

## Description

AH372 is a single-digital-output Hall-Effect latch sensor with internal 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, and a comparator to provide switching hysteresis for noise rejection, and an output driver with a pull-up resistor. 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) perpendicular to the package is larger than operation point ( $B_{OP}$ ), output is switched on (OUT pin is pulled low). The output state is held on until a magnetic flux density reversal falls below  $B_{RP}$ . When B is less than  $B_{RP}$ , the output is switched off.

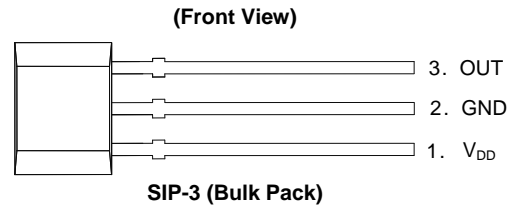
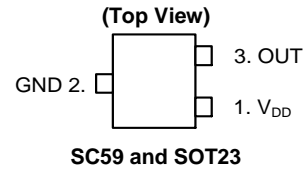
The AH372 is available in SIP-3 (Ammo Pack), SIP-3 (Bulk Pack), SC59 and SOT23 packages.

## Features

- Bipolar Hall Effect Latch Operation
- 2.2V to 20V Operating Range
- Single Output with Built-in Pull-up Resistor
- 25mA output Sink Capability
- -40°C to +125°C Operating Temperature
- Industry Standard SIP-3 (Ammo Pack), SIP-3 (Bulk Pack), SC59 and SOT23 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/quality/lead\\_free.html](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.

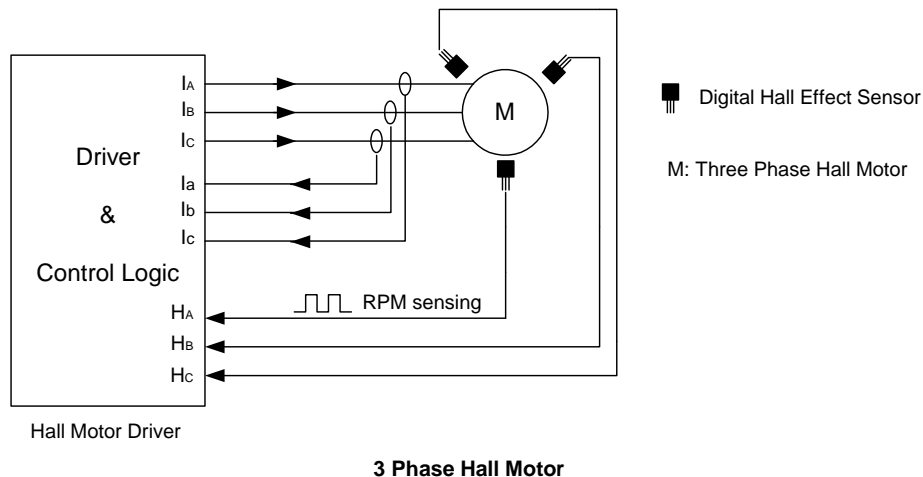
## Pin Assignments



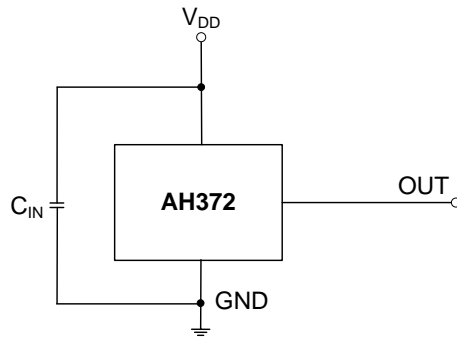
## Applications

- Rotor Position Sensing for Motor Commutation
- Encoder
- Speed Measurement – RPM Monitor
- Contact-Less Current Switch

## Typical Application Circuits



**Typical Application Circuits** (cont.)



**Typical AH372 Circuit**

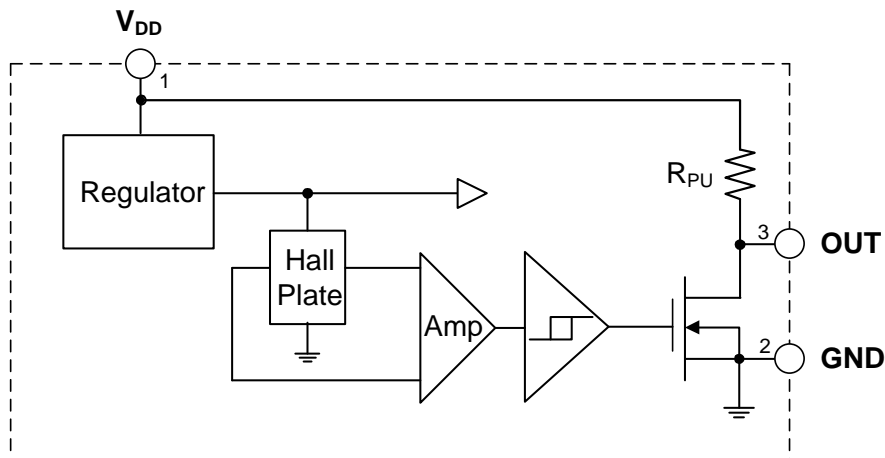
Note: 4.  $C_{IN}$  is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 100nF typical.

