

## Description

The DIODES™ AH375 is an integrated Hall-Effect latched sensor designed for electronic commutation of brush-less DC motor applications. The device includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifies the Hall voltage, and a Schmitt trigger to provide switching hysteresis for noise rejection, and open drain output. An internal band-gap regulator provides a temperature compensated supply voltage for internal circuits and allows a wide operating supply range.

When the magnetic flux density (**B**) is larger than operate point (**Bop**), output is switched on (OUT pin is pulled low). The output state is held on until a magnetic flux density reversal falls below Brp. When **B** is less than Brp, the output is switched off.

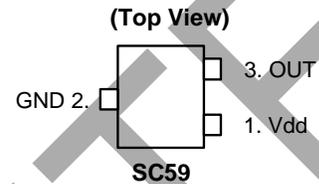
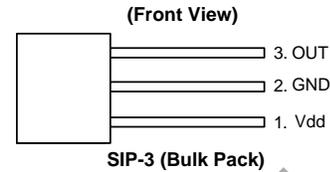
The AH375 is available in SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SC59 packages.

## Features

- Bipolar Hall-Effect Latch Sensor
- 2.2V to 20V DC Operating Voltage
- Temperature Compensation
- Open Drain Pre-Driver
- 25mA Maximum Output Sink Current
- Operating Temperature: -40°C to +125°C
- SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SC59 Packages (SC59 is Commonly Known as SOT23 in Asia)
- **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/>**

- 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.

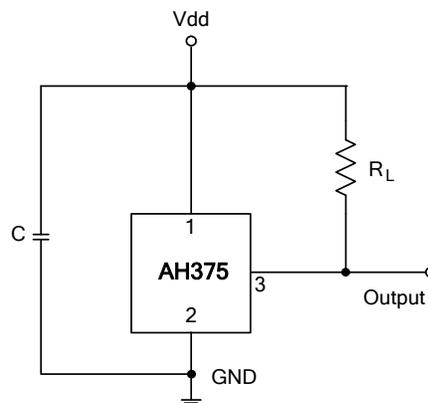
## Pin Assignments



## Applications

- Brush-less DC motors
- Brush-less DC fans
- Revolution counting
- Speed measurements

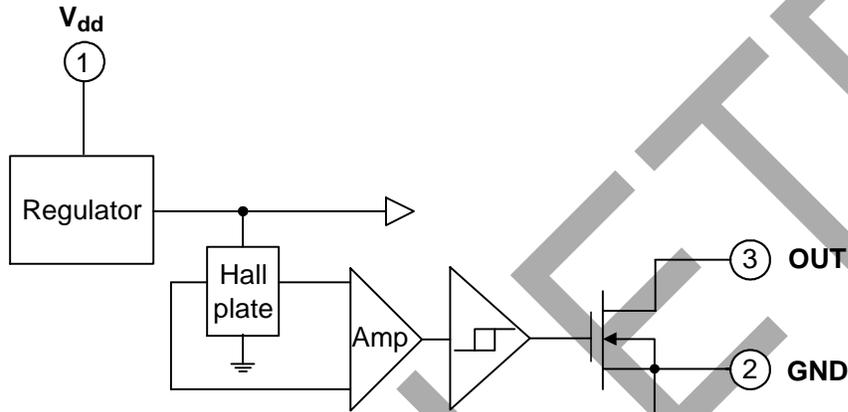
## Typical Applications Circuit



## Pin Descriptions

Pin Name	P/I/O	Pin #	Description
Vdd	P	1	Positive Power Supply
GND	P	2	Ground
OUT	O	3	Output Pin

## Functional Block Diagram



## Absolute Maximum Ratings (T<sub>A</sub> = +25°C)

Symbol	Characteristics	Values	Unit
V <sub>dd</sub>	Supply Voltage	20	V
B	Magnetic Flux Density	Unlimited	
V <sub>DS</sub>	Output OFF Voltage	30	V
I <sub>d</sub>	Output "On" Current	Continuous 25	mA
T <sub>s</sub>	Storage Temperature Range	-65 to +150	°C
T <sub>J(MAX)</sub>	Maximum Junction Temperature	+150	°C
P <sub>D</sub>	Package Power Dissipation	SIP-3 (Ammo Pack)	550
		SIP-3 (Bulk Pack)	550
		SC59	230
θ <sub>JC</sub>	Thermal Resistance	SIP-3 (Ammo Pack)	227
		SIP-3 (Bulk Pack)	227
		SC59	543

