Description

The DIODES™ AH1804 is a micropower Omnipolar Hall effect switch IC with a single output driver with internal pull up and pull down capability. Designed for portable and battery powered equipment such as cellular phones and portable PCs, the average supply current is only 12μA at 3.3V. To support battery powered equipment, the AH1804 can operate over the supply range of 2.5V to 3.6V and uses a hibernating clocking system to minimize the power consumption.

The output is activated with either a north or south pole of sufficient strength. When the magnetic flux density (B) is larger than operate point (Bop), the output will be turned on (pulled low) and held until B is lower than release point (Brp).

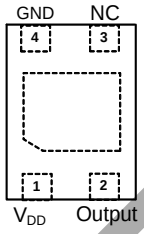
The AH1804 is available in SC59 and small low profile X1-DFN1216-4 packages.

Features

- Omnipolar Operation (North or South Pole)
- Low Supply Voltage 2.5V to 3.6V
- Micropower Operation
- No External Pull up Resistors Required
- Chopper Stabilized Design
  - Superior Temperature Stability
  - Extremely Low Switch-Point Drift
  - Insensitive to Physical Stress
- Good RF Noise Immunity
- -40°C to +85°C Operating Temperature
- Small Low Profile X1-DFN1216-4 and SC59 Packages
- ESD (HBM) > 5kV
- **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/**

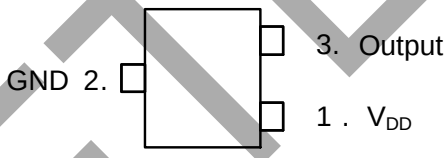
Pin Assignments

X1-DFN1216-4



Top View

SC59



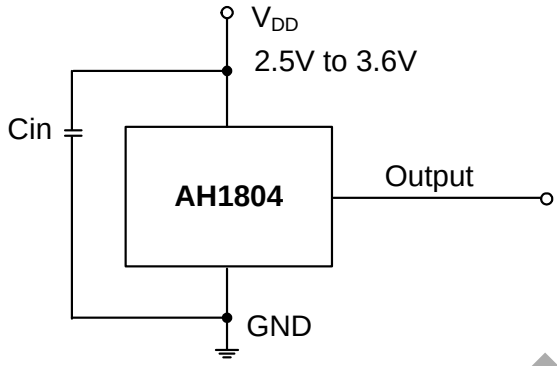
Top View

Applications

- Cover switches in clam-shell and slide cellular phones
- Cover switches in portable PCs, tablets and PDAs
- Display screen open/close detect in digital camcorders
- Contact-less switch in portable battery powered consumer and industrial products

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 Application Circuit



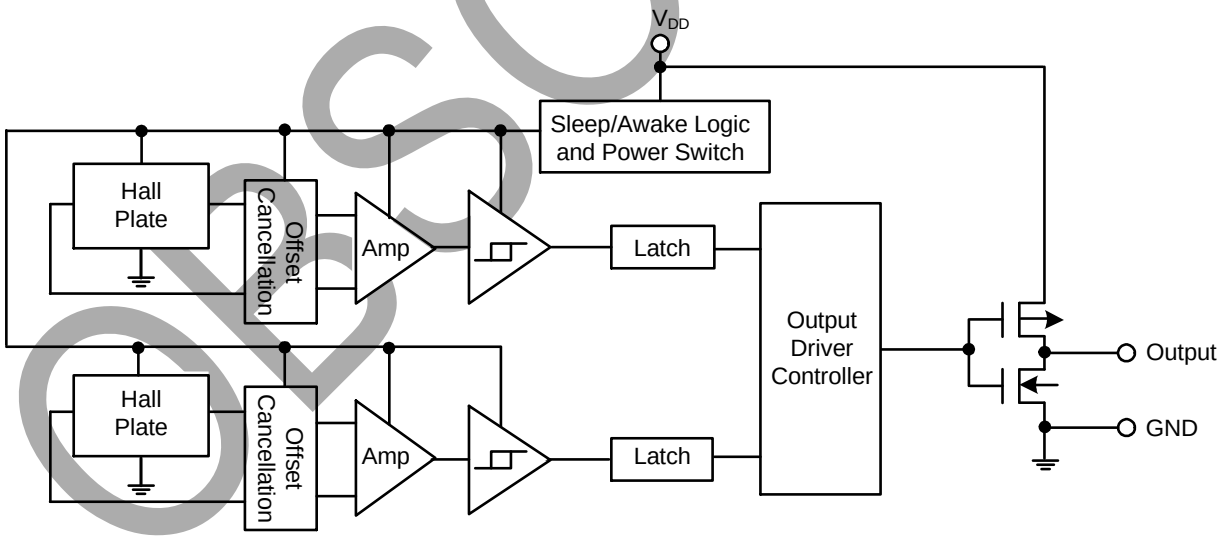
Note: Cin is for power stabilization and to strengthen the noise immunity, C = 100nF or higher must be used.

