HIGH SENSIVITY DUAL UNIPOLAR HALL-EFFECT SWITCH

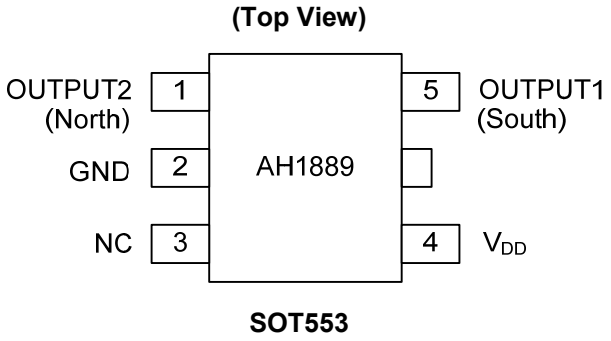
NEW PRODUCT

Description

AH1889 is a high sensitivity dual output Unipolar Hall effect IC which can detect either a North or South pole independently and switch one of its two outputs with internal pull up and pull down capability. The AH1889 is mainly designed for low voltage applications which require a quick response time and can operate over the supply voltage of 1.65V to 3.6V. To minimize PCB space AH1889 outputs have internal pull up and pull down capability and is packaged in a small low profile SOT553 package.

A South pole of sufficient strength will turn OUTPUT1 on and a North pole of sufficient strength with turn on OUTPUT2. While the magnetic flux density (B) perpendicular to the package is larger than operate point Bops or Bopn, the appropriate output will be turned on (pulled low), the output is held until B is lower than release point Brps or Brps, then turned off (high). The outputs will be turned off and will remain off when there is no magnetic field.

Pin Assignments



Features

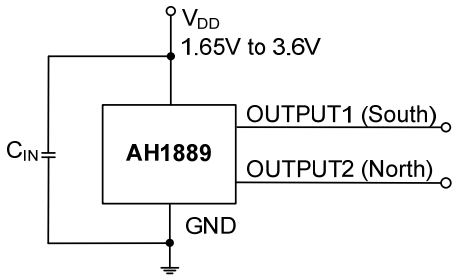
- Two Monolithic Unipolar Hall Effect Sensor Switch
  - Operation with a South Pole (OUTPUT1)
  - Operation with a North Pole (OUTPUT2)
- Supply Voltage of 1.65V to 3.6V
- Quick Response Time Without Sleep Mode
- Chopper Stabilized Design Provides:
  - Superior Temperature Stability
  - Extremely low Switch-Point Drift
  - Enhanced immunity to physical stress
- Good RF Noise Immunity
- -40°C to +85°C Operating Temperature
- ESD (Human Body Model) >4kV
- Small and Low Profile SOT553 package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Applications

- Position and proximity detection for consumer, office equipments and industrial applications
- Open and close detect switches for home appliances
- Door, lids, tray position detect switches
- Magnetic field direction detection
- Contact-less switches for consumer and industrial applications

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/quality/lead_free.html 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. C_{IN} is for power stabilization and to strengthen the noise immunity, the recommended capacitance 100nF typical.

