HIGH SENSIVITY MICROPOWER OMNIPOLAR HALL-EFFECT SWITCH

Description

The DIODES™ 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 potable 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.

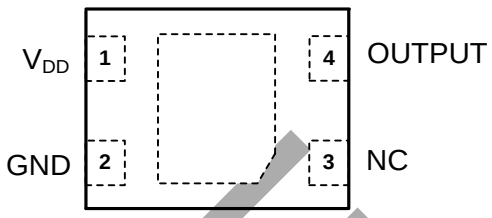
The open drain output is activated with either a North or South pole of sufficient magnetic field strength. When the magnetic flux density (B) perpendicular to the package is larger than operate point (Bop), the output will be turned on (pulled low). The output is turned off when B becomes lower than 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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Pin Assignments

X1-DFN1216-4



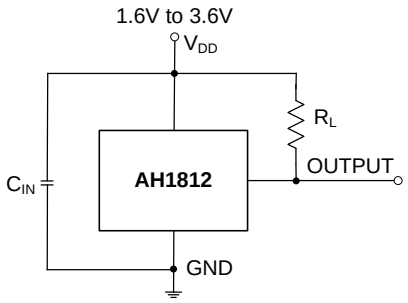
Top View

Applications

- Cover or display switches 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

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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.

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.

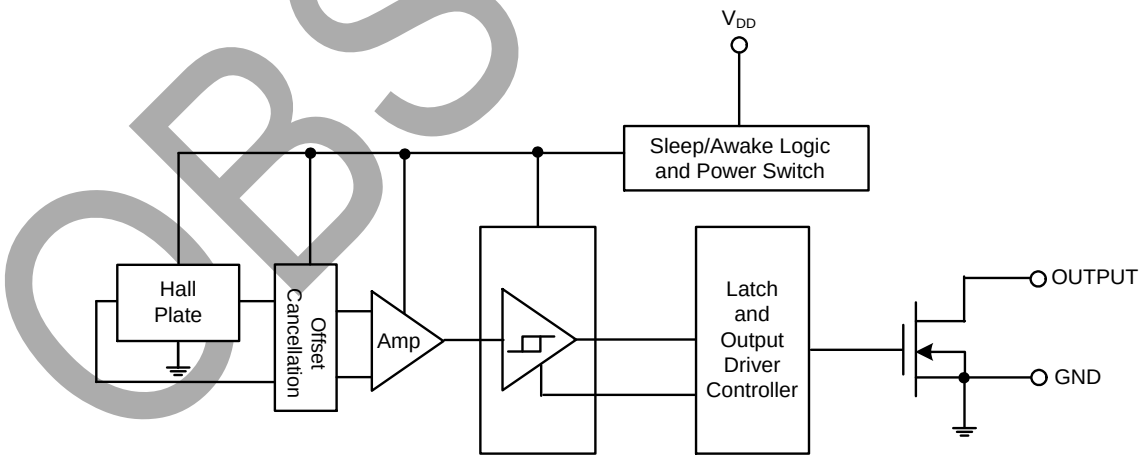
Pin Descriptions

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°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	°C
T_J	Maximum Junction Temperature		+150	°C
ESD HBM	Human Body Model ESD Capability		4	kV

Notes: 6. Stresses greater than those listed under *Absolute Maximum Ratings* can cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to *Absolute Maximum Ratings* for extended periods can affect device reliability.

7. 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.

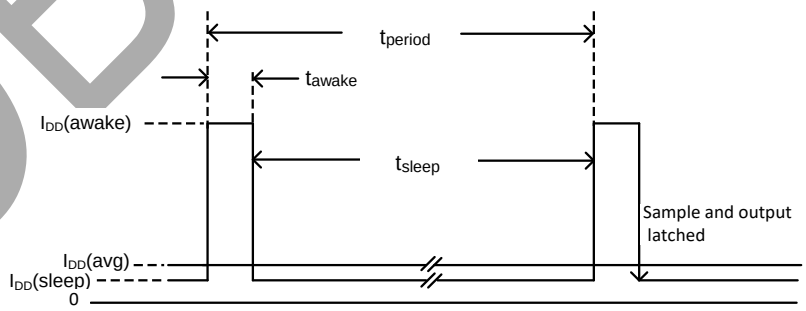
Recommended Operating Conditions (@T_A = +25°C, unless otherwise specified.)

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	°C

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

Symbol	Characteristic	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Low Voltage (On)	I_{OUT} = 1mA	—	0.1	0.2	V
Ioff	Output Leakage Current	V_{OUT} = 3.6V, B < Brps	—	<0.1	1	µA
I_{DD} (awake)	Supply Current	During 'awake' period	—	2.3	—	mA
I_{DD} (sleep)		During 'sleep' period	—	2.5	—	µA
I_{DD} (avg)	Average Supply Current	V_{DD} = 1.85V	—	4.3	8	µA
I_{DD} (avg)		V_{DD} = 3.0V	—	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: 8. When power is initially turned on, the operating V_{DD} (1.6V to 3.6V) must be applied to guarantee the output sampling. The output state is valid after the second operating cycle (typical 100ms).

