

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 μ A with a supply of 3V.

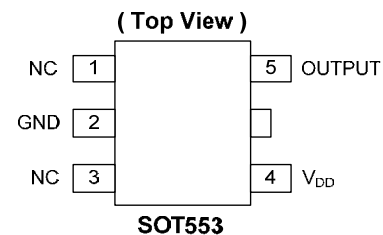
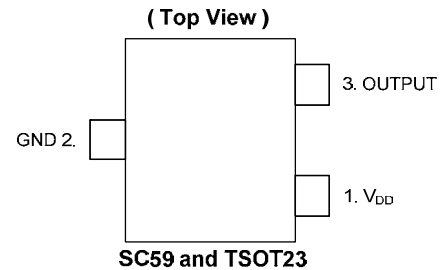
The single open drain output can switched on with either a North or South pole of sufficient strength. When the magnetic flux density (B) is larger than operate point (Bop) the output is switched on (pulled low). The output is turned off when B becomes lower than the release point (Brp). The output will 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) compliant.
 2. See <http://www.diodes.com> 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.

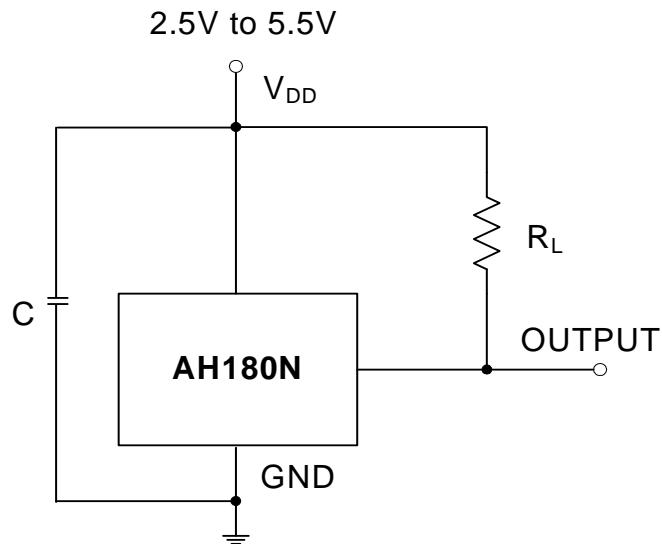
Pin Assignments



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

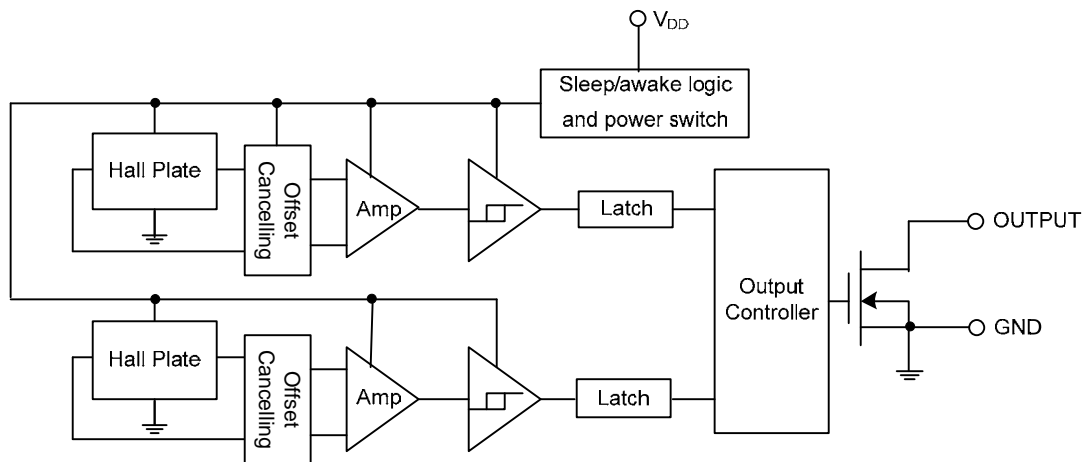


Note: C is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 10nF ~ 100nF.
RL is the pull-up resistor, the recommended resistance is 10kOhm ~ 100kOhm.

Pin Descriptions

| Pin Name | P/I/O | Function |
|-----------------|-------|--------------------|
| V _{DD} | P/I | Power Supply Input |
| GND | P/I | Ground |
| Output | O | Output Pin |

Functional Block Diagram



Absolute Maximum Ratings (Note 4) (@T_A = +25°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 | °C |
| T _J | Maximum Junction Temperature | 150 | °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.