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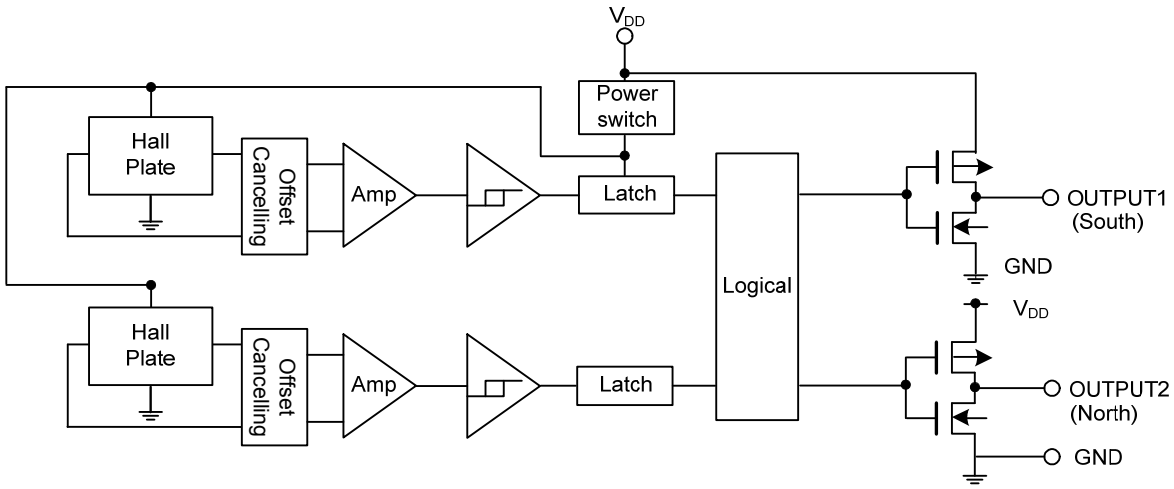
Pin Descriptions

Package: SOT553

Pin Number	Pin Name	Function
1	OUTPUT2	North Pole Setecting Output Pin (active low)
2	GND	Ground
3	NC	No Connection (Note 5)
4	V_{DD}	Power Supply Voltage
5	OUTPUT1	South Pole Detecting Output Pin (active low)

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)		5	V
V_{DD_REV}	Reverse Supply Voltage		-0.3	V
I_{OUTPUT}	Output current (source and sink)		1	mA
B	Magnetic Flux Density		Unlimited	
P_D	Package Power Dissipation	SOT553	230	mW
Ts	Storage Temperature Range		-65 to +150	°C
T_J	Maximum Junction Temperature		150	°C
ESD	Human Body Model ESD capability		4	kV

Notes: 6. 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.
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.

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

Symbol	Characteristic	Conditions	Rating	Unit
V_{DD}	Supply Voltage	Operating	1.65 to 3.6	V
T_A	Operating Temperature Range	Operating	-40 to +85	°C

Electrical Characteristics (Note 8) (@T_A = +25°C, V_{DD} = 1.8V, unless otherwise specified.)

Symbol	Characteristic	Conditions	Min	Typ	Max	Unit
V_{OH}	OUTPUT1 and OUTPUT2 High Voltage (off)	I_{OUT} = -0.5mA	V_{DD} -0.2	—	—	V
V_{OL}	OUTPUT1 and OUTPUT2 Low Voltage (on)	I_{OUT} = 0.5mA	—	0.1	0.2	V
I_{DD}	Supply Current	V_{DD} = 1.8V Outputs Off	—	2.1	—	mA
		V_{DD} = 3.6V Outputs Off	—	5	—	mA

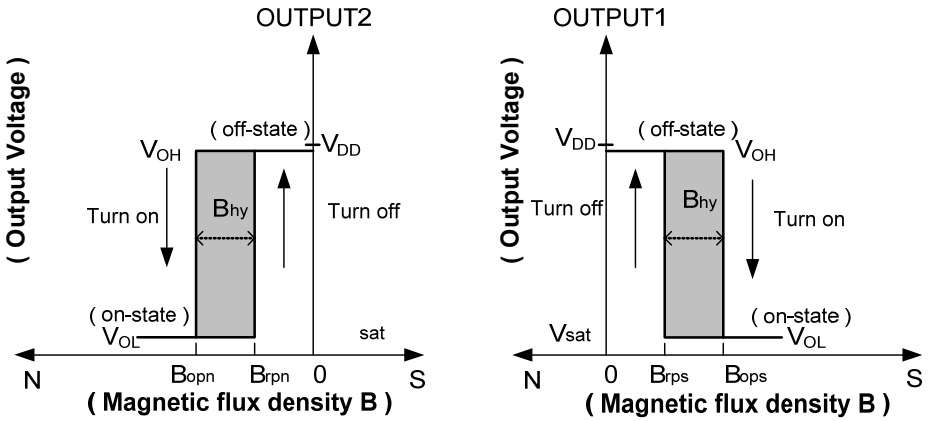
Note: 8. When power is initially turned on, the operating V_{DD} (1.65V to 3.6V) must be applied to guaranteed the output.

