

## Description

The 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 12 $\mu$ A 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**).

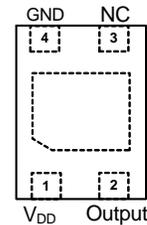
The AH1804 is available in SC59 and small low profile DFN1216-4 packages.

## 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 DFN1216-4 and SC59 packages
- ESD (HBM) > 5KV
- "Green" Molding Compound

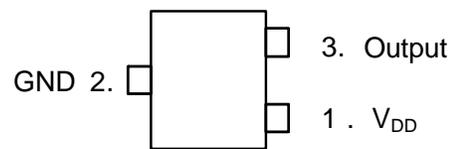
## Pin Assignments

### (Top View)



**DFN1216-4**

### (Top View)

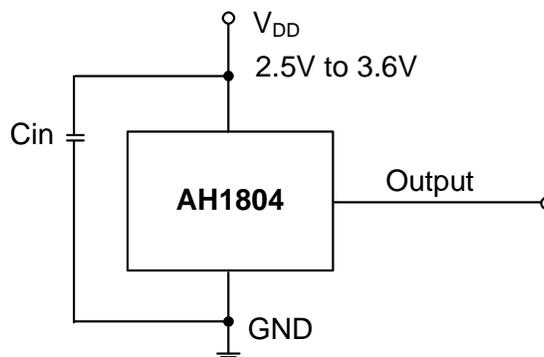


**SC59**

## Applications

- Cover switch in clam-shell and slide cellular phones
- Cover switch in portable PC's, Tablets and PDA
- Display screen open/close detect in Digital camcorders
- Contact-less switch in portable battery powered consumer and industrial products

## Typical Application Circuit



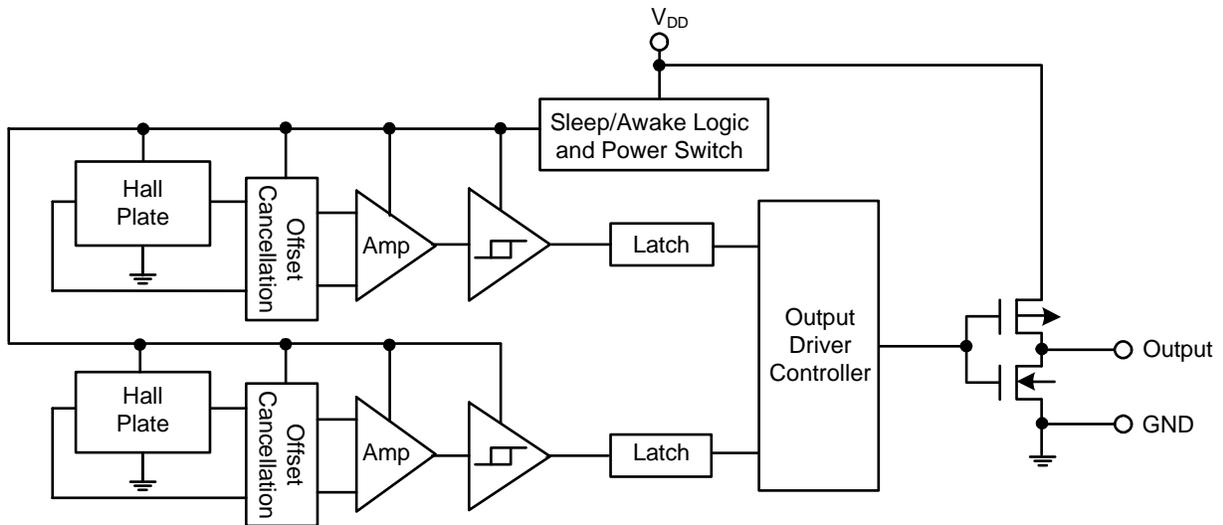
Note: Cin is for power stabilization and to strengthen the noise immunity, C = 100nF or higher must be used.

**Pin Descriptions**

Pin Name	P/I/O	Description
V <sub>DD</sub>	P/I	Power Supply Input
GND	P/I	Ground
Output	O	Output Pin
NC	NC	No Connection (Note 1)

Notes: 1. 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 ( $T_A = 25^\circ\text{C}$ , Note 2)

Symbol	Characteristics	Values	Unit
$V_{DD}$	Supply voltage (Note 3)	5.0	V
$V_{DD\text{ rev}}$	Reverse supply voltage	-0.3	V
B	Magnetic flux density	Unlimited	
$T_s$	Storage Temperature Range	-65 to +150	$^\circ\text{C}$
$P_D$	Package Power Dissipation	DFN1216-4	230
		SC59	270
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$

- 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 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 ( $T_A = 25^\circ\text{C}$ )

Symbol	Characteristics	Conditions	Rating	Unit
$V_{DD}$	Supply Voltage	$C_{IN} = 0.1\mu\text{F}$ (Note 4)	2.5 to 3.6	V
$T_A$	Operating Temperature Range	Operating	-40 to +85	$^\circ\text{C}$

- Notes:
- Decoupling capacitor  $C_{IN} = 100\text{nF}$  or higher must be used for full 2.5V to 3.6V supply range.

