

## Description

The AH180N is a high sensitivity, micro power Omnipolar Hall Effect switch IC designed for portable and battery powered equipment such as cellular phones, PDA' s and portable PC' s. Based on two sensitive Hall Effect plates and a chopper stabilized architecture the AH180N provides a reliable solution over the whole operating range. To support portable and battery powered equipment the design has been optimized to operate over the supply range of 2.5V to 5.5V and consumes only 24 $\mu$ A with a supply of 3V.

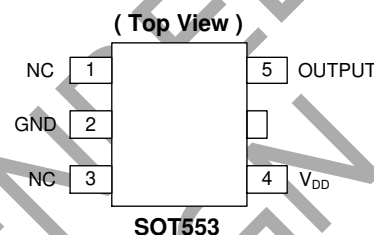
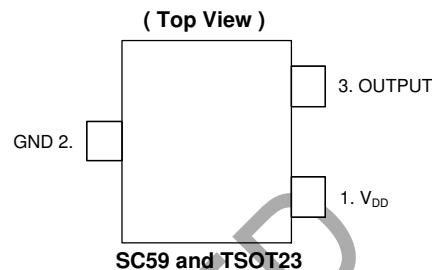
The single open drain output can switched on with either a North or South pole of sufficient strength. When the magnetic flux density (B) is larger than operate point (Bop) the output is switched on (pulled low). The output is turned off when B becomes lower than the release point (Brp). The output will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

## Features

- Omnipolar (North or South pole) Operation
- High Sensitivity
- Single Open Drain Output
- Micropower Operation
- 2.5V to 5.5V Operating Range
- Chopper Stabilized Design Provides
  - Superior Temperature Stability
  - Minimal Switch Point Drift
  - Enhanced Immunity to Stress
- Good RF Noise Immunity
- -40°C to +85°C Operating Temperature
- ESD (HBM) > 6KV
- SC59 (SOT23), TSOT23, and SOT553 Low Profile Packages
- **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) & 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.

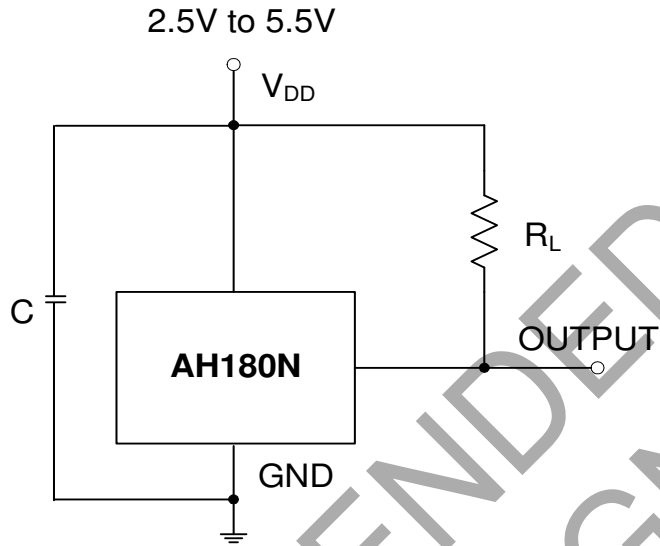
## Pin Assignments



## Applications

- Cover Switch in Clam-Shell or Slide Type Cellular Phones
- Display Switch for Portable PCs
- On/Off Switch for PDAs and Digital Cameras
- Contact-Less Switch in Consumer Products