Pin Descriptions

Pin Name	P/I/O	Description
V_{DD}	P/I	Power Supply Input
GND	P/I	Ground
Output	O	Output Pin
NC	NC	No Connection (Note 4)

Note: 4. NC is "No Connection" which is not connected internally. This pin can be left open or tied to ground.

Functional Block Diagram



Absolute Maximum Ratings (T_A = +25°C, Note 5)

Symbol	Characteristics		Values	Unit
V_{DD}	Supply Voltage (Note 6)		5.0	V
$V_{DD\ rev}$	Reverse Supply Voltage		-0.3	V
B	Magnetic Flux Density		Unlimited	
T_S	Storage Temperature Range		-65 to +150	°C
P_D	Package Power Dissipation	X1-DFN1216-4	230	mW
		SC59	270	
T_J	Maximum Junction Temperature		+150	°C

Notes: 5. 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.

6. The absolute maximum of 5V is a transient stress rating and is not meant as functional operating conditions. 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)

Symbol	Characteristics	Conditions	Rating	Unit
V_{DD}	Supply Voltage	C_{IN} = 0.1µF (Note 7)	2.5 to 3.6	V
T_A	Operating Temperature Range	Operating	-40 to +85	°C

Note: 7. Decoupling capacitor C_{IN} = 100nF or higher must be used for full 2.5V to 3.6V supply range.

Electrical Characteristics (T_A = +25°C, V_{DD} = 3.3V, unless otherwise specified.)

Symbol	Characteristics	Conditions	Min	Typ.	Max	Unit
V_{OL}	Output Low Voltage (On)	I_{OUT} = 1mA	—	0.1	0.2	V
V_{OH}	Output High Voltage (Off)	I_{OUT} = -1mA	V_{DD}-0.2	V_{DD}-0.1	—	V
$I_{dd(en)}$	Supply Current	Chip Enable	—	4	—	mA
$I_{dd(dis)}$		Chip Disable	—	8	—	µA
$I_{dd(avg)}$		Average Supply Current	—	12	—	µA
t_{awake}	Awake Time	(Note 8)	—	50	100	µs
t_{period}	Period	(Note 8)	—	50	100	ms
D.C.	Duty Cycle	—	—	0.1	—	%

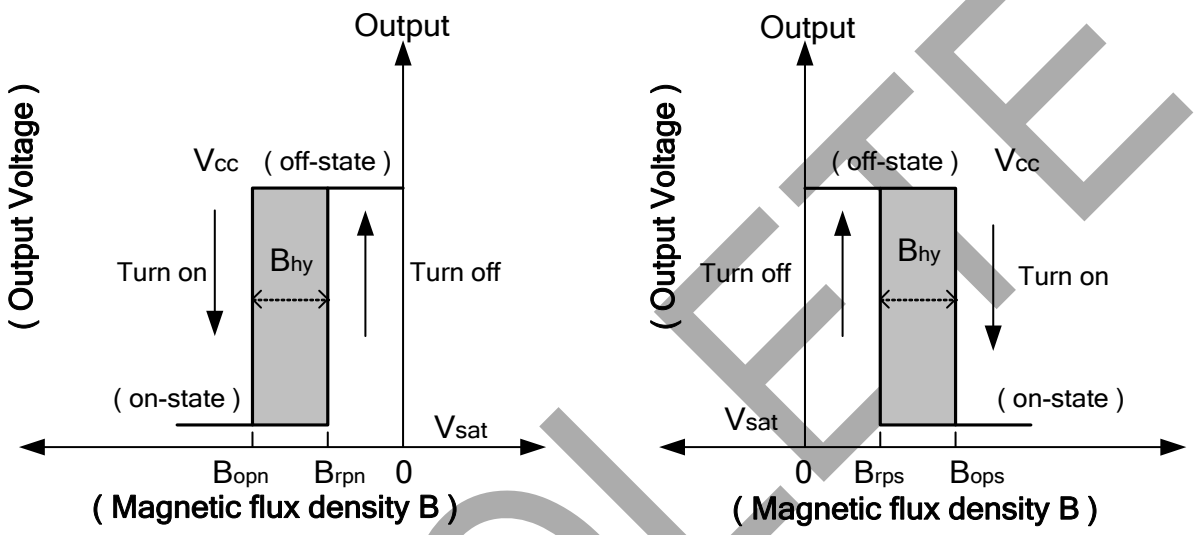
Note: 8. When power is initially on, the operating V_{DD} (2.5V to 3.6V) must be applied to be guaranteed for the output sampling. The output state is valid after the second operating phase (typical 100ms).

