

**Description**

AH173 is a single-digital-output Hall-Effect latch sensor with pull-up resistor for high temperature operation. The device includes an on-chip Hall voltage generator for magnetic sensing, an amplifier to amplify Hall voltage, a comparator to provide switching hysteresis for noise rejection, and an output driver with a pull-up resistor (R<sub>pu</sub>). 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 (**B<sub>op</sub>**), output is switched on (OUT pin is pulled low). The output state is held on until a magnetic flux density reversal falls below Br<sub>p</sub>. When **B** is less than Br<sub>p</sub>, the output is switched off.

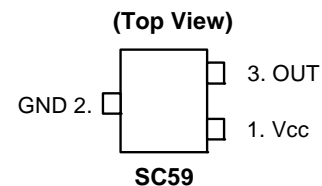
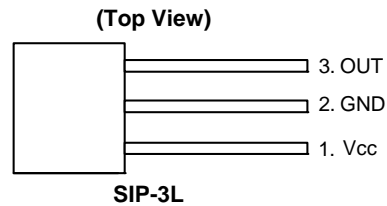
The AH173 is available in SIP-3L and SC59 packages.

**Features**

- Bipolar Hall-Effect latch sensor
- 3V to 20V DC operating voltage
- Built-in pull-up resistor
- 25mA output sink current
- Operating temperature: -40°C to +125°C
- SIP-3L and SC59 packages (SC59 is commonly known as SOT23 in Asia)
- Green Molding Compound (No Br, Sb) (Note 1)

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html).