## Recommended Operating Conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>dd</sub>	Supply Voltage (Note 4)	Operating	2.2	20	V
T <sub>A</sub>	Operating Ambient Temperature	Operating	-40	+125	°C

Notes: 4. The output of IC will be switched after the supply voltage is over 2.2V, but the magnetic characteristics won't be normal until the supply is over 2.5V.

**Electrical Characteristics** ( $T_A = +25^\circ\text{C}$ ,  $V_{dd} = 12\text{V}$ )

Symbol	Characteristic	Test Conditions	Min	Typ.	Max	Unit
$V_{DS(SAT)}$	Output Saturation Voltage	$I_{OUT} = 20\text{mA}$	-	300	700	mV
$I_{OFF}$	Output Leakage Current	$V_{dd} = 14\text{V}$	-	<0.1	10	$\mu\text{A}$
$I_{dd}$	Supply Current	Output Open	-	2	4	mA

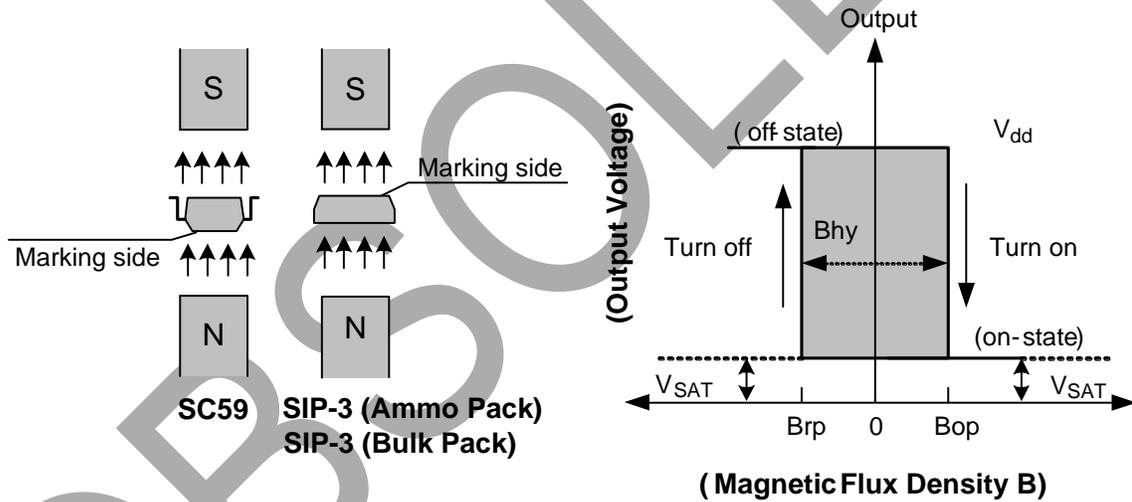
**Magnetic Characteristics** ( $T_A = +25^\circ\text{C}$ ,  $V_{dd} = 2.5\text{V to }20\text{V}$ , Note 5)

(1mT = 10 Gauss)

Symbol	Parameter	Min	Typ.	Max	Unit
Bops(South Pole to Brand Side)	Operation Point	5	30	60	Gauss
Brps(South Pole to Brand Side)	Release Point	-60	-30	-5	Gauss
Bhy( Bopx - Brpx )	Hysteresis	-	60	-	Gauss