Magnetic Characteristics (T_A = +25°C, V_{DD} = 3.3V, Note 9)

(1mT = 10 Gauss)

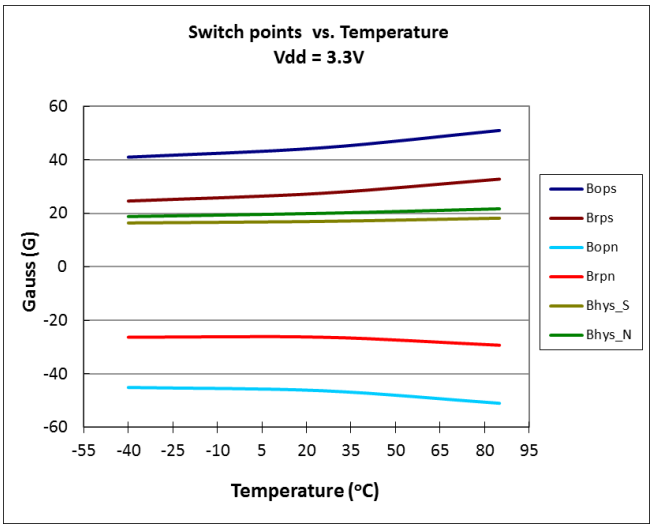
Symbol	Characteristics	Min	Typ.	Max	Unit
Bops (South Pole to Brand Side)	Operation Point	20	40	60	Gauss
Bopn (North Pole to Brand Side)		-60	-40	-20	
Brps (South Pole to Brand Side)	Release Point	15	32	—	
Brpn (North Pole to Brand Side)		—	-32	-15	
Bhy (|Bopx|-|Brpx|)	Hysteresis	—	8	—	

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

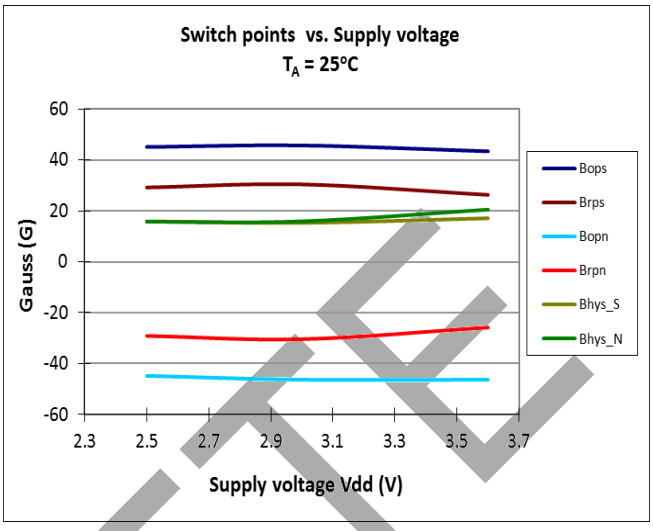


Typical Characteristics

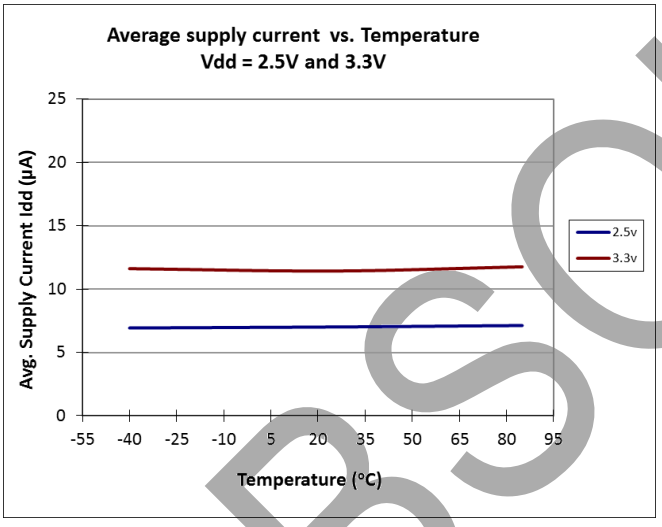
Typical Switch Point Bop and Brp vs. Temperature