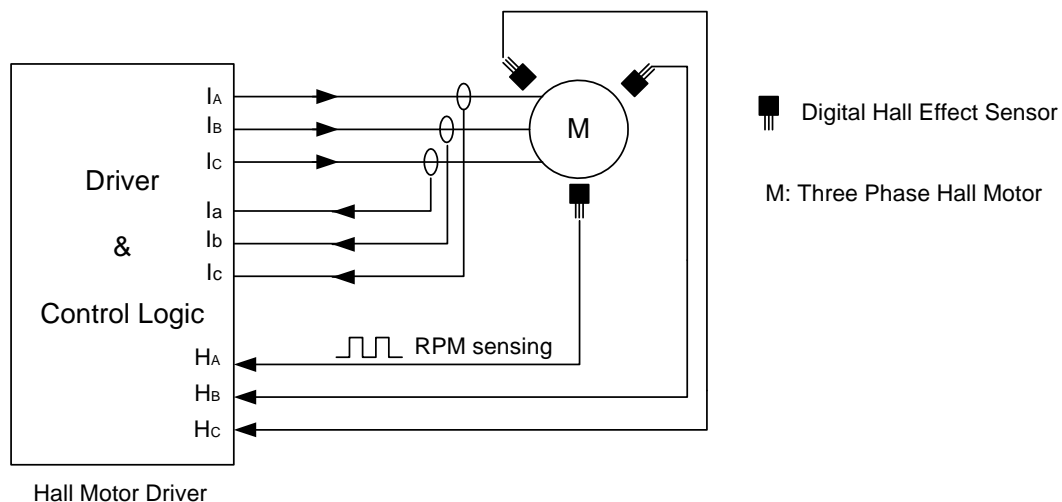
**Pin Assignments**



**Applications**

- Rotor Position Sensing
- Current Switch
- Encoder
- RPM Detection

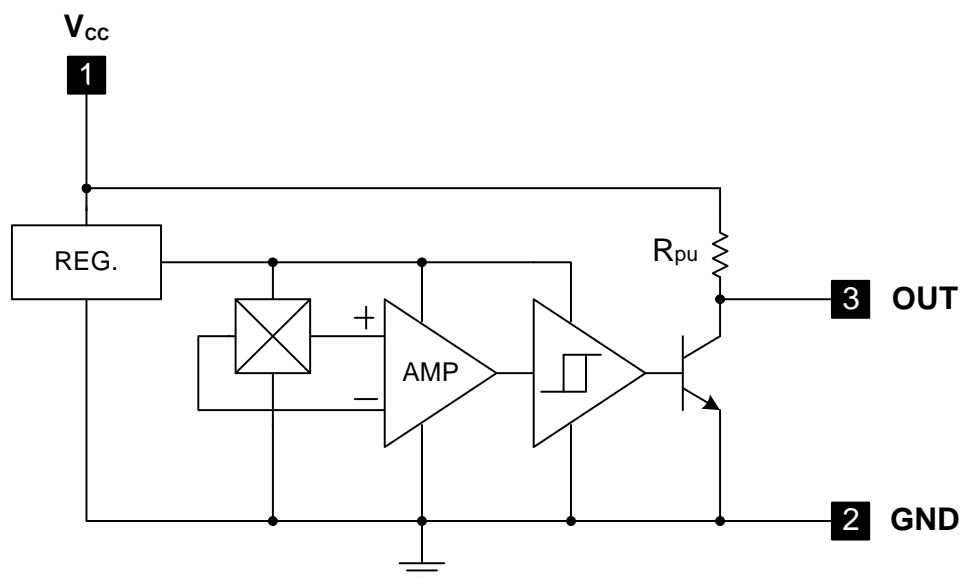
**Typical Application Circuit**



### Pin Descriptions

| Pin Name        | Pin # | Description           |
|-----------------|-------|-----------------------|
| V <sub>CC</sub> | 1     | Positive Power Supply |
| GND             | 2     | Ground                |
| OUT             | 3     | Output Stage          |

### Functional Block Diagram



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

| Symbol                 | Characteristics              | Values   | Unit |    |
|------------------------|------------------------------|----------|------|----|
| V <sub>CC</sub>        | Supply Voltage               | 20       | V    |    |
| V <sub>OUT</sub> (off) | Output "Off" Voltage         | 20       | V    |    |
| I <sub>O</sub> (sink)  | Output "On" Current          | 25       | mA   |    |
| T <sub>S</sub>         | Storage Temperature Range    | -65~+150 | °C   |    |
| T <sub>J</sub>         | Maximum Junction Temperature | +150     | °C   |    |
| P <sub>D</sub>         | Power Dissipation            | SIP-3L   | 550  | mW |
|                        |                              | SC59     | 230  | mW |

### Recommended Operating Conditions

| Symbol          | Characteristic                | Conditions | Min | Max | Unit |
|-----------------|-------------------------------|------------|-----|-----|------|
| V <sub>CC</sub> | Supply Voltage                | Operating  | 3   | 20  | V    |
| T <sub>A</sub>  | Operating Ambient Temperature | Operating  | -40 | 125 | °C   |

### Electrical Characteristics (T<sub>A</sub> = 25°C)

| Symbol                 | Characteristics           | Conditions   | Min | Typ. | Max | Unit |
|------------------------|---------------------------|--|-----|------|-----|------|
| V <sub>OUT (SAT)</sub> | Output Saturation Voltage | V <sub>CC</sub> = 12V, OUT "ON"<br>I <sub>O</sub> = 10mA | -   | 300  | 400 | mV   |
| I <sub>CC</sub>        | Supply Current            | V <sub>CC</sub> = 12V, OUT "OFF"                         | -   | 3.5  | 6   | mA   |
| R <sub>pu</sub>        | Internal Pull-up Resistor |  | 7   | 10   | 13  | KΩ   |
| V <sub>d</sub>         | Dropout Voltage           | V <sub>d</sub> = V <sub>CC</sub> - V <sub>Ce</sub>       | -   | -    | 0.3 | V    |

### Magnetic Characteristics (T<sub>A</sub> = 25°C, V<sub>CC</sub> = 12V, unless otherwise specified, Note 2)

(1mT = 10 Gauss)

