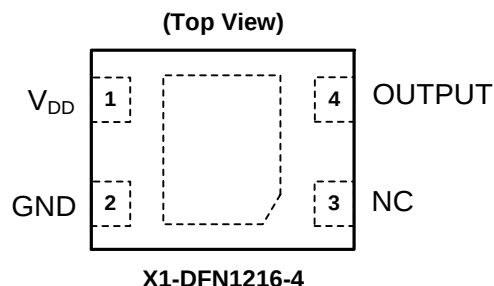
Features

- Omnipolar Operation (North or South Pole)
- Supply Voltage of 1.6V to 3.6V
- High Sensitivity
- Micropower Operation
- Chopper Stabilized Design Provides:
 - Superior Temperature Stability
 - Extremely Low Switch-Point Drift
 - Enhanced Immunity to Stress
- Open Drain Output for System Flexibility
- Good RF Noise Immunity
- -40°C to +85°C Operating Temperature
- Small and Low Profile X1-DFN1216-4 Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

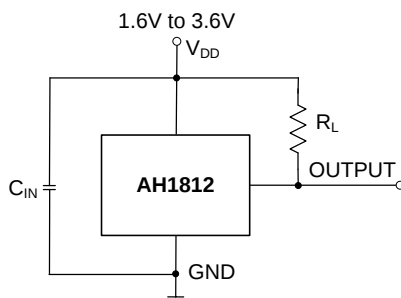
Pin Assignments



Applications

- Cover or Display Switch in Portable PCs
- Open and Close Detect for Cellular Phones
- Holster Detect for Cellular Phones and Tablet PCs
- Digital Still and Video Cameras
- Contact-Less Switches

Typical Applications Circuit (Note 4)



Note:

4. C_{IN} is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 10nF to 100nF. R_L is the pull-up resistor, the recommended resistance is 10kΩ to 100kΩ.

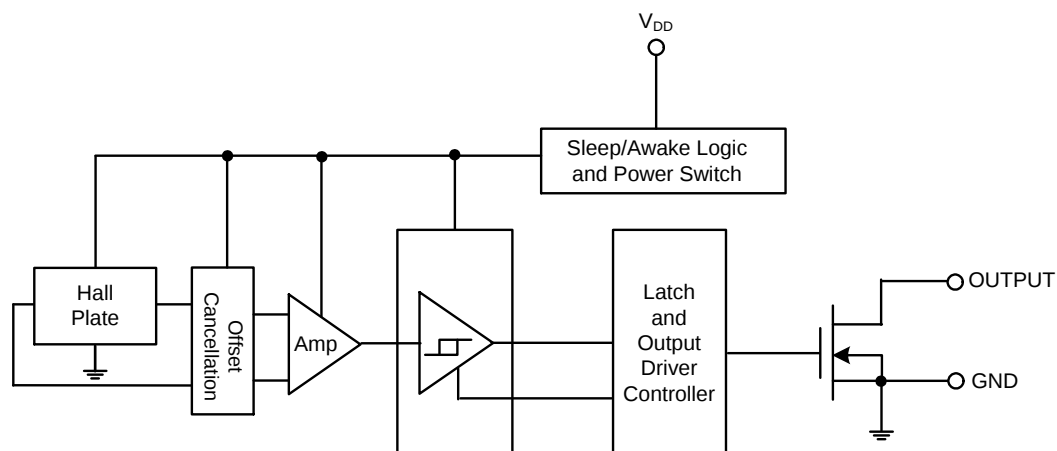
Pin Descriptions

Package: X1-DFN1216-4

Pin Number	Pin Name	Function
1	V _{DD}	Power Supply Input
2	GND	Ground Pin
3	NC	No Connection (Note 5)
4	OUTPUT	Output Pin
Pad	Pad	Can be connected to GND or left open circuit

Note: 5. NC is "No Connection" pin and is not connected internally. This pin can be left open or tied to ground.

Functional Block Diagram



Absolute Maximum Ratings (Note 6) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Characteristics	Values	Unit
V_{DD}	Supply Voltage (Note 7)	6	V
V_{DD_REV}	Reverse Supply Voltage	-0.3	V
I_{OUTPUT}	Output current (source and sink)	2	mA
B	Magnetic Flux Density	Unlimited	
P_D	Package Power Dissipation	X1-DFN1216-4	230 mW
T_S	Storage Temperature Range	+150	$^\circ\text{C}$
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$
ESD HBM	Human Body Model ESD capability	4	kV

Notes:

- Stresses greater than the 'Absolute Maximum Ratings' specified above may cause permanent damage to the device. These are stress ratings only; functional operation of the device at these or any other conditions exceeding those indicated in this specification is not implied. Device reliability may be affected by exposure to absolute maximum rating conditions for extended periods of time.
- The absolute maximum V_{DD} of 6V is a transient stress rating and is not meant as a functional operating condition. It is not recommended to operate the device at the absolute maximum rated conditions for any period of time.