Notes: 5. Magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

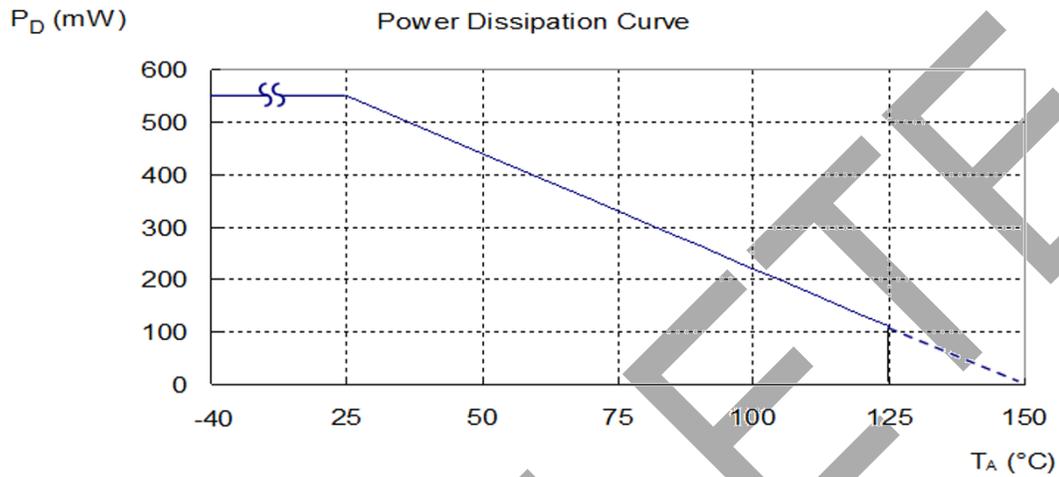
**Operating Characteristics**



**Performance Characteristics**

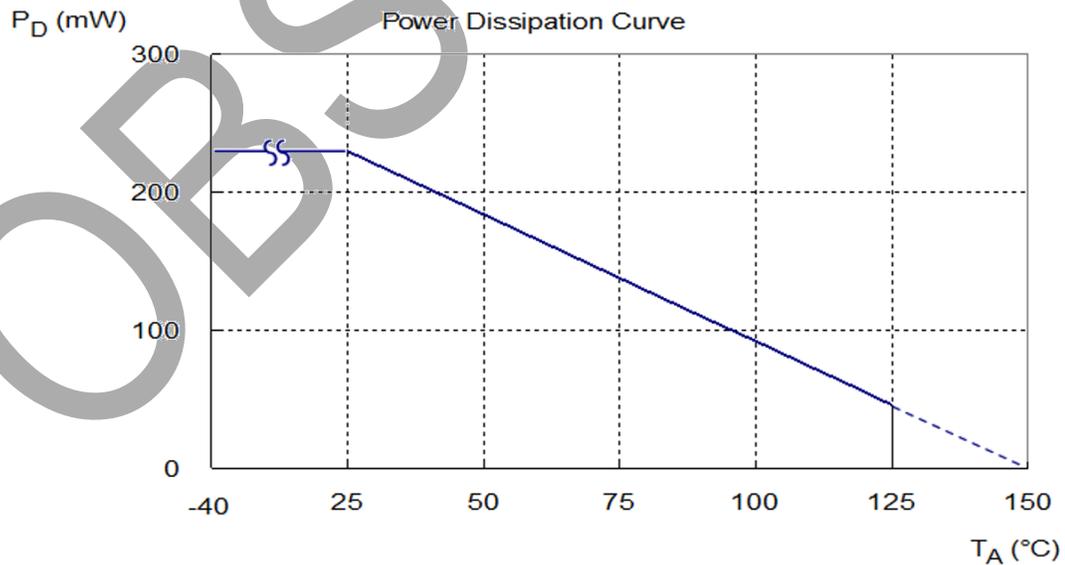
**(1) SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)**

$T_A$ (°C)	25	50	60	70	80	85	90	95	100
$P_D$ (mW)	550	440	396	352	308	286	264	242	220
$T_A$ (°C)	105	110	115	120	125	130	135	140	150
$P_D$ (mW)	198	176	154	132	110	88	66	44	0