#### A grade

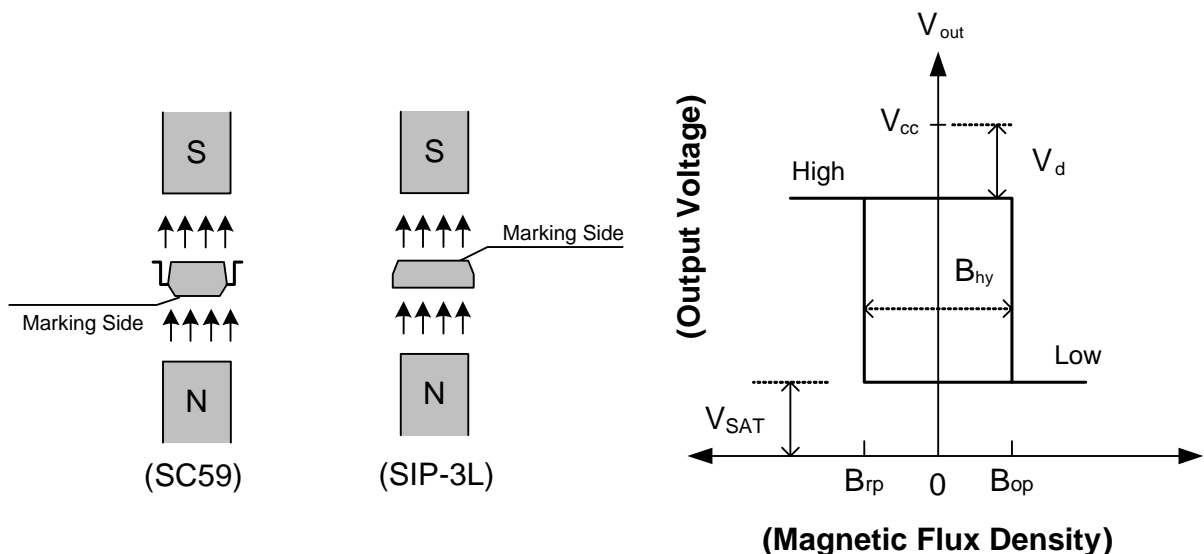
| Symbol   | Parameter       | Min | Typ. | Max | Unit  |
|--|-----------------|-----|------|-----|-------|
| B <sub>ops</sub> (south pole to brand side)                  | Operation Point | 15  | -    | 60  | Gauss |
| B <sub>brps</sub> (south pole to brand side)                 | Release Point   | -60 | -    | -15 | Gauss |
| B <sub>hy</sub> ( B <sub>opx</sub>   -  B <sub>brpx</sub>  ) | Hysteresis      | -   | 80   | -   | Gauss |

#### B grade

| Symbol   | Parameter       | Min | Typ. | Max | Unit  |
|--|-----------------|-----|------|-----|-------|
| B <sub>ops</sub> (south pole to brand side)                  | Operation Point | 5   | -    | 80  | Gauss |
| B <sub>brps</sub> (south pole to brand side)                 | Release Point   | -80 | -    | -5  | Gauss |
| B <sub>hy</sub> ( B <sub>opx</sub>   -  B <sub>brpx</sub>  ) | Hysteresis      | -   | 80   | -   | Gauss |