Magnetic Characteristics (Note 9, 10, 11) (@T_A = +25°C, V_{DD} = 1.8V, unless otherwise specified.)

(1mT=10 Gauss)

Output	Symbol	Characteristic	Min	Typ	Max	Unit
OUTPUT1	Bops (South pole to part marking side)	Operation Point	—	35	50	Gauss
	Brps (South pole to part marking side)	Release point	6	20	—	
OUTPUT2	Bopn (North pole to part marking side)	Operation Point	-50	-35	—	
	Brpn (North pole to part marking side)	Release point	—	-20	-6	
	Bhy (|Bopx|-|Brpx|)	Hysteresis	—	8	—	

Notes: 9. Typical data is at T_A = +25°C, V_{DD} = 3V, and for design information only.
10. Bops and Brps for OUTPUT1 pin responds to South pole only; Bopn and Brpn for OUTPUT2 pin responds to North pole only.
11. Magnetic characteristics may vary with operating temperature and after soldering.



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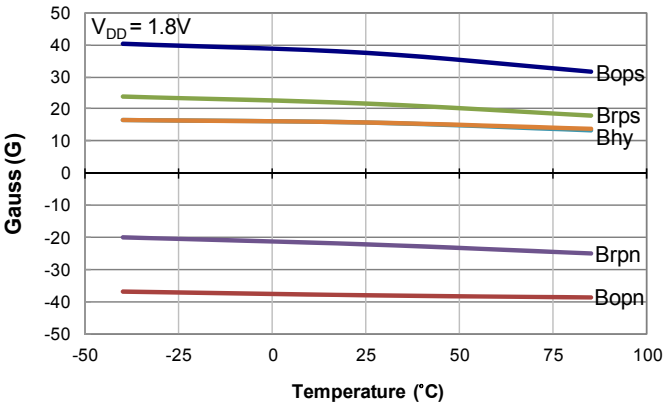
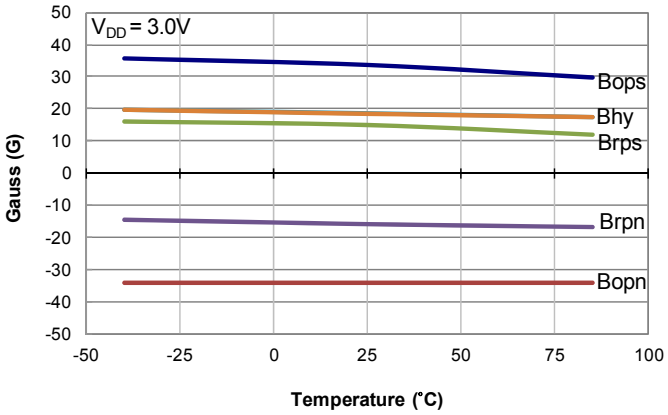
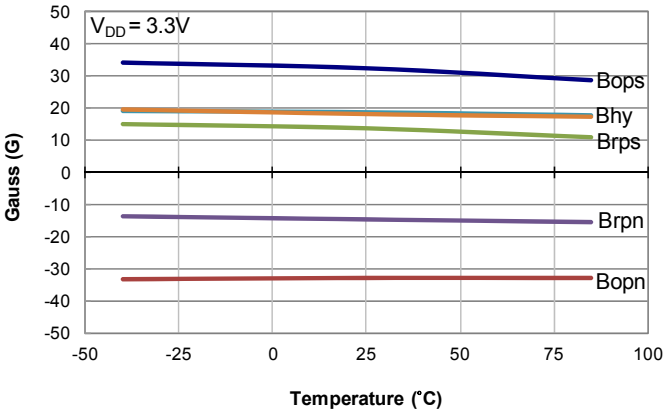
Typical Operating Characteristics