**(2) SC59 (Commonly Known as SOT23 in Asia)**

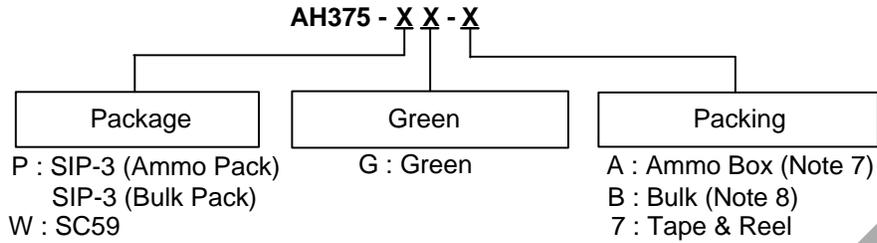
$T_A$ (°C)	25	50	60	70	80	85	90	100	110	120	130	140	150
$P_D$ (mW)	230	184	166	147	129	120	110	92	74	55	37	18	0



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**Ordering Information**



Part Number	Part Number Suffix	Package Code	Package (Note 6)	Packing	
				Qty.	Carrier
AH375-PG-A	-A	P	SIP-3 (Ammo Pack)	4000	Box
AH375-PG-B	-B	P	SIP-3 (Bulk Pack)	1000	Bulk
AH375-WG-7	-7	W	SC59	3000	Tape & Reel

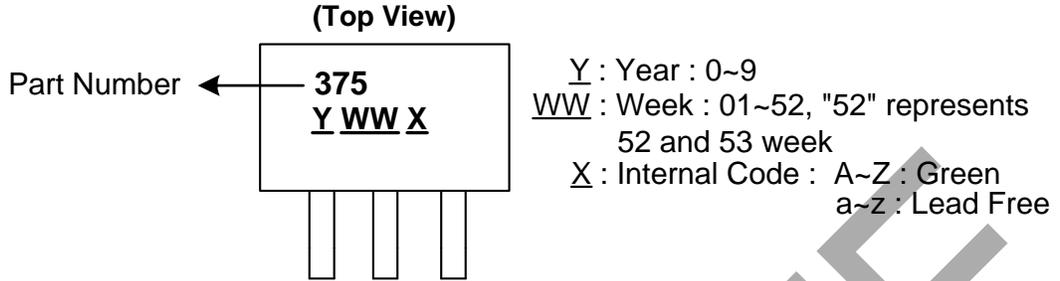
- Notes:
- 6. Pad layout as shown on Diodes Incorporated's suggested pad layout document, which can be found on our website at <http://www.diodes.com/package-outlines.html>.
  - 7. Ammo Box is for SIP-3 Spread Lead.
  - 8. Bulk is for SIP-3 Straight Lead.

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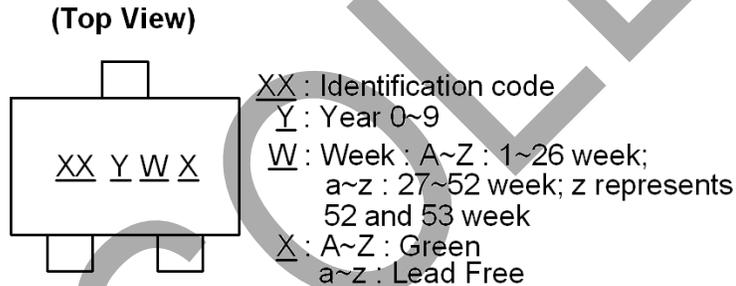
**Marking Information**

(1) Package Types: SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)



Part Number	Package	Identification Code
AH375	SIP-3 (Ammo Pack)	375
AH375	SIP-3 (Bulk Pack)	375

(2) Package Type: SC59

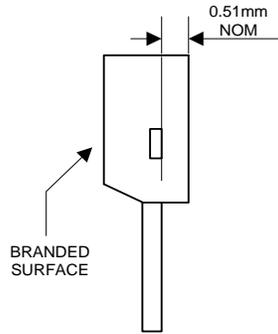


Part Number	Package	Identification Code
AH375	SC59	P3

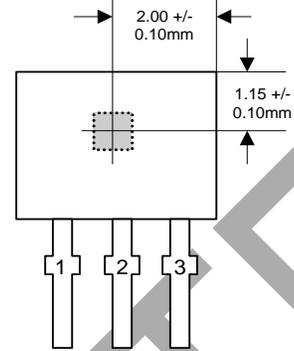
**Package Outline Dimensions** (All Dimensions in mm)