**Typical Applications Circuit**

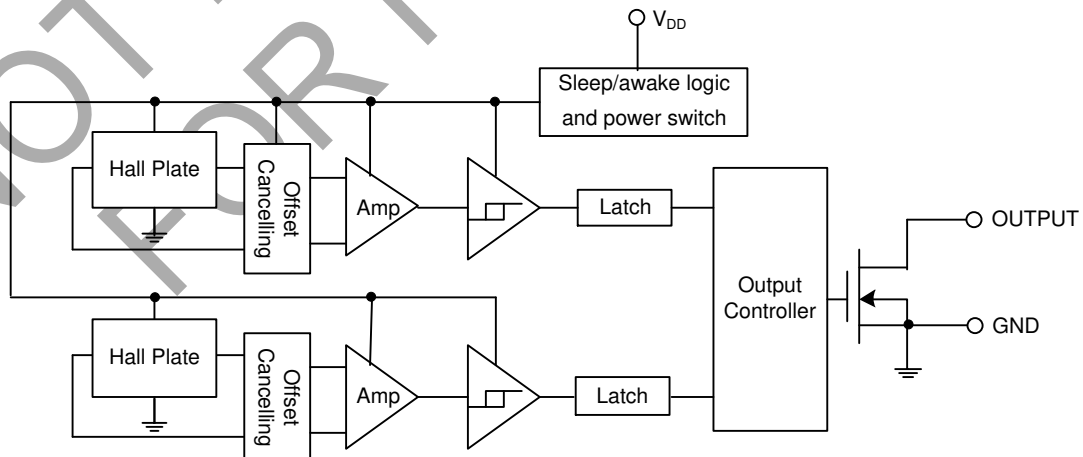


Note: C is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 10nF ~ 100nF.  
RL is the pull-up resistor, the recommended resistance is 10kOhm ~ 100kOhm.

**Pin Descriptions**

Pin Name	P/I/O	Function
V <sub>DD</sub>	P/I	Power Supply Input
GND	P/I	Ground
Output	O	Output Pin

**Functional Block Diagram**



**Absolute Maximum Ratings** (Note 4) (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Ratings	Unit
$V_{DD}$	Supply Voltage (Note 5)	7	V
B	Magnetic Flux Density	Unlimited	
$P_D$	Package Power Dissipation	SC59	230
		TSOT23	230
		SOT553	230
$T_s$	Storage Temperature Range	-65 to +150	$^\circ\text{C}$
$T_J$	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  $V_{DD}$  of 7V 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.

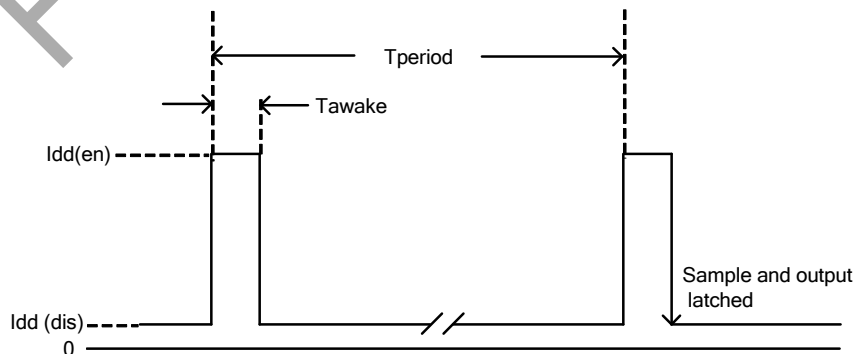
**Recommended Operating Conditions** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Conditions	Rating	Unit
$V_{DD}$	Supply Voltage	Operating	2.5 to 5.5	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	Parameter	Conditions	Min	Typ	Max	Unit
$V_{OUT}$	Output On Voltage	$I_{OUT} = 1\text{mA}$	—	0.1	0.3	V
$I_{off}$	Output Leakage Current	$V_{OUT} = 5.5\text{V}$ , Output Off	—	<0.1	1	$\mu\text{A}$
$I_{dd(en)}$	Supply Current	Chip Enable, $T_A = +25^\circ\text{C}$ , $V_{DD} = 3\text{V}$	—	3	6	mA
$I_{dd(en)}$		Chip Enable, $T_A = -40$ to $+85^\circ\text{C}$ , $V_{DD} = 2.5\text{V}$ to $5.5\text{V}$	—	3	12	mA
$I_{dd(dis)}$		Chip Disable, $T_A = +25^\circ\text{C}$ , $V_{DD} = 3\text{V}$	—	5	10	$\mu\text{A}$
$I_{dd(dis)}$		Chip Disable, $T_A = -40$ to $85^\circ\text{C}$ , $V_{DD} = 2.5\text{V}$ to $5.5\text{V}$	—	5	28	$\mu\text{A}$
$I_{dd(ave)}$		Average Supply Current, $T_A = +25^\circ\text{C}$ , $V_{DD} = 3\text{V}$	—	8	16	$\mu\text{A}$
$I_{dd(ave)}$		Average Supply Current, $T_A = -40$ to $+85^\circ\text{C}$ , $V_{DD} = 2.5\text{V}$ to $5.5\text{V}$	—	8	40	$\mu\text{A}$
$T_{awake}$	Awake Time	(Note 6)	—	75	125	$\mu\text{s}$
$T_{period}$	Period	(Note 6)	—	75	125	ms
D.C.	Duty Cycle	—	—	0.1	—	%