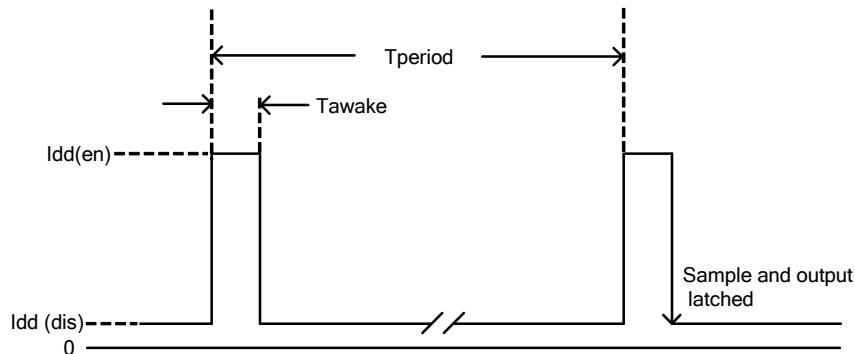
Recommended Operating Conditions (@T_A = +25°C, unless otherwise specified.)

| 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 | °C |

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------------|------------------------|---|-----|------|-----|------|
| V _{OUT} | Output On Voltage | I _{OUT} = 1mA | — | 0.1 | 0.3 | V |
| I _{off} | Output Leakage Current | V _{OUT} = 5.5V, Output Off | — | <0.1 | 1 | μA |
| I _{dd(en)} | Supply Current | Chip Enable, T _A = +25°C, V _{DD} = 3V | — | 3 | 6 | mA |
| I _{dd(en)} | | Chip Enable, T _A = -40 to +85°C, V _{DD} = 2.5V to 5.5V | — | 3 | 12 | mA |
| I _{dd(dis)} | | Chip Disable, T _A = +25°C, V _{DD} = 3V | — | 5 | 10 | μA |
| I _{dd(dis)} | | Chip Disable, T _A = -40 to 85°C, V _{DD} = 2.5V to 5.5V | — | 5 | 28 | μA |
| I _{dd(avg)} | | Average Supply Current, T _A = +25°C, V _{DD} = 3V | — | 8 | 16 | μA |
| I _{dd(avg)} | | Average Supply Current, T _A = -40 to +85°C, V _{DD} = 2.5V to 5.5V | — | 8 | 40 | μA |
| T _{awake} | Awake Time | (Note 6) | — | 75 | 125 | μs |
| T _{period} | Period | (Note 6) | — | 75 | 125 | ms |
| D.C. | Duty Cycle | | — | 0.1 | — | % |

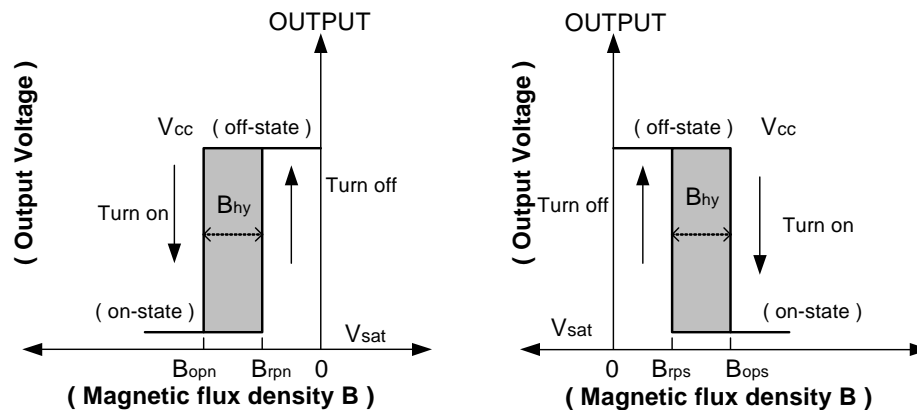
- Notes:
- When power is initially turned on, V_{DD} must be within its correct operating range (2.5V to 5.5V) to guaranteed the output sampling. The output state is valid after the second operating cycle (typical 150ms).