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

(1) Package Type: SIP-3 (Bulk Pack)

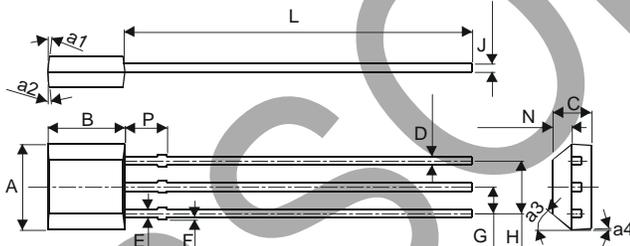


Active Area Depth



Sensor Location

Package Dimensions



SIP-3 (Bulk Pack)		
Dim	Min	Max
A	3.9	4.3
a1	5° Typ	
a2	5° Typ	
a3	45° Typ	
a4	3° Typ	
B	2.8	3.2
C	1.40	1.60
D	0.33	0.432
E	0.40	0.508
F	0	0.2
G	1.24	1.30
H	2.51	2.57
J	0.35	0.43
L	14.0	15.0
N	0.63	0.84
P	1.55	-
All Dimensions in mm		

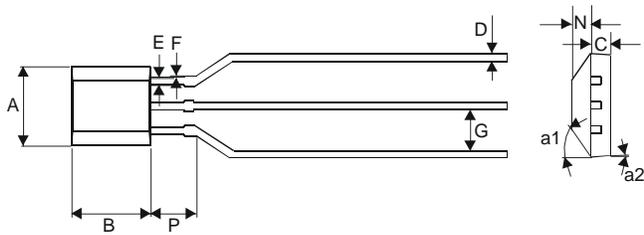
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**Package Outline Dimensions** (Continued)

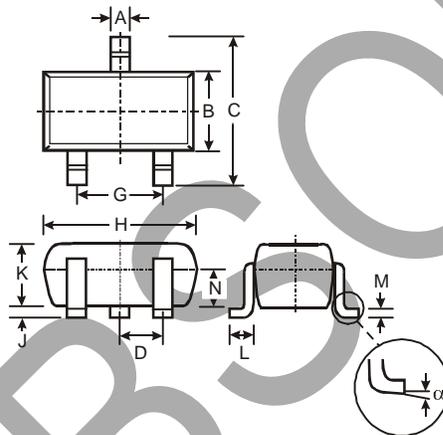
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(2) Package Type: SIP-3 (Ammo Pack)

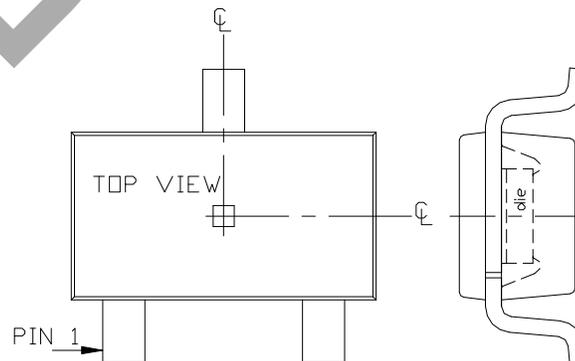


SIP-3 (Ammo Pack)		
Dim	Min	Max
A	3.9	4.3
a1	45° Typ	
a2	3° Typ	
B	2.8	3.2
C	1.40	1.60
D	0.35	0.41
E	0.43	0.48
F	0	0.2
G	2.4	2.9
N	0.63	0.84
P	1.55	-
All Dimensions in mm		

(3) Package Type: SC59 (Commonly Known as SOT23 in Asia)



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			



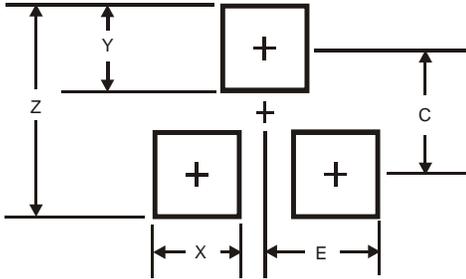
CL = Package Center Line

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**Suggested Pad Layout**

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

(1) Package Type: SC59 (Commonly Known as SOT23 in Asia)



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

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