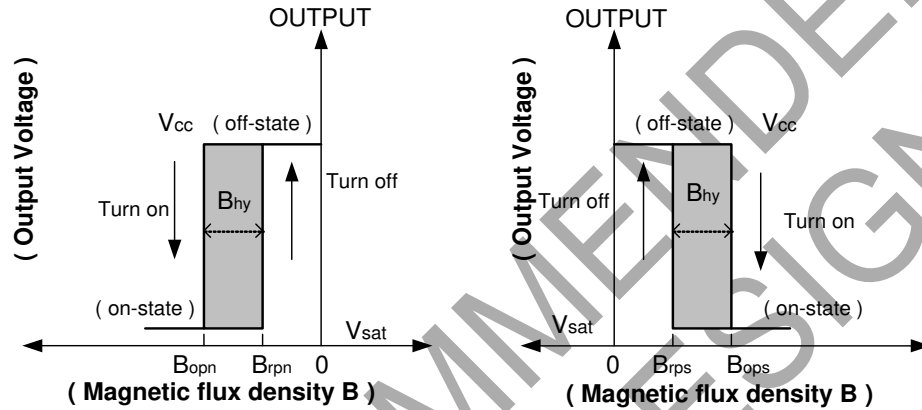
- Notes:
- When power is initially turned on,  $V_{DD}$  must be within its correct operating range (2.5V to 5.5V) to guaranteed the output sampling. The output state is valid after the second operating cycle (typical 150ms).



**Magnetic Characteristics** (Note 7 & 8) (@ $T_A = +25^\circ\text{C}$ ,  $V_{DD} = 3\text{V}$ , unless otherwise specified.)

Symbol	Parameter	Min	Typ	Max	Unit
Bops(south pole to brand side)	Operation Point	—	35	50	Gauss
Bopn(north pole to brand side)		-50	-35	—	
Brps(south pole to brand side)	Release Point	10	25	—	
Brpn(north pole to brand side)		—	-25	-10	
Bhy( Bopx - Brpx )	Hysteresis	—	10	—	

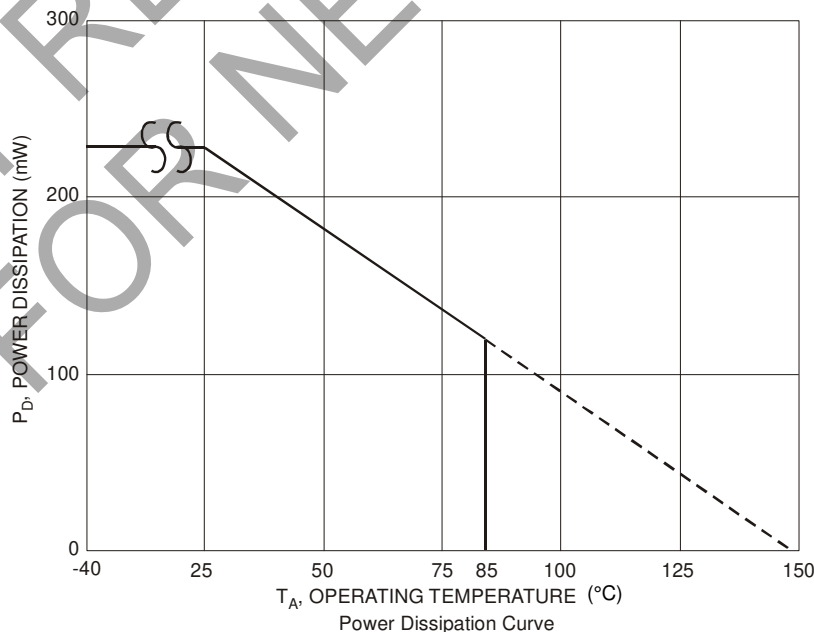
Notes: 7. Typical data is at  $T_A = +25^\circ\text{C}$ ,  $V_{DD} = 3\text{V}$ , and for design information only.  
8. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.



**Performance Characteristics**

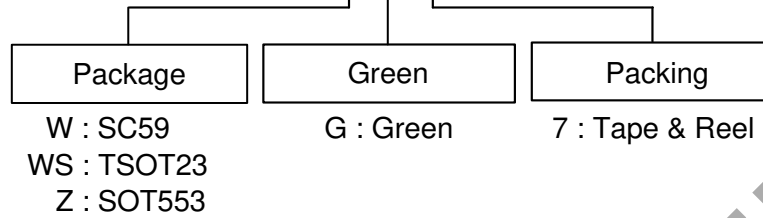
(1) SC59 (commonly known as SOT23 in Asia), TSOT23, and SOT553

$T_A$ ( $^\circ\text{C}$ )	25	50	60	70	80	85	90	100	110	120	130	140	150
$P_D$ (mW)	230	184	166	147	129	120	110	92	74	55	37	18	0