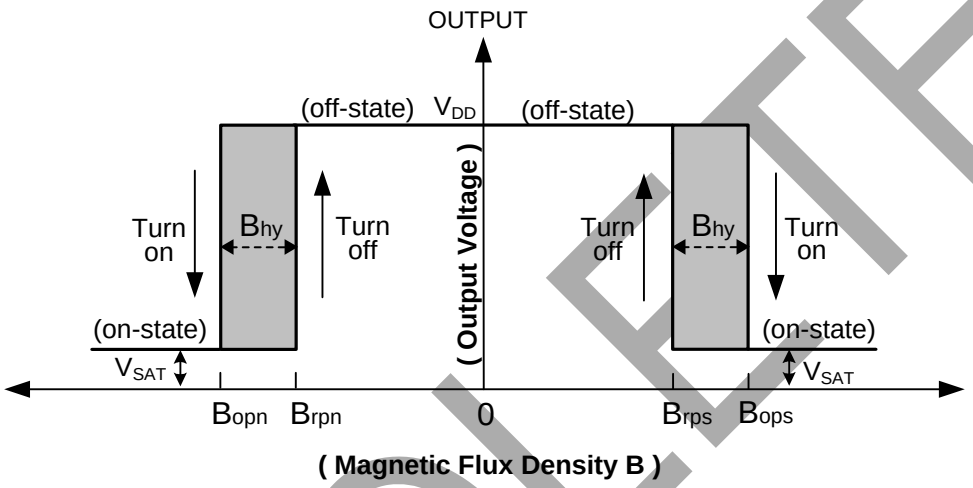


Magnetic Characteristics (Note 9) (@T_A = +25°C, V_{DD} = 3V, unless otherwise specified.)

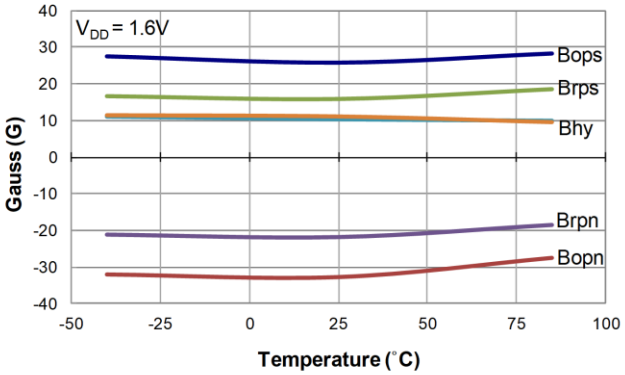
(1mT = 10 Gauss)

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	—	

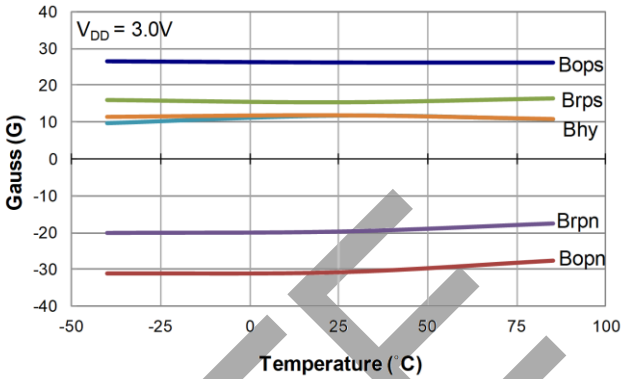
Note: 9. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.



Typical Operating Characteristics



Switch Points vs Temperature



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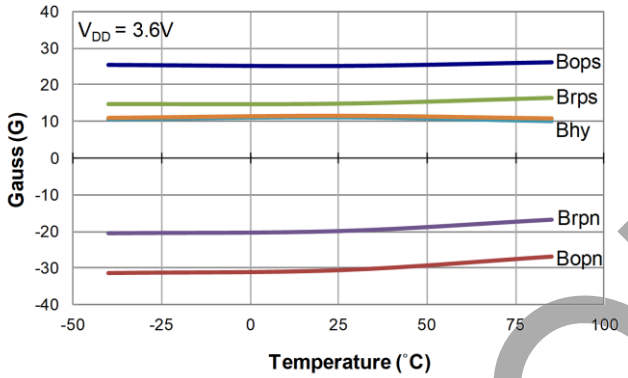