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 | — | |

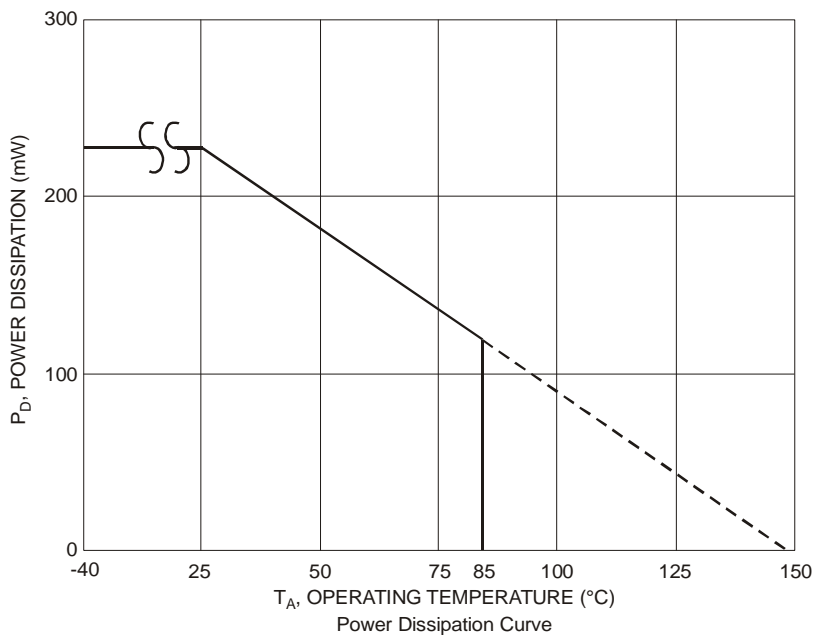
Notes: 7. Typical data is at $T_A = +25^\circ\text{C}$, $V_{DD} = 3\text{V}$, and for design information only.
8. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.



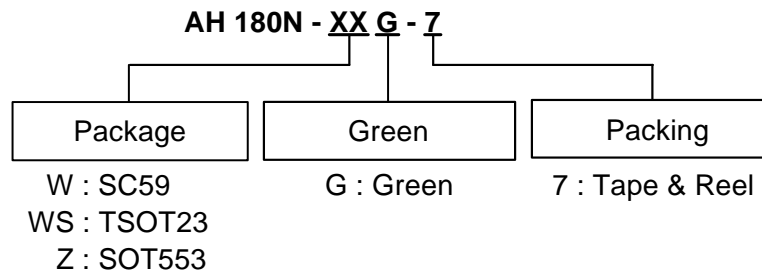
Performance Characteristics

(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

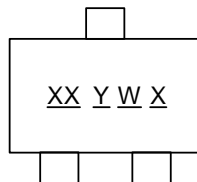


| Device | Package Code | Packaging | 7" Tape and Reel | |
|--------------|--------------|-----------|------------------|--------------------|
| | | | Quantity | Part Number Suffix |
| AH180N-WG-7 | W | SC59 | 3000/Tape & Reel | -7 |
| AH180N-WSG-7 | WS | TSOT23 | 3000/Tape & Reel | -7 |
| AH180N-ZG-7 | Z | SOT553 | 3000/Tape & Reel | -7 |

Marking Information

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

(Top View)

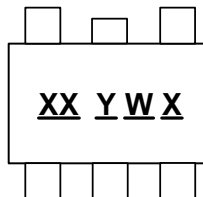


XX : Identification code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 week;
 a to z : 27 to 52 week; z represents 52 and 53 week
X : A to Z : Green

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH180N | SC59 | K9 |
| AH180N | TSOT23 | N9 |

(2) SOT553

(Top View)



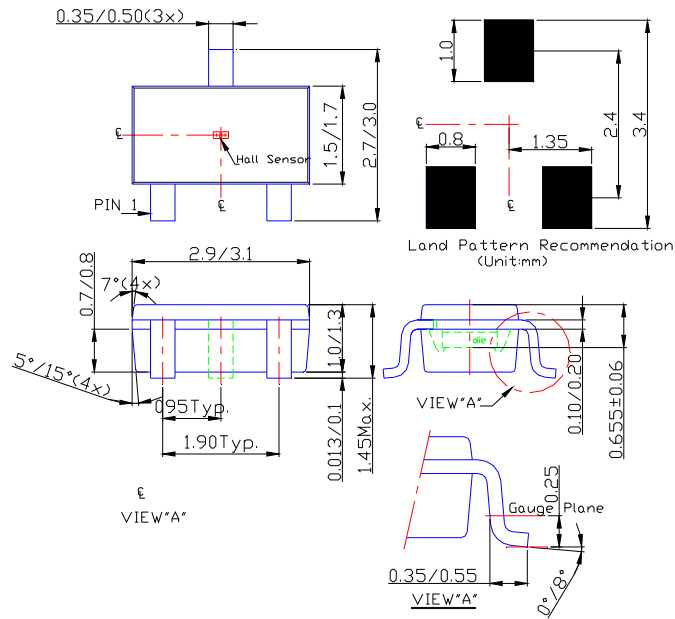
XX : Identification Code
Y : Year : 0 to 9
W : Week : A to Z : 1~26 week;
 a to z : 27~52 week; z represents 52 and 53 week
X : A to Z : Green

