

Description

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.

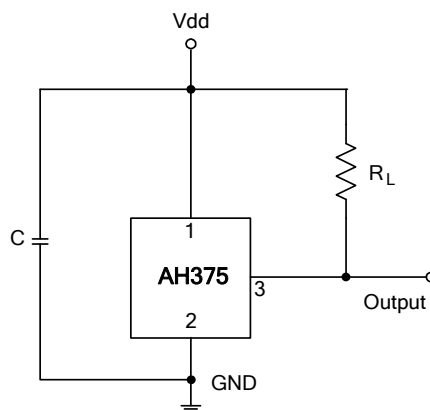
The AH375 is available in SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SC59 packages.

Features

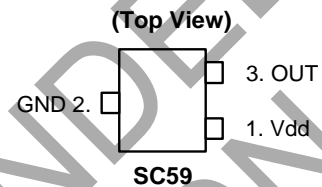
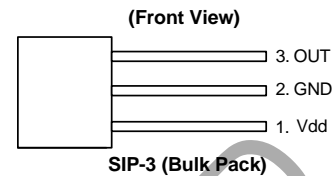
- Bipolar Hall-Effect Latch Sensor
- 2.2V to 20V DC Operating Voltage
- Temperature Compensation
- Open Drain Pre-Driver
- 25mA Maximum Output Sink Current
- Operating Temperature: -40°C to +125°C
- SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SC59 Packages (SC59 is Commonly Known as SOT23 in Asia)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

- 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



Pin Assignments



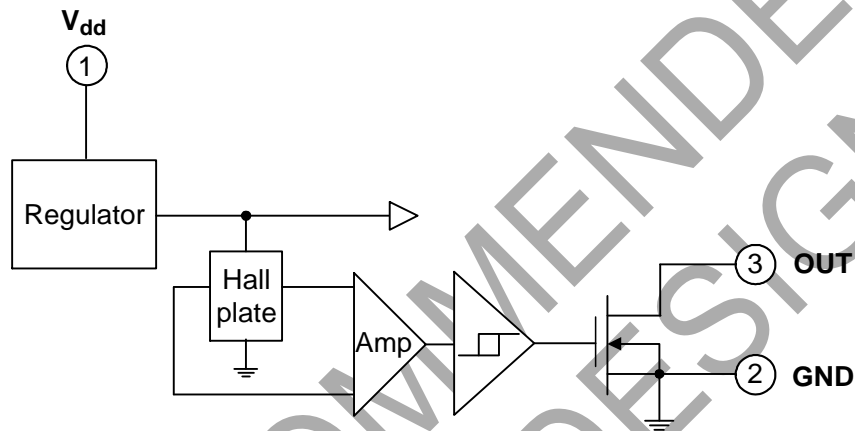
Applications

- Brush-Less DC Motor
- Brush-Less DC Fan
- Revolution Counting
- Speed Measurement

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

| Symbol | Characteristics | | Values | Unit |
|---------------------|------------------------------|-------------------|-------------|------|
| Vdd | Supply Voltage | | 20 | V |
| B | Magnetic Flux Density | | Unlimited | |
| V _{DS} | Output OFF Voltage | | 30 | V |
| I _D | Output "On" Current | Continuous | 25 | mA |
| T _S | Storage Temperature Range | | -65 to +150 | °C |
| T _{J(MAX)} | Maximum Junction Temperature | | +150 | °C |
| P _D | Package Power Dissipation | SIP-3 (Ammo Pack) | 550 | mW |
| | | SIP-3 (Bulk Pack) | 550 | |
| | | SC59 | 230 | |
| θ _{JC} | Thermal Resistance | SIP-3 (Ammo Pack) | 227 | °C/W |
| | | SIP-3 (Bulk Pack) | 227 | |
| | | SC59 | 543 | |

Recommended Operating Conditions

| Symbol | Parameter | Conditions | Min | Max | Unit |
|----------------|-------------------------------|------------|-----|------|------|
| Vdd | Supply Voltage (Note 4) | Operating | 2.2 | 20 | V |
| T _A | 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 | μA |
| I_{dd} | Supply Current | Output Open | - | 2 | 4 | mA |