### Electrical Characteristics ( $T_A = 25^\circ\text{C}$ , $V_{DD} = 3.3\text{V}$ , unless otherwise specified)

Symbol	Characteristics	Conditions	Min	Typ.	Max	Unit
$V_{OL}$	Output Low Voltage (on)	$I_{OUT} = 1\text{mA}$	—	0.1	0.2	V
$V_{OH}$	Output High Voltage (off)	$I_{OUT} = -1\text{mA}$	$V_{DD}-0.2$	$V_{DD}-0.1$	—	V
$I_{dd(en)}$	Supply current	Chip enable	—	4	—	mA
$I_{dd(dis)}$		Chip disable	—	8	—	$\mu\text{A}$
$I_{dd(avg)}$		Average supply current,	—	12	—	$\mu\text{A}$
$T_{awake}$	Awake Time	(Note 5)	—	50	100	$\mu\text{s}$
$T_{period}$	Period	(Note 5)	—	50	100	ms
D.C.	Duty Cycle		—	0.1	—	%

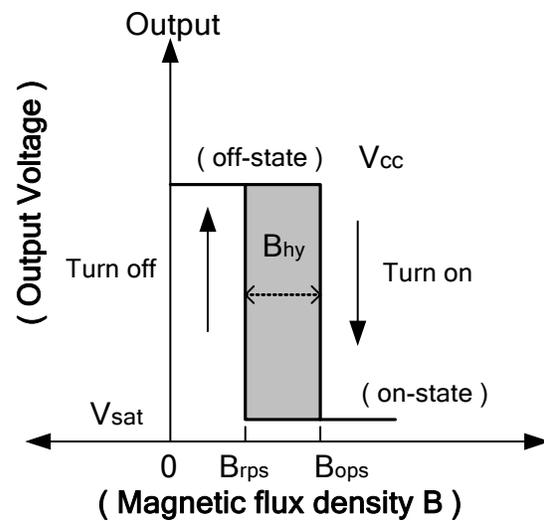
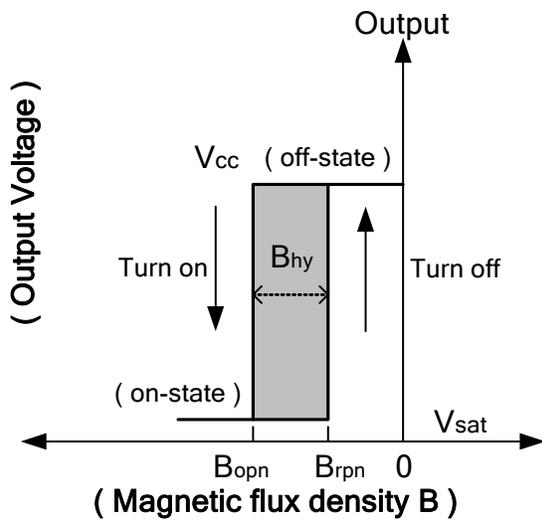
- Notes:
- When power is initially on, the operating  $V_{DD}$  (2.5V to 3.6V) must be applied to be guaranteed for the output sampling. The output state is valid after the second operating phase (typical 100ms).

**Magnetic Characteristics** ( $T_A = 25^\circ\text{C}$ ,  $V_{DD} = 3.3\text{V}$ , Note 6)

(1mT=10 Gauss)