Notes: 2. Magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

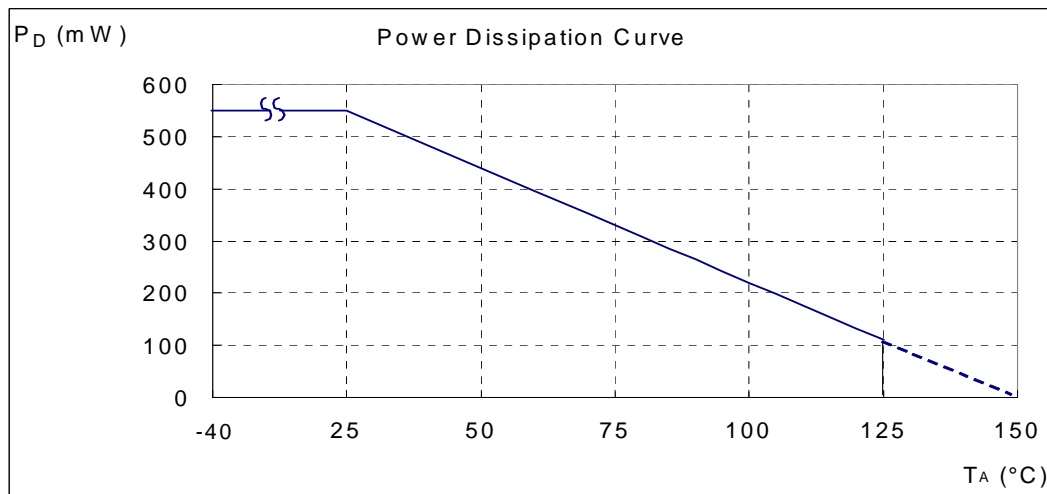
### Operating Characteristics



**Performance Characteristics**

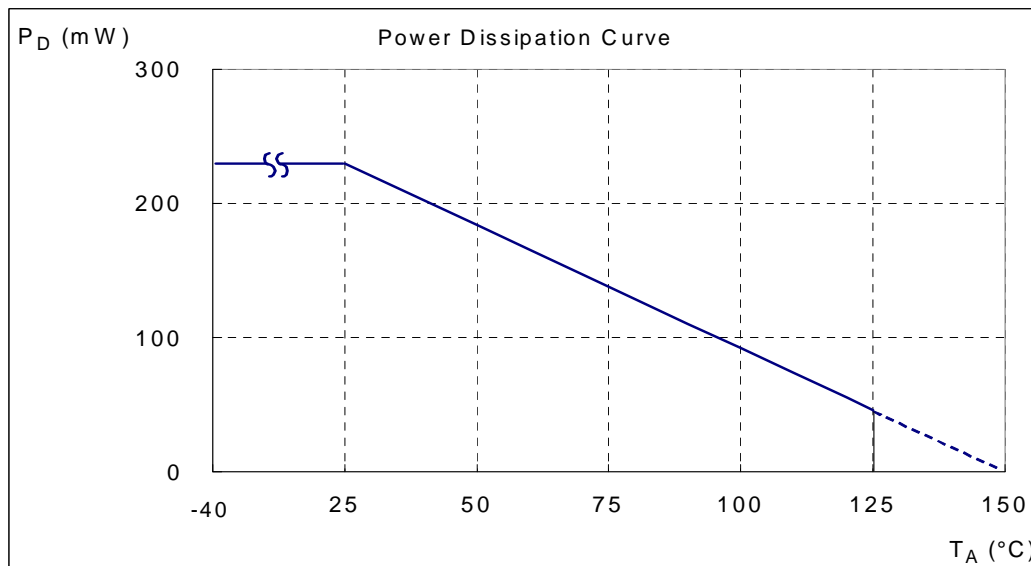
**(1) SIP-3L**

|                           |            |            |            |            |            |            |            |            |            |
|---------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>T<sub>A</sub> (°C)</b> | <b>25</b>  | <b>50</b>  | <b>60</b>  | <b>70</b>  | <b>80</b>  | <b>85</b>  | <b>90</b>  | <b>95</b>  | <b>100</b> |
| P <sub>D</sub> (mW)       | 550        | 440        | 396        | 352        | 308        | 286        | 264        | 242        | 220        |
| <b>T<sub>A</sub> (°C)</b> | <b>105</b> | <b>110</b> | <b>115</b> | <b>120</b> | <b>125</b> | <b>130</b> | <b>135</b> | <b>140</b> | <b>150</b> |
| P <sub>D</sub> (mW)       | 198        | 176        | 154        | 132        | 110        | 88         | 66         | 44         | 0          |

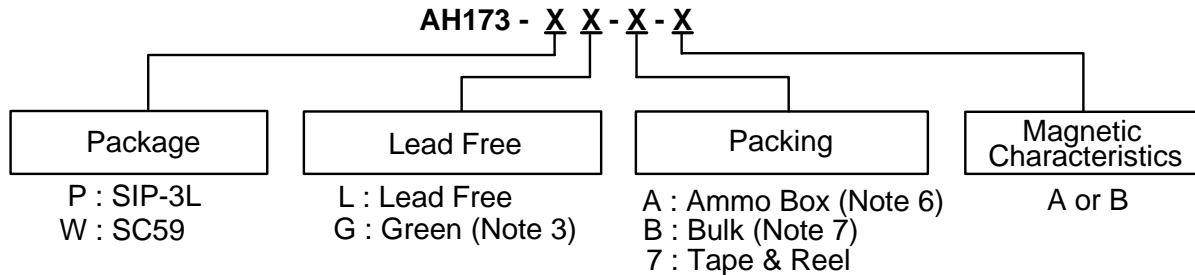














**(2) SC59 (commonly known as SOT23 in Asia)**

|                           |           |           |           |           |           |           |           |            |            |            |            |            |            |
|---------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|
| <b>T<sub>A</sub> (°C)</b> | <b>25</b> | <b>50</b> | <b>60</b> | <b>70</b> | <b>80</b> | <b>85</b> | <b>90</b> | <b>100</b> | <b>110</b> | <b>120</b> | <b>130</b> | <b>140</b> | <b>150</b> |
| P <sub>D</sub> (mW)       | 230       | 184       | 166       | 147       | 129       | 120       | 110       | 92         | 74         | 55         | 37         | 18         | 0          |