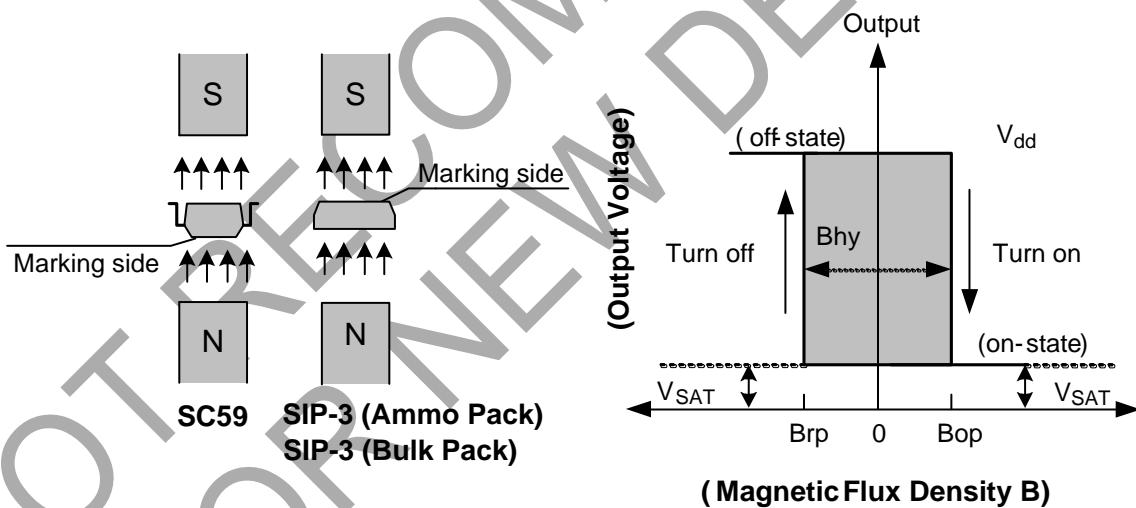
Magnetic Characteristics ($T_A = +25^\circ\text{C}$, $V_{dd} = 2.5\text{V to } 20\text{V}$, Note 5)

(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.

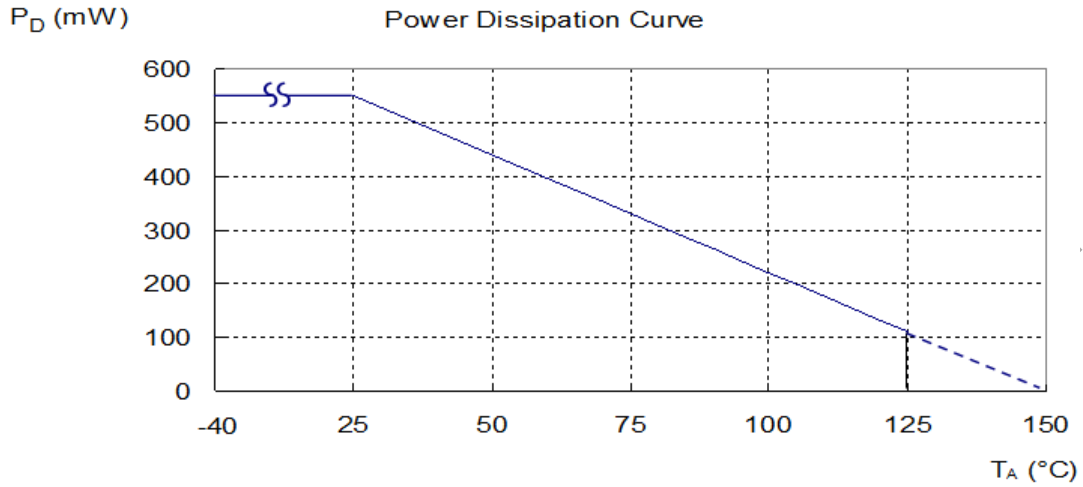
Operating Characteristics



Performance Characteristics

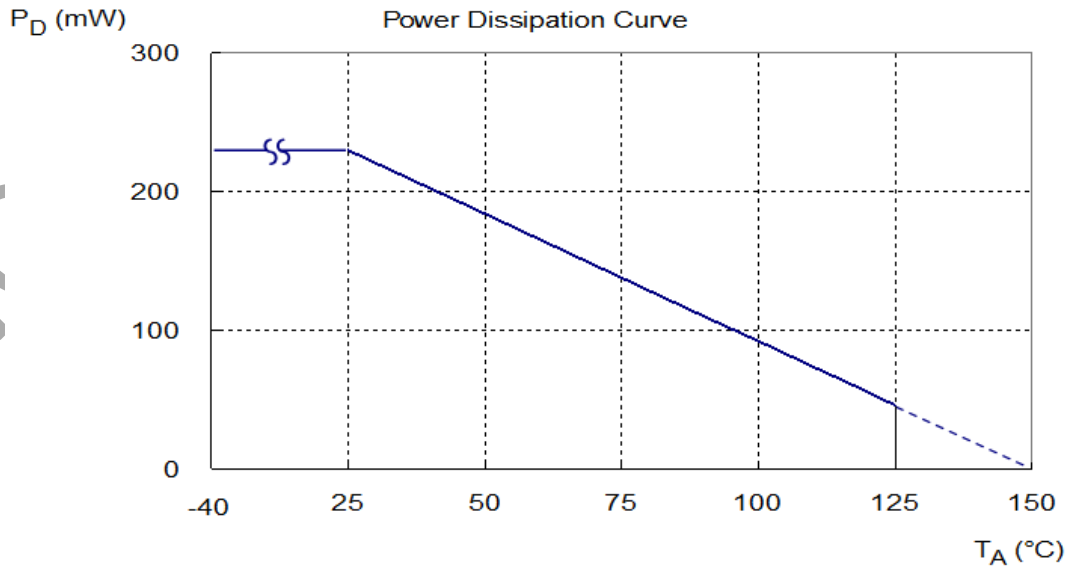
(1) SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)