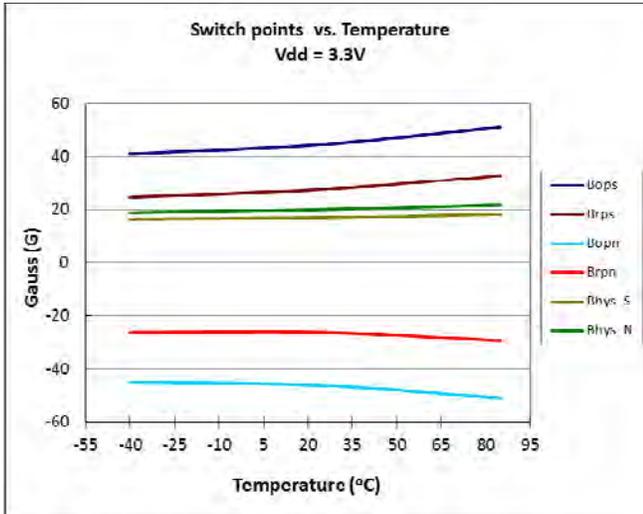
Symbol	Characteristics	Min	Typ.	Max	Unit
Bops(south pole to brand side)	Operation Point	20	40	60	Gauss
Bopn(north pole to brand side)		-60	-40	-20	
Brps(south pole to brand side)	Release Point	15	32	-	
Brpn(north pole to brand side)		-	-32	-15	
Bhy ( $ B_{opx}  -  B_{rpx} $ )	Hysteresis		8	-	

Notes: 6. The magnetic characteristics may vary with operating temperature and after soldering.

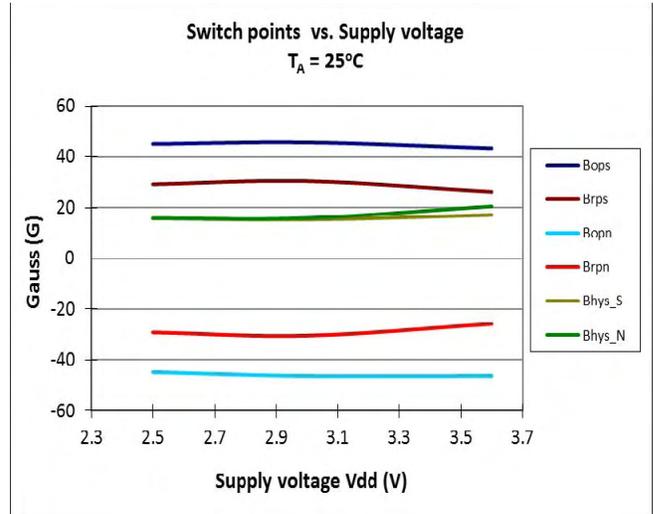


**Typical Characteristics**

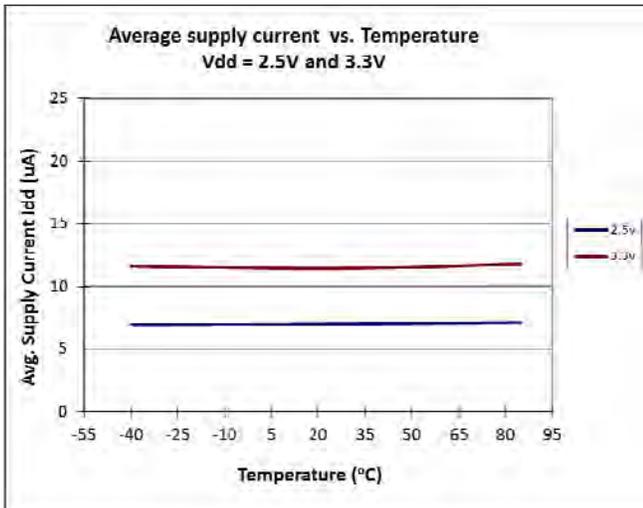
**Typical Switch Point Bop and Brp vs. Temperature**



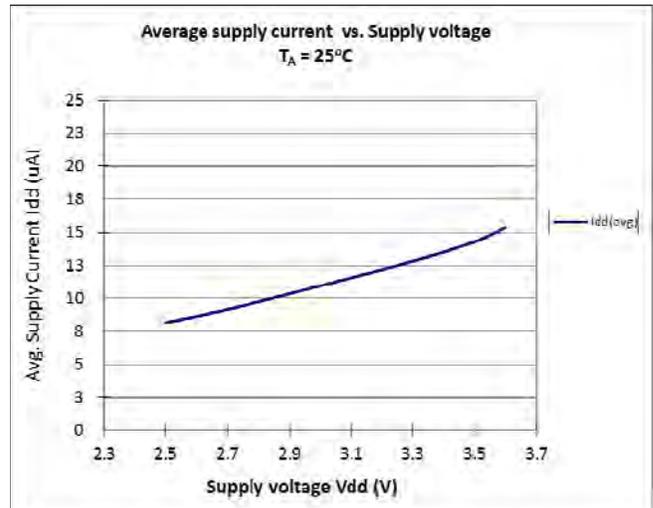
**Typical Switch Points Bop and Brp vs. Supply Voltage**