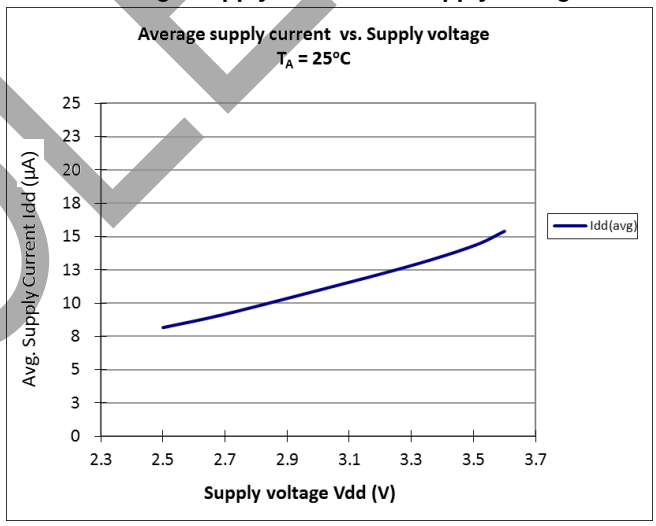
Typical Switch Points Bop and Brp vs. Supply Voltage



Average Supply Current vs. Temperature



Average Supply Current vs. Supply Voltage



Ordering Information

AH1804 - XX - 7 X

Package	Packing	Magentic Characteristics
FA : X1-DFN1216-4 W : SC59	7 : Tape & Reel	- Blank : Option 1 (Note 10)

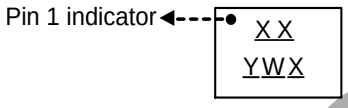
Part Number	Part Number Suffix	Package Code	Package (Note 11)	Magentic Characteristics (Note 10)	Packing	
					Qty.	Carrier
AH1804-FA-7	-7	FA	X1-DFN1216-4	-Blank	3000	7” Tape & Reel
AH1804-W-7	-7	W	SC59	-Blank	3000	7” Tape & Reel

Notes: 10. Please refer to the *Magnetic Characteristics* table.
11. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

(1) X1-DFN1216-4

(Top View)

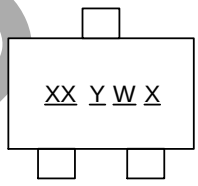


XX : Identification Code
Y : Year : 0 to 9
W : Week : A to Z : week 1 to 26;
a to z : week 27 to 52; z represents week 52 and 53
X : Internal code

Part Number	Package	Identification Code
AH1804-FA-7	X1-DFN1216-4	KJ

(2) SC59 (commonly known as SOT23 in Asia)

(Top View)



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

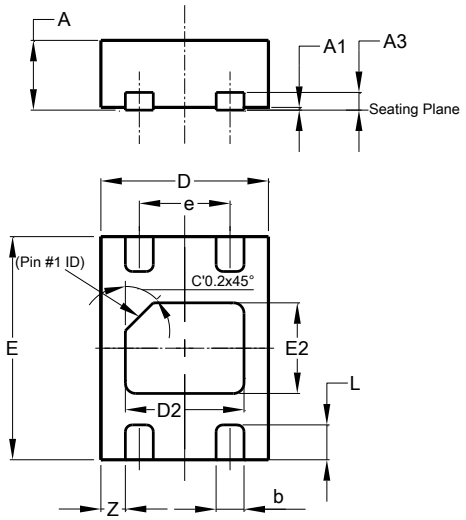
Part Number	Package	Identification Code
AH1804-W-7	SC59	WJ

Package Outline Dimensions

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

(1) Package Type: X1-DFN1216-4

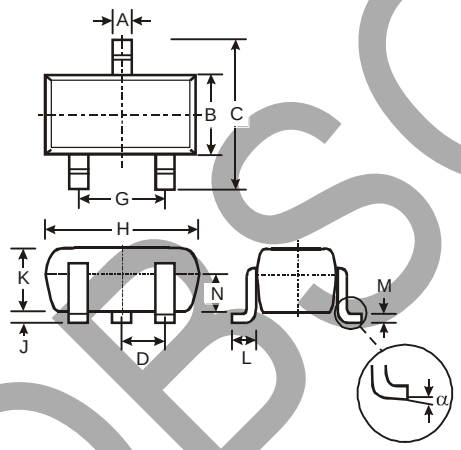
X1-DFN1216-4



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			

(2) Package Type: SC59 (commonly known as SOT23 in Asia)