| | | | | | | | | | |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 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 |

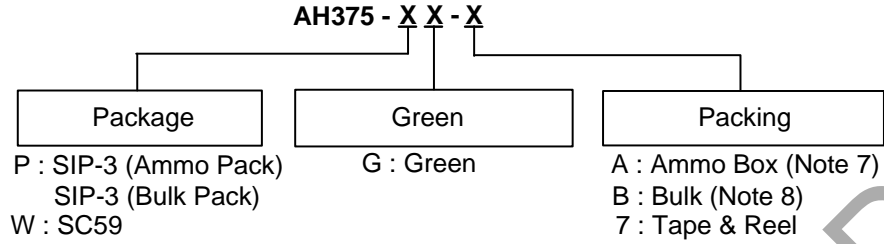


(2) SC59 (Commonly Known as SOT23 in Asia)

| | | | | | | | | | | | | | |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 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 |



Ordering Information



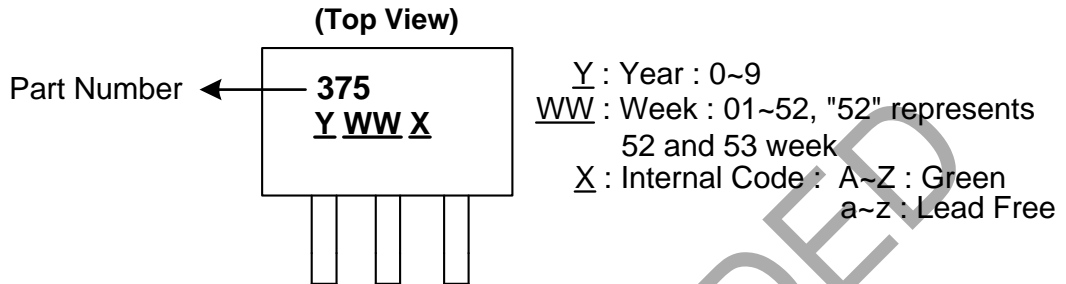
| Part Number | Status (Note 9) | Package Code | Packaging (Note 6) | Bulk | | 7" Tape and Reel | | Ammo Box | |
|-------------|-----------------|--------------|--------------------|----------|--------------------|------------------|--------------------|----------|--------------------|
| | | | | Quantity | Part Number Suffix | Quantity | Part Number Suffix | Quantity | Part Number Suffix |
| AH375-PG-A | NRND | P | SIP-3 (Ammo Pack) | NA | NA | NA | NA | 4000/Box | -A |
| AH375-PG-B | NRND | P | SIP-3 (Bulk Pack) | 1000 | -B | NA | NA | NA | NA |
| AH375-WG-7 | NRND | W | SC59 | NA | NA | 3000/Tape & Reel | -7 | NA | NA |

- 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.
 - 9. NRND = Not Recommended for New Design

NOT RECOMMENDED FOR NEW DESIGN

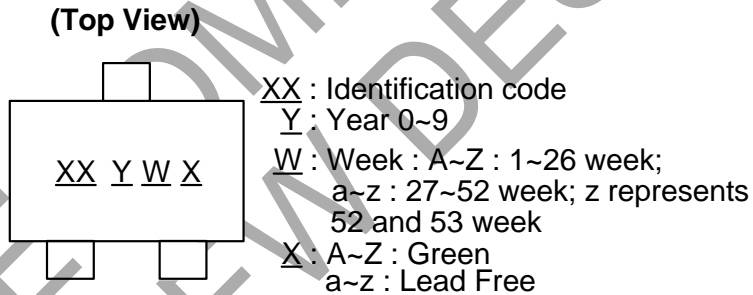
Marking Information

(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

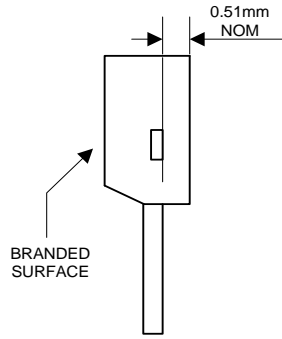


| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH375 | SC59 | P3 |

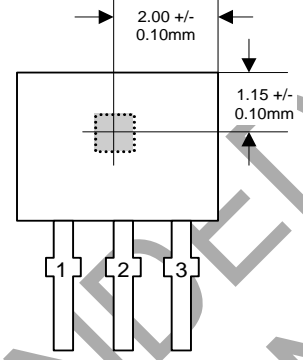
Package Outline Dimensions (All Dimensions in mm)