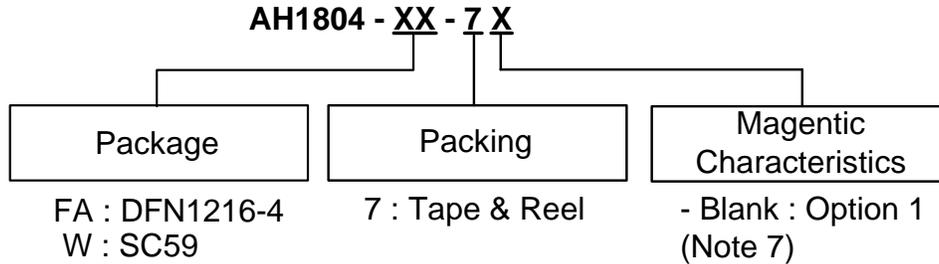
**Average Supply Current vs. Temperature**



**Average Supply Current vs. Supply Voltage**



**Ordering Information**

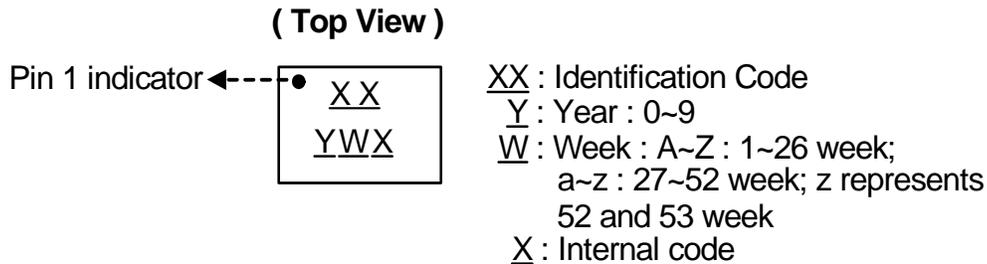


Device (Note 8)	Package Code	Packaging (Note 9)	7" Tape and Reel		Magnetic Characteristics (Note 7)
			Quantity	Part Number Suffix	
AH1804-FA-7	FA	DFN1216-4	3000/Tape & Reel	-7	-Blank
AH1804-W-7	W	SC59	3000/Tape & Reel	-7	-Blank

- Notes:
- Please refer the Magnetic Characteristics table.
  - EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html).
  - Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>

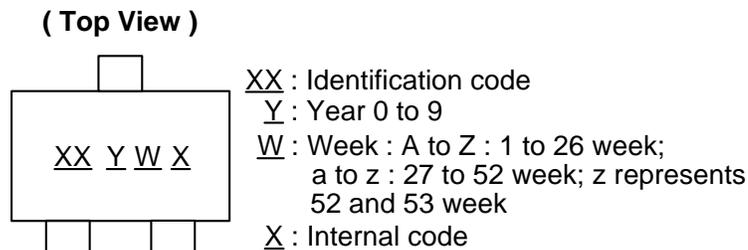
**Marking Information**

**(1) DFN1216-4**



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

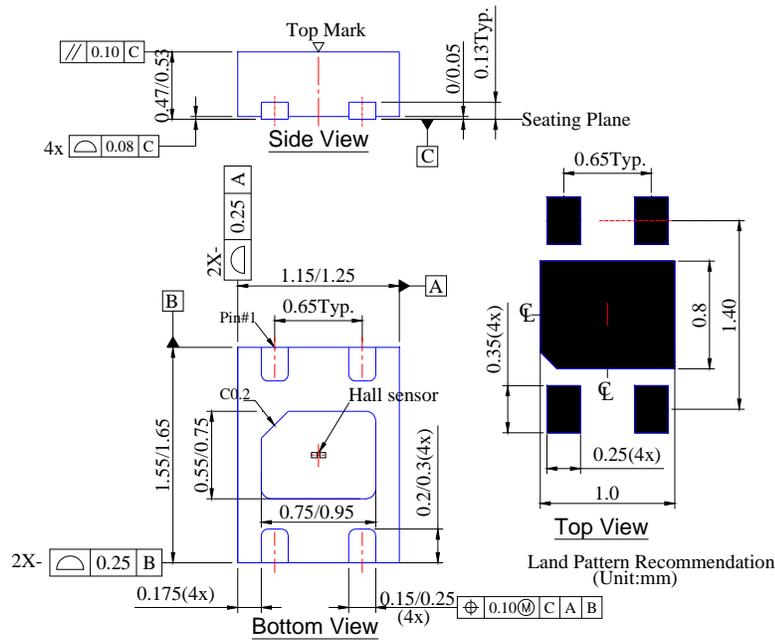
**(2) SC59 (commonly known as SOT23 in Asia)**