Recommended Operating Conditions (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

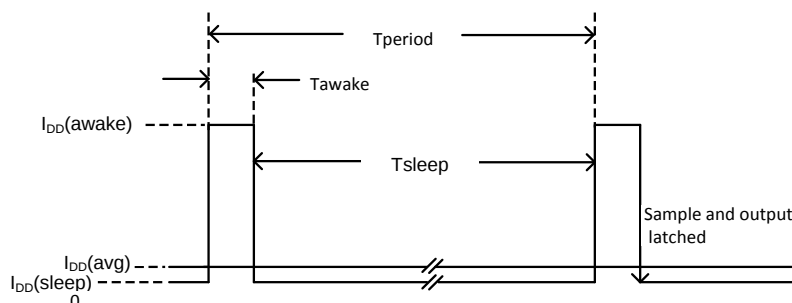
Symbol	Characteristic	Conditions	Rating	Unit
V_{DD}	Supply Voltage	Operating	1.6 to 3.6	V
T_A	Operating Temperature Range	Operating	-40 to +85	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, $V_{DD} = 3\text{V}$, unless otherwise specified.)

Symbol	Characteristic	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Low Voltage (on)	$I_{OUT} = 1\text{mA}$	—	0.1	0.2	V
I_{off}	Output leakage current	$V_{out} = 3.6\text{V}$, $B < Brps$	—	<0.1	1	μA
$I_{DD}(\text{awake})$	Supply Current	During 'awake' period	—	2.3	—	mA
$I_{DD}(\text{sleep})$		During 'sleep' period	—	2.5	—	μA
$I_{DD}(\text{avg})$	Average Supply Current	$V_{DD} = 1.85\text{V}$	—	4.3	8	μA
$I_{DD}(\text{avg})$		$V_{DD} = 3.0\text{V}$	—	6	10	μA
T_{awake}	Awake Active Pulse Width	(Note 8)	—	50	100	μs
T_{period}	Awake Period	(Note 8)	—	50	100	ms
D.C.	Duty Cycle		—	0.1	—	%

Note:

- When power is initially turned on, the operating V_{DD} (1.6V to 3.6V) must be applied to guaranteed the output sampling. The output state is valid after the second operating cycle (typical 100ms).

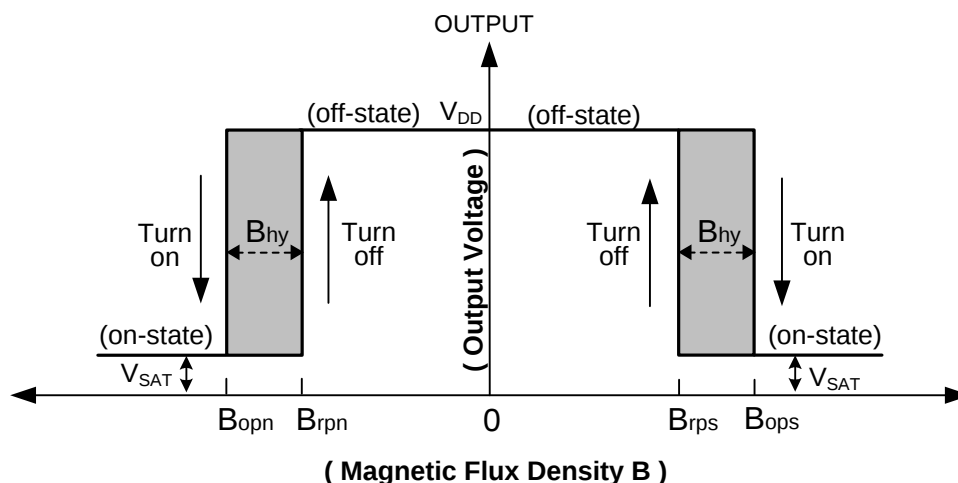


Magnetic Characteristics (Note 9) (@T_A = +25°C, V_{DD} = 3V, unless otherwise specified.)