### Ordering Information

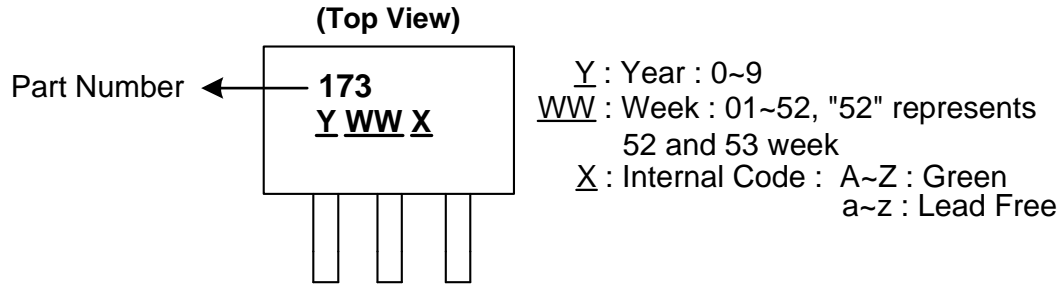


| Device   | Package Code | Packaging (Note 4, 5) | Tube/Bulk |                    | 7" Tape and Reel |                    | Ammo Box |                    | Magnetic Characteristics |
|--|--------------|-----------------------|-----------|--------------------|------------------|--------------------|----------|--------------------|--------------------------|
|  |              |                       | Quantity  | Part Number Suffix | Quantity         | Part Number Suffix | Quantity | Part Number Suffix |                          |
|  AH173-PL-A-A   | P            | SIP-3L                | NA        | NA                 | NA               | NA                 | 4000/Box | -A                 | A                        |
|  AH173-PL-A-B   | P            | SIP-3L                | NA        | NA                 | NA               | NA                 | 4000/Box | -A                 | B                        |
|  AH173-PG-A-A   | P            | SIP-3L                | NA        | NA                 | NA               | NA                 | 4000/Box | -A                 | A                        |
|  AH173-PG-A-B  | P            | SIP-3L                | NA        | NA                 | NA               | NA                 | 4000/Box | -A                 | B                        |
|  AH173-PL-B-A | P            | SIP-3L                | 1000      | -B                 | NA               | NA                 | NA       | NA                 | A                        |
|  AH173-PL-B-B | P            | SIP-3L                | 1000      | -B                 | NA               | NA                 | NA       | NA                 | B                        |
|  AH173-PG-B-A | P            | SIP-3L                | 1000      | -B                 | NA               | NA                 | NA       | NA                 | A                        |
|  AH173-PG-B-B | P            | SIP-3L                | 1000      | -B                 | NA               | NA                 | NA       | NA                 | B                        |
|  AH173-WL-7-A | W            | SC59                  | NA        | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 | A                        |
|  AH173-WL-7-B | W            | SC59                  | NA        | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 | B                        |
|  AH173-WG-7-A | W            | SC59                  | NA        | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 | A                        |
|  AH173-WG-7-B | W            | SC59                  | NA        | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 | B                        |

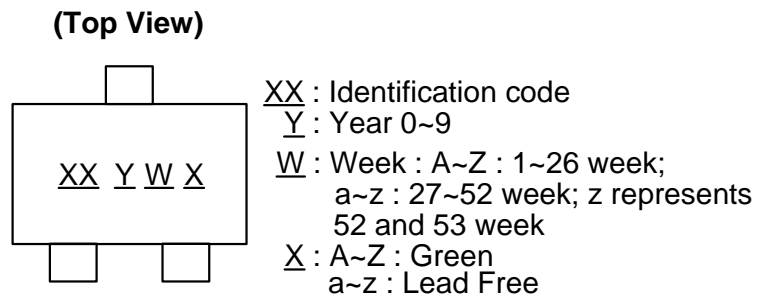
- Notes:
3. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html).
  4. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
  5. Reverse taping as shown on Diodes Inc. Surface Mount (SMD) Packaging document AP02007, which can be found on our website <http://www.diodes.com/datasheets/ap02007.pdf>.
  6. Ammo Box is for SIP-3L Spread Lead.
  7. Bulk is for SIP-3L Straight Lead.

**Marking Information**

**(1) SIP-3L**



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



| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH173       | SC59    | J3                  |







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