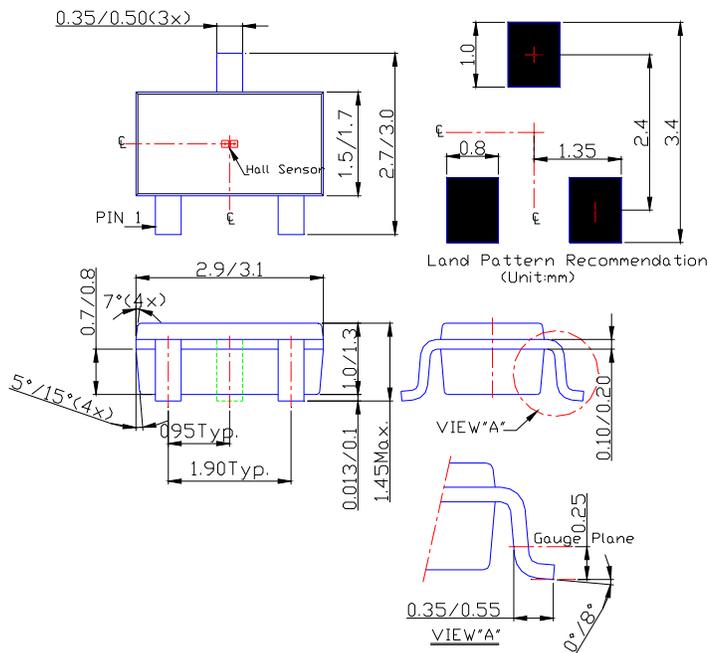
Part Number	Package	Identification Code
AH1804-W-7	SC59	WJ

**Package Outline Dimensions (All Dimensions in mm)**

**(1) Package type: DFN1216-4**

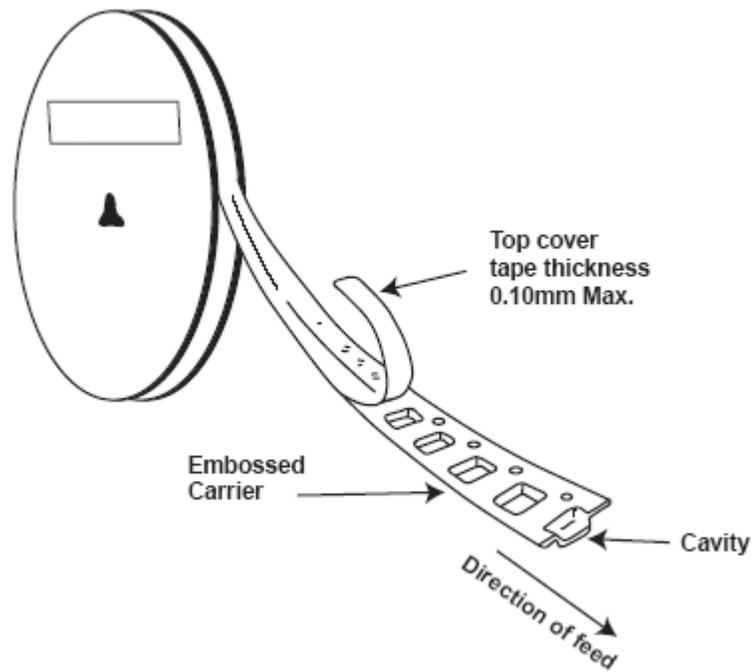
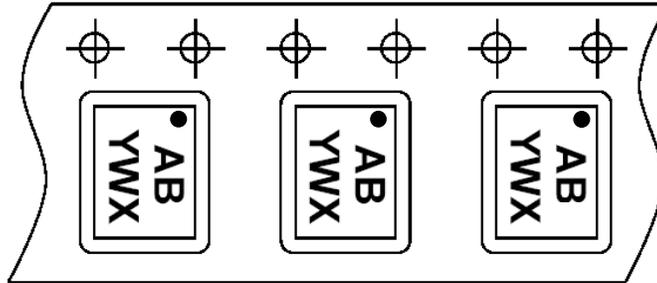


**(2) Package Type: SC59 (commonly known as SOT23 in Asia)**



**Taping Orientation (Note 10)**

DFN1216-4



Notes: 10. The taping orientation of the other package type can be found on our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

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