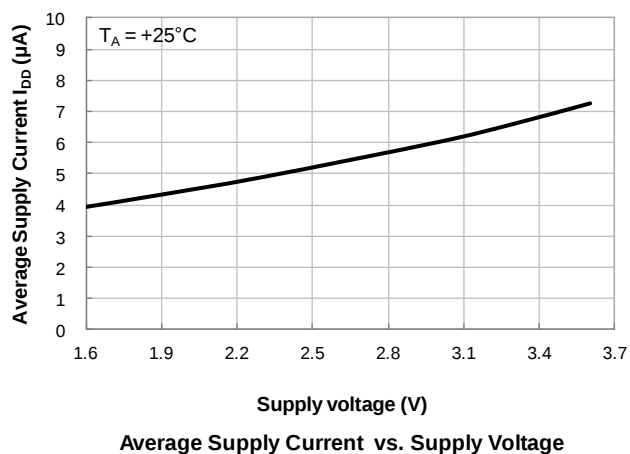
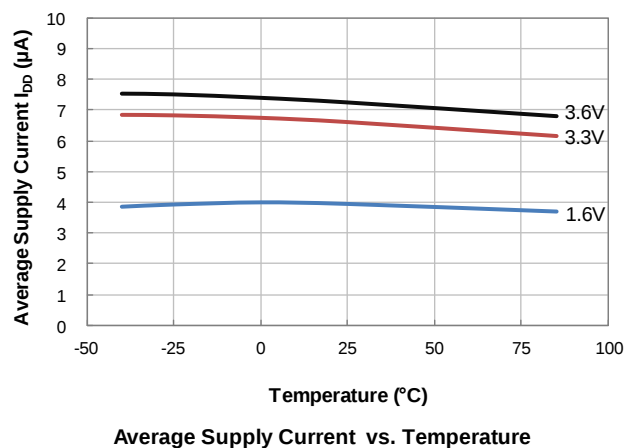
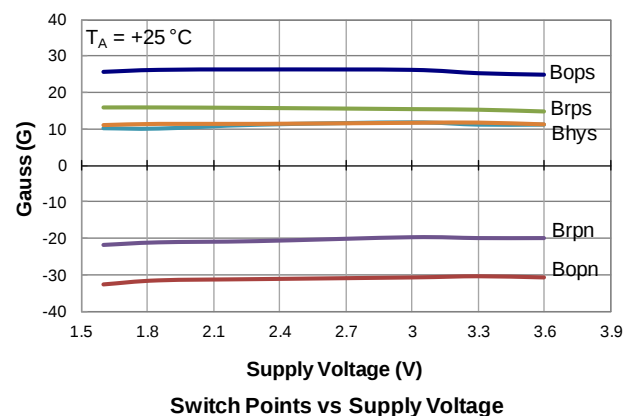
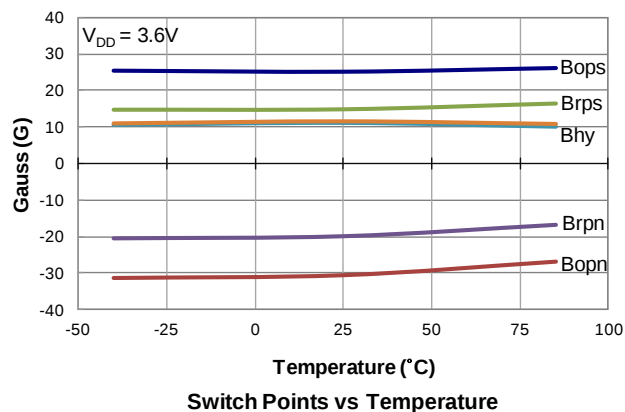
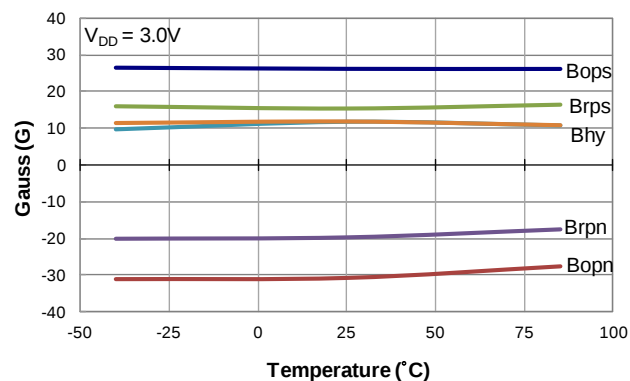
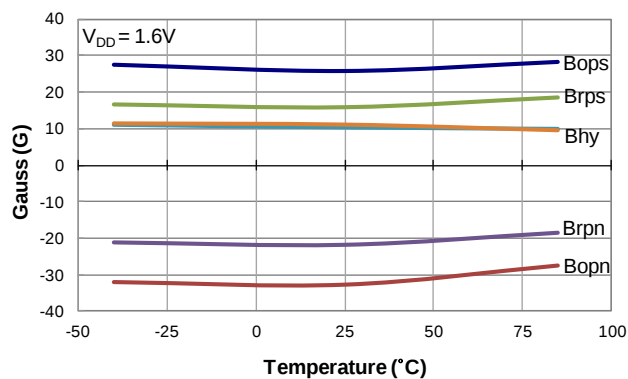
(1mT=10 Gauss)