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

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

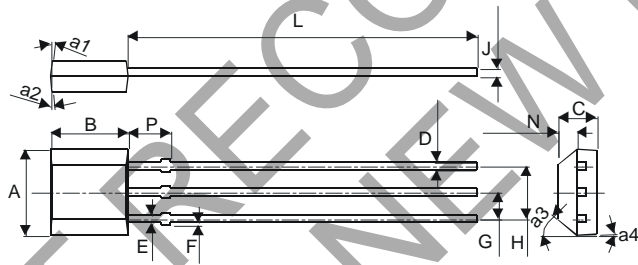


Active Area Depth



Sensor Location

Package Dimensions

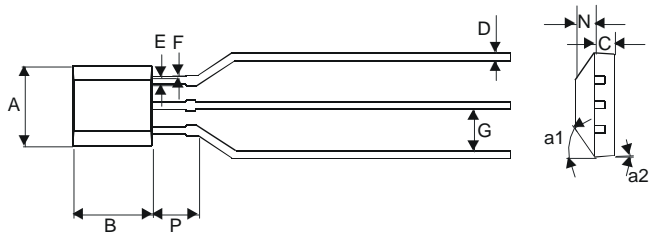


| SIP-3 (Bulk Pack) | | |
|-----------------------------|---------|-------|
| Dim | Min | Max |
| A | 3.9 | 4.3 |
| a1 | 5° Typ | |
| a2 | 5° Typ | |
| a3 | 45° Typ | |
| a4 | 3° Typ | |
| B | 2.8 | 3.2 |
| C | 1.40 | 1.60 |
| D | 0.33 | 0.432 |
| E | 0.40 | 0.508 |
| F | 0 | 0.2 |
| G | 1.24 | 1.30 |
| 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 | | |

Package Outline Dimensions (Continued)

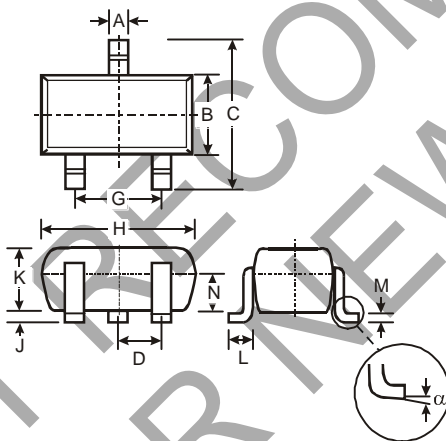
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

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

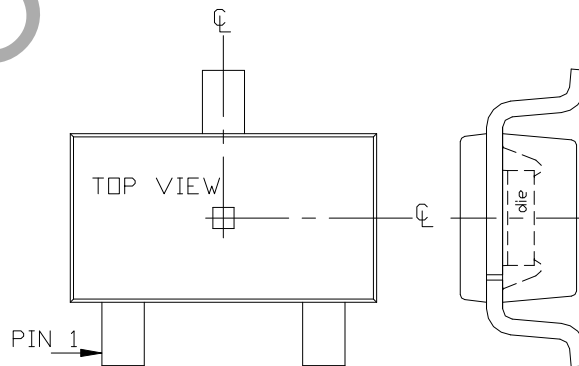


| SIP-3 (Ammo Pack) | | |
|----------------------|---------|------|
| Dim | Min | Max |
| A | 3.9 | 4.3 |
| a1 | 45° Typ | |
| a2 | 3° Typ | |
| B | 2.8 | 3.2 |
| C | 1.40 | 1.60 |
| D | 0.35 | 0.41 |
| E | 0.43 | 0.48 |
| F | 0 | 0.2 |
| G | 2.4 | 2.9 |
| N | 0.63 | 0.84 |
| P | 1.55 | - |
| All Dimensions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

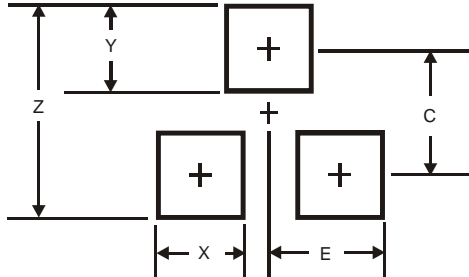


CL = Package Center Line

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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