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH180N | SOT553 | K9 |

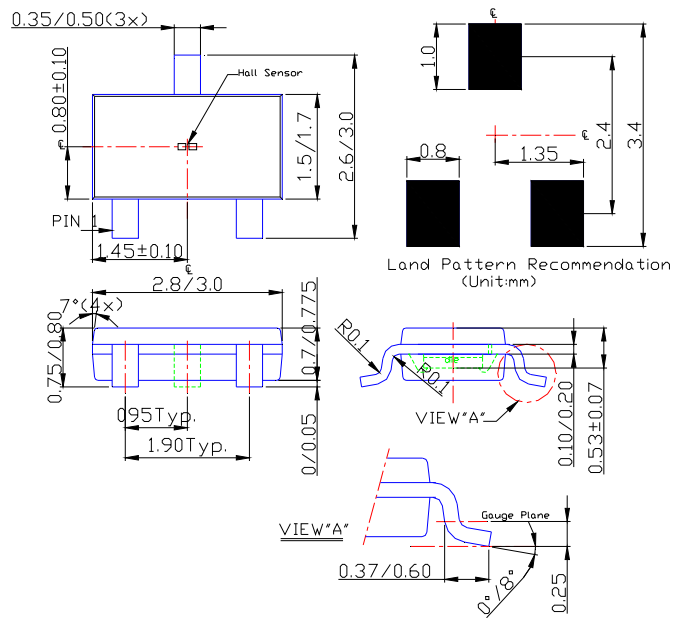
Package Outline Dimensions (All dimensions in mm.)

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

(1) Package Type: SC59

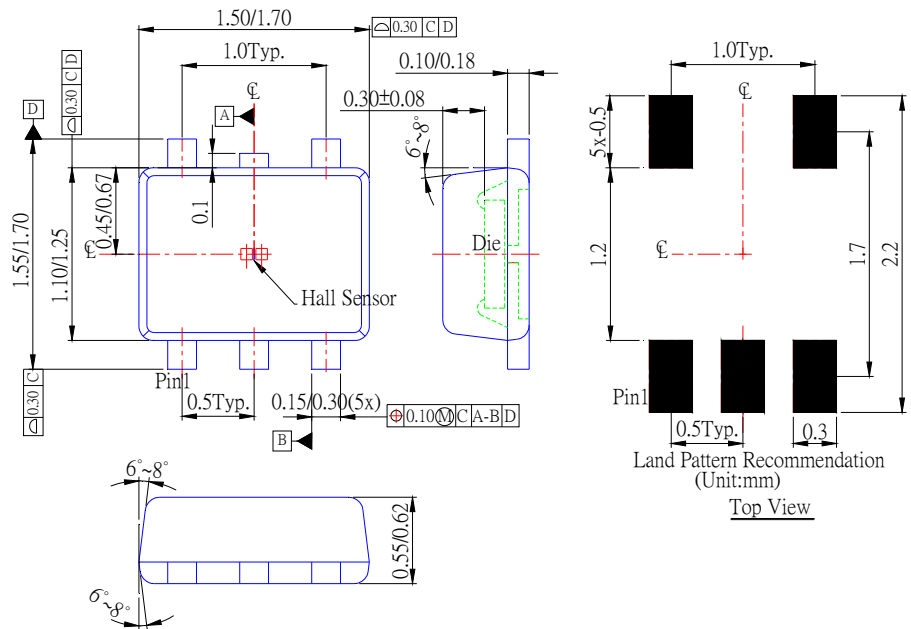


(2) Package Type: TSOT23



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

(3) Package Type: SOT553



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