Symbol	Characteristic	Min	Typ	Max	Unit
Bops (south pole to part marking side)	Operation Point	16	30	40	Gauss
Bopn (north pole to part marking side)		-40	-30	-16	
Brps (south pole to part marking side)	Release Point	11	20	35	
Brpn (north pole to part marking side)		-35	-20	-11	
Bhy (Bopx - Brpx)	Hysteresis	-	10	-	

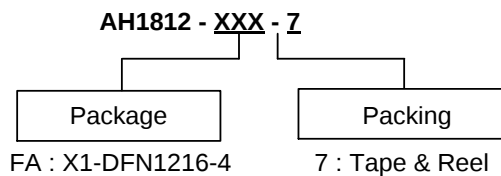
Note: 9. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.



Typical Operating Characteristics



Ordering Information

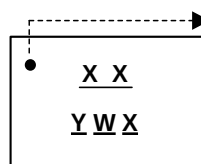


Part Number	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
AH1812-FA-7	FA	X1-DFN1216-4	3000/Tape & Reel	-7

Marking Information

(1) Package Type: X1-DFN1216-4

(Top View)



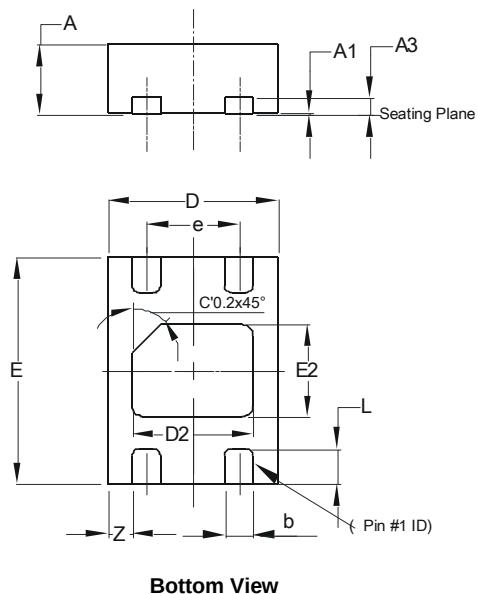
Pin 1 indicator
XX : Identification Code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
 a~z : 27~52 week; z represents
 52 and 53 week
X : Internal Code

Part Number	Package	Identification Code
AH1812-FA-7	X1-DFN1216-4	H2

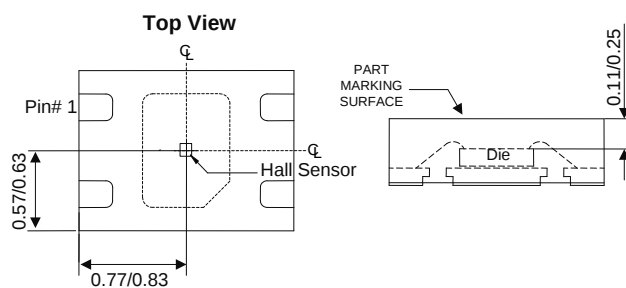
Package Outline Dimensions (All dimensions in mm.)

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

(1) Package Type: X1-DFN1216-4



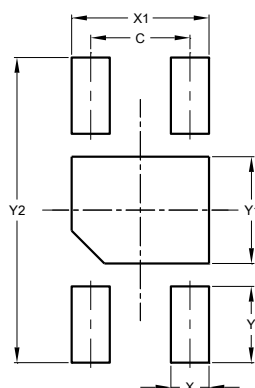
X1-DFN1216-4			
Dim	Min	Max	Typ
A	0.47	0.53	0.50
A1	0.00	0.05	0.02
A3	--	--	0.13
b	0.15	0.25	0.20
D	1.15	1.25	1.20
D2	0.75	0.95	0.85
E	1.55	1.65	1.60
E2	0.55	0.75	0.65
e	-	-	0.65
L	0.20	0.30	0.25
Z	-	-	0.175
All Dimensions in mm			



Sensor Location

Suggested Pad Layout (All dimensions in mm.)

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for latest version.



X1-DFN1216-4	
Dimensions	Value
C	0.65
X	0.25
X1	0.90
Y	0.50
Y1	0.70
Y2	2.00
All Dimensions in mm	

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