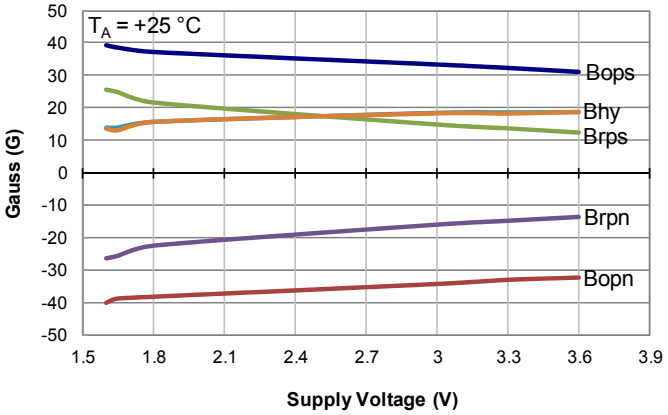
Switch Points vs Temperature



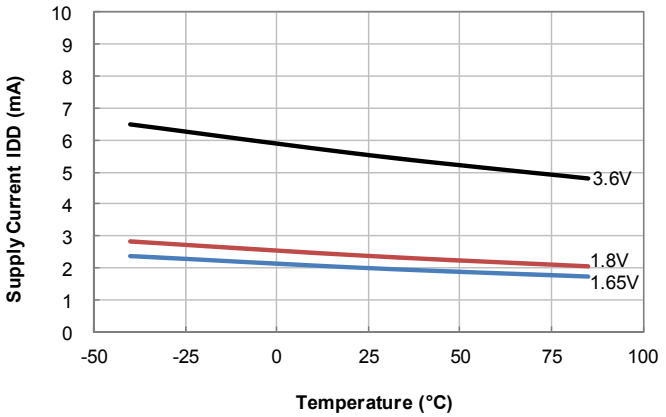
Switch Points vs Temperature



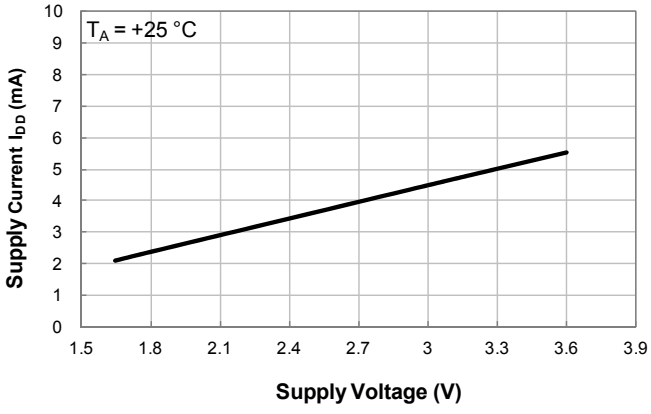
Switch Points vs Temperature



Switch Points vs Supply Voltage



Supply Current vs. Temperature



Supply Current vs. Supply Voltage

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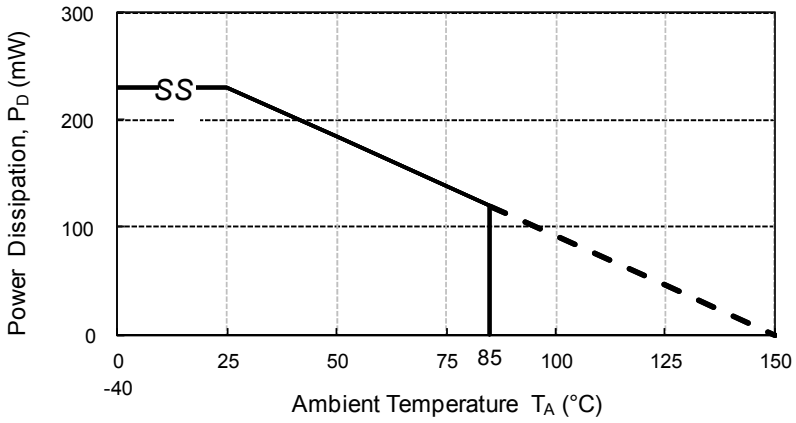
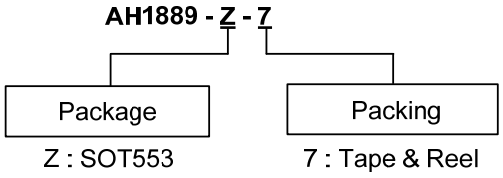
Thermal Performance Characteristics