SC59



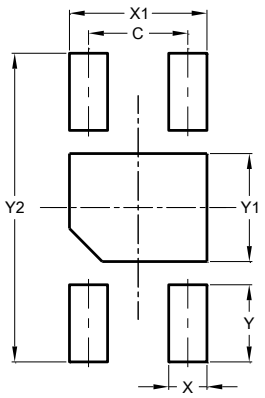
SC59			
Dim	**Min**	**Max**	**Typ**
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
G	-	-	1.90
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout

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

(1) Package Type: X1-DFN1216-4

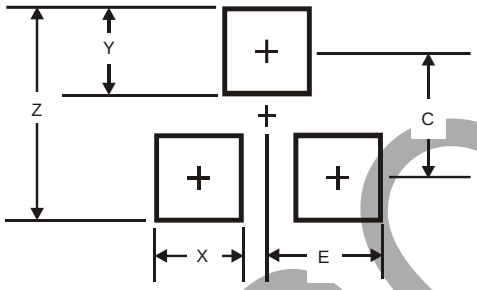
X1-DFN1216-4



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

(2) Package Type: SC59

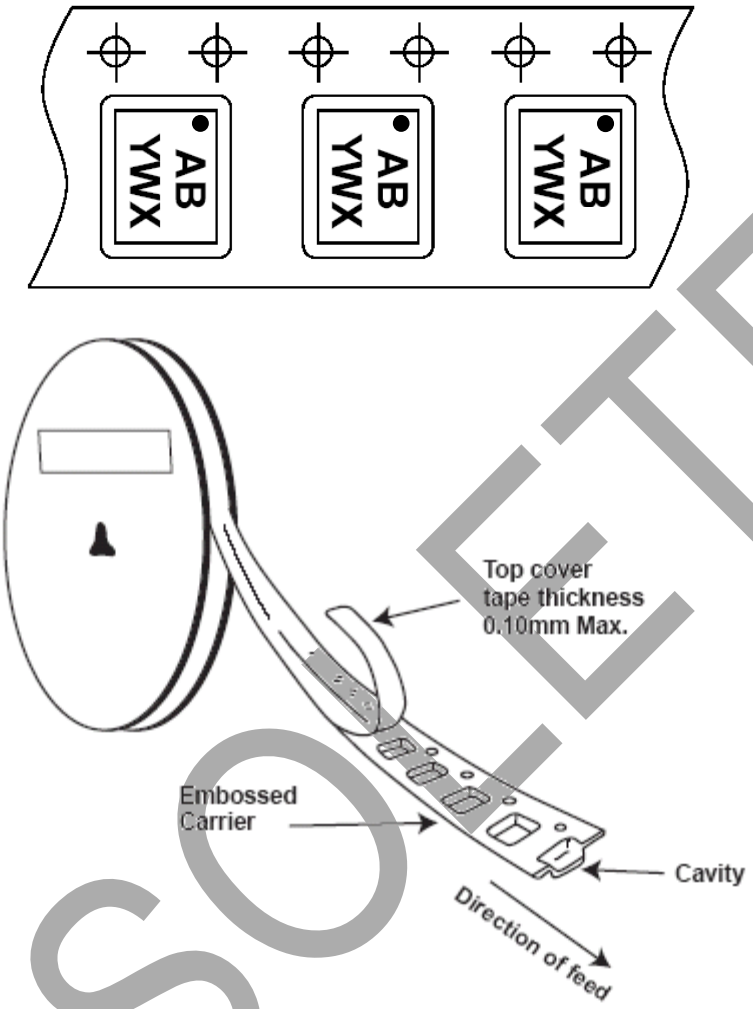
SC59



Dimensions	Value (in mm)
Z	3.4
X	0.8
Y	1.0
C	2.4
E	1.35

Taping Orientation (Note 12)

X1-DFN1216-4



Note: 12. The taping orientation of the other package type can be found on our website at https://www.diodes.com/assets/Packaging-Support-Docs/ap02007.pdf.

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