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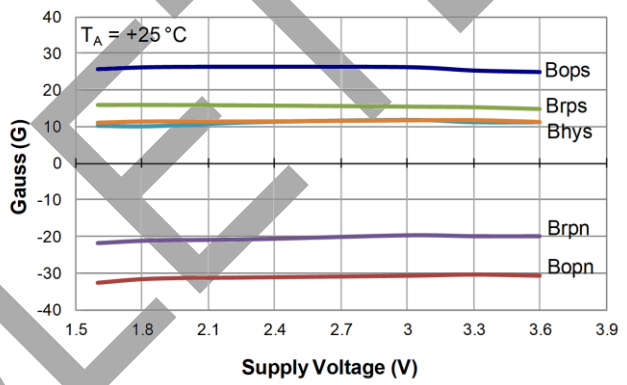
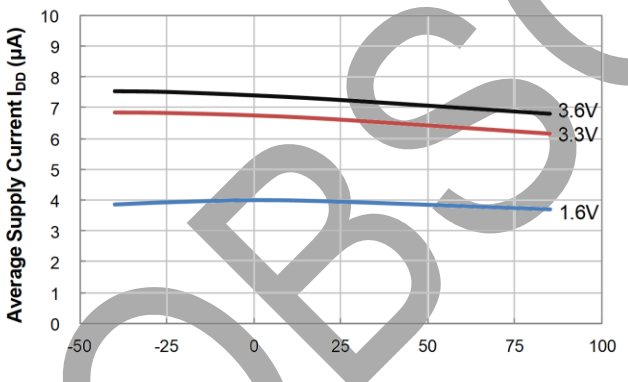
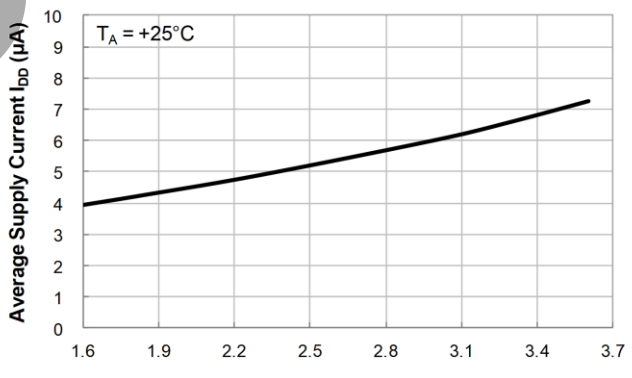


Switch Points vs Supply Voltage

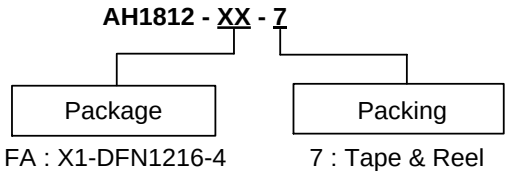


Average Supply Current vs. Temperature



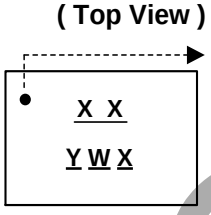
Average Supply Current vs. Supply Voltage

Ordering Information



Part Number	Part Number Suffix	Package Code	Package	Packing	
				Qty.	Carrier
AH1812-FA-7	-7	FA	X1-DFN1216-4	3000	7” Tape and Reel

Marking Information



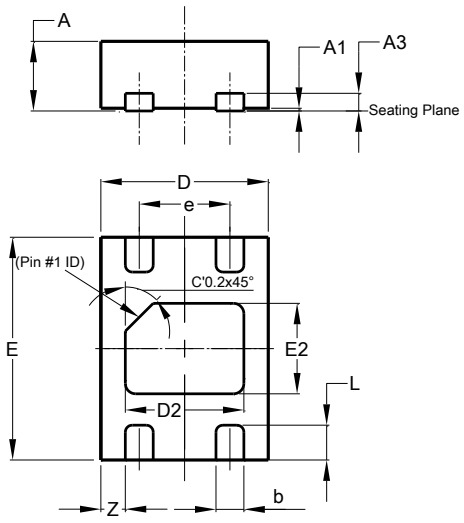
Pin 1 indicator
XX : Identification Code
Y : Year : 0 to 9
W : Week : A to Z : week 1 to 26;
a to z : week 27 to 52; z represents
week 52 and 53
X : Internal Code

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

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

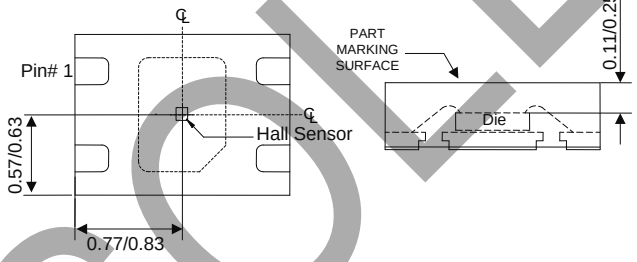
X1-DFN1216-4



Bottom View

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			

Top View

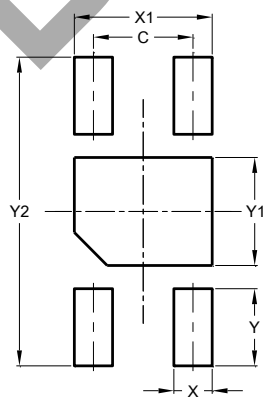


Sensor Location

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

X1-DFN1216-4



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

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