T_A (°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



Power Dissipation Curve

Ordering Information

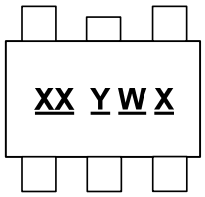


Part Number	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
AH1889-Z-7	Z	SOT553	3000/Tape & Reel	-7

Marking Information

(1) Package Type: 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 : Internal code

Part Number	Package	Identification Code
AH1889	SOT553	KX

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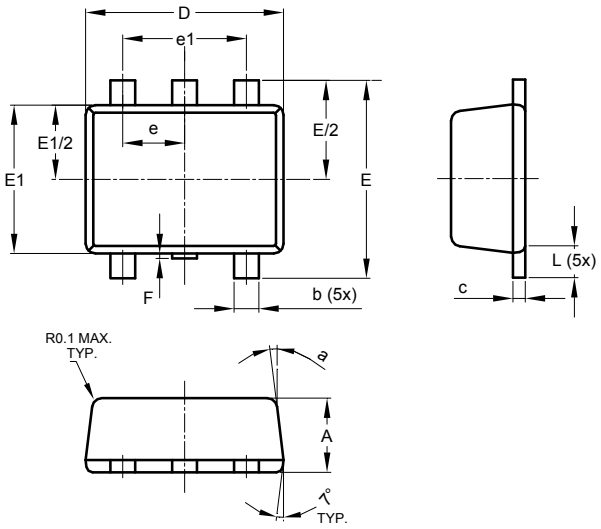
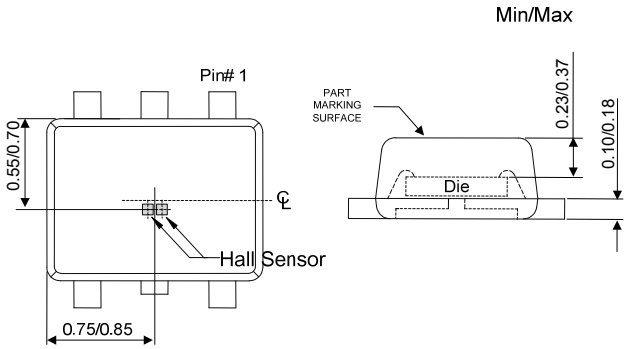
Package Outline Dimensions (All dimensions in mm.)

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

(1) Package Type: SOT553



SOT553			
Dim	**Min**	**Max**	**Typ**
A	0.55	0.62	0.60
b	0.15	0.30	0.20
c	0.10	0.18	0.15
D	1.50	1.70	1.60
E	1.55	1.70	1.60
E1	1.10	1.25	1.20
e	0.50 BSC		
e1	1.00 BSC		
F	0.00	0.10	—
L	0.10	0.30	0.20
a	6°	8°	7°
All Dimensions in mm			

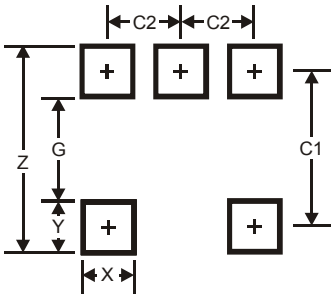


Sensor Location

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(1) Package Type: SOT553



Dimensions	Value (in mm)
Z	2.2
G	1.2
X	0.375
Y	0.5
C1	1.7
C2	0.5

NEW PRODUCT

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