## Ordering Information

### AH 180N - XX G - 7



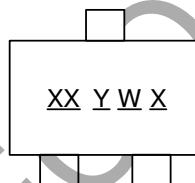
Device	Status (Note 9)	Package Code	Packaging	7" Tape and Reel	
				Quantity	Part Number Suffix
AH180N-WG-7	NRND	W	SC59	3000/Tape & Reel	-7
AH180N-WSG-7	NRND	WS	TSOT23	3000/Tape & Reel	-7
AH180N-ZG-7	NRND	Z	SOT553	3000/Tape & Reel	-7

Note: 9. NRND = Not Recommended for New Design.

## Marking Information

### (1) SC59 (commonly known as SOT23 in Asia) and TSOT23

(Top View)

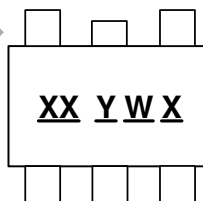


**XX** : Identification code  
**Y** : Year 0 to 9  
**W** : Week : A to Z : 1 to 26 week;  
           a to z : 27 to 52 week; z represents  
           52 and 53 week  
**X** : A to Z : Green

Part Number	Package	Identification Code
AH180N	SC59	K9
AH180N	TSOT23	N9

### (2) SOT553

(Top View)



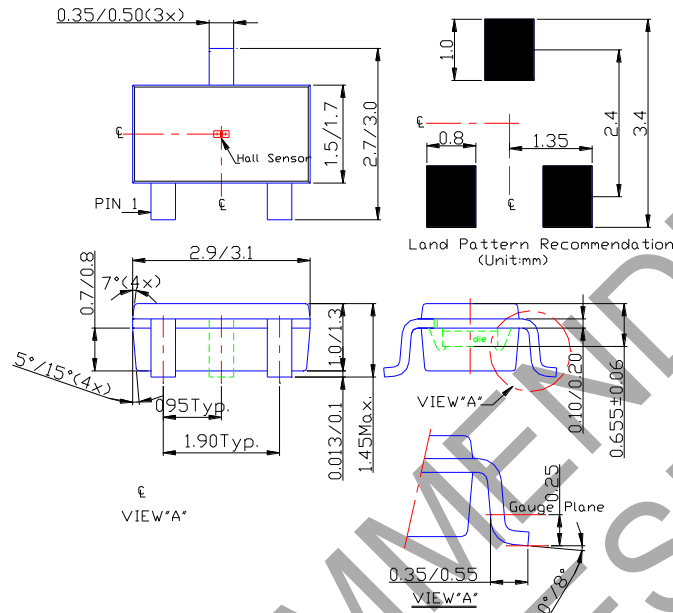
**XX** : Identification Code  
**Y** : Year : 0 to 9  
**W** : Week : A to Z : 1~26 week;  
           a to z : 27~52 week; z represents  
           52 and 53 week  
**X** : A to Z : Green

Part Number	Package	Identification Code
AH180N	SOT553	K9

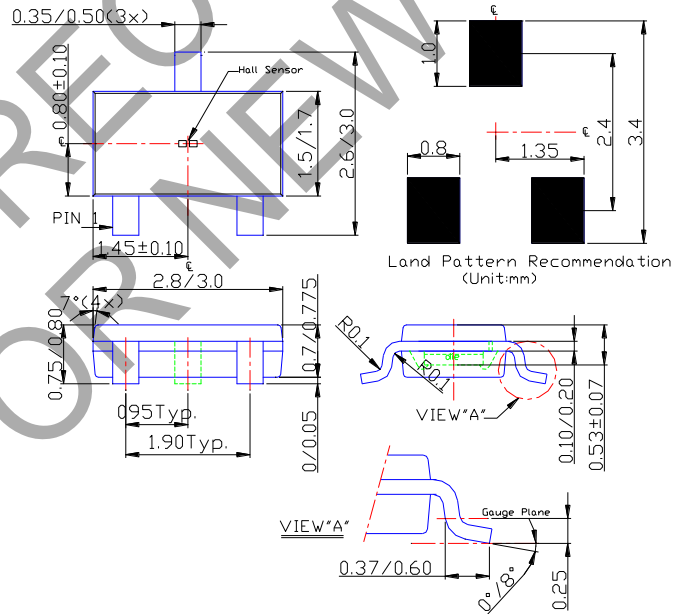
**Package Outline Dimensions** (All dimensions in mm.)

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

**(1) Package Type: SC59**



**(2) Package Type: TSOT23**





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