**Pin Descriptions**

Packages: SC59, SOT23, SIP-3 (Ammo Pack) and SIP-3 (Bulk Pack)

| Pin Number | Pin Name | Function           |
|------------|----------|--------------------|
| 1          | $V_{DD}$ | Power Supply Input |
| 2          | GND      | Ground             |
| 3          | OUT      | Output             |

**Functional Block Diagram**



### Absolute Maximum Ratings (Note 5) @ $T_A = +25^{\circ}\text{C}$ , unless otherwise specified.)

| Symbol         | Characteristics              | Values                                  | Unit               |    |
|----------------|------------------------------|---|--------------------|----|
| $V_{DD}$       | Supply Voltage (Note 6)      | 28                                      | V                  |    |
| $V_{OUT(OFF)}$ | Output "Off" Voltage         | 28                                      | V                  |    |
| $I_{O(SINK)}$  | Output "On" Current (Sink)   | 25                                      | mA                 |    |
| B              | Magnetic Flux Density        | Unlimited                               |                    |    |
| $P_D$          | Package Power Dissipation    | SIP-3 (Ammo Pack) and SIP-3 (Bulk Pack) | 550                | mW |
|                |                              | SC59 and SOT23                          | 230                | mW |
| $T_{STG}$      | Storage Temperature Range    | -65 to +150                             | $^{\circ}\text{C}$ |    |
| $T_J$          | Maximum Junction Temperature | +150                                    | $^{\circ}\text{C}$ |    |

- 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 28V 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 (@ $T_A = +25^{\circ}\text{C}$ , unless otherwise specified.)

| Symbol   | Characteristic              | Conditions | Rating      | Unit               |
|----------|-----------------------------|------------|-------------|--------------------|
| $V_{DD}$ | Supply Voltage (Note 7)     | Operating  | 2.2 to 20   | V                  |
| $T_A$    | Operating Temperature Range | Operating  | -40 to +125 | $^{\circ}\text{C}$ |

- Note: 7. The output of IC will be switched after the supply voltage is over 2.2V, but the magnetic characteristics will not be normal until the supply is over 2.5V.

### Electrical Characteristics (@ $T_A = +25^{\circ}\text{C}$ , $V_{DD} = 12\text{V}$ , unless otherwise specified.)

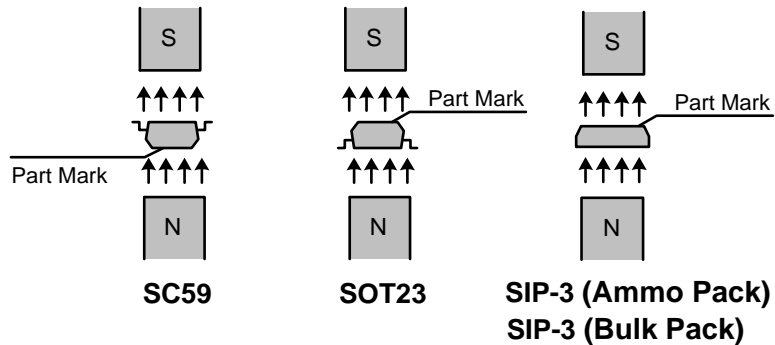
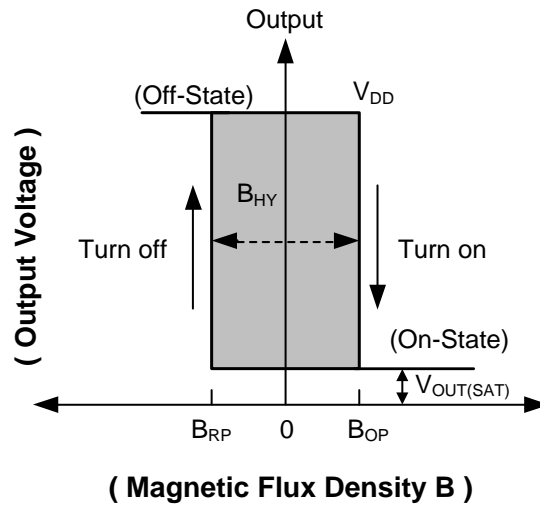
| Symbol    | Characteristic            | Conditions              | Min | Typ   | Max | Unit             |
|-----------|---------------------------|-------------------------|-----|-------|-----|------------------|
| $V_{OUT}$ | Output On Voltage         | $I_{OUT} = 20\text{mA}$ | —   | 300   | 400 | mV               |
| $I_{DD}$  | Supply Current            | $B < B_{RP}$            | —   | 2     | 4   | mA               |
| $I_{OFF}$ | Output Leakage Current    | Output off              | —   | < 0.1 | 10  | $\mu\text{A}$    |
| $R_{PU}$  | Internal Pull-up Resistor | —                       | 7   | 10    | 13  | $\text{k}\Omega$ |

**Magnetic Characteristics** (Note 8) (@ $T_A = +25^\circ\text{C}$ ,  $V_{DD} = 2.5\text{V}$  to  $20\text{V}$ , unless otherwise specified.)

(1mT=10 Gauss)

| Symbol  | Characteristic  | Min | Typ | Max | Unit  |
|---|-----------------|-----|-----|-----|-------|
| $B_{OP}$ (South Pole to Part Marking Side for SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SOT23;<br>North Pole to Part Marking Side for SC59 ) | Operation Point | 5   | 30  | 60  | Gauss |
| $B_{RP}$ (South Pole to Part Marking Side for SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SOT23;<br>North Pole to Part Marking Side for SC59 ) | Release Point   | -60 | -30 | -5  |       |
| $B_{HY}$ ( $ B_{OPX}  -  B_{RPX} $ )  | Hysteresis      | —   | 60  | —   |       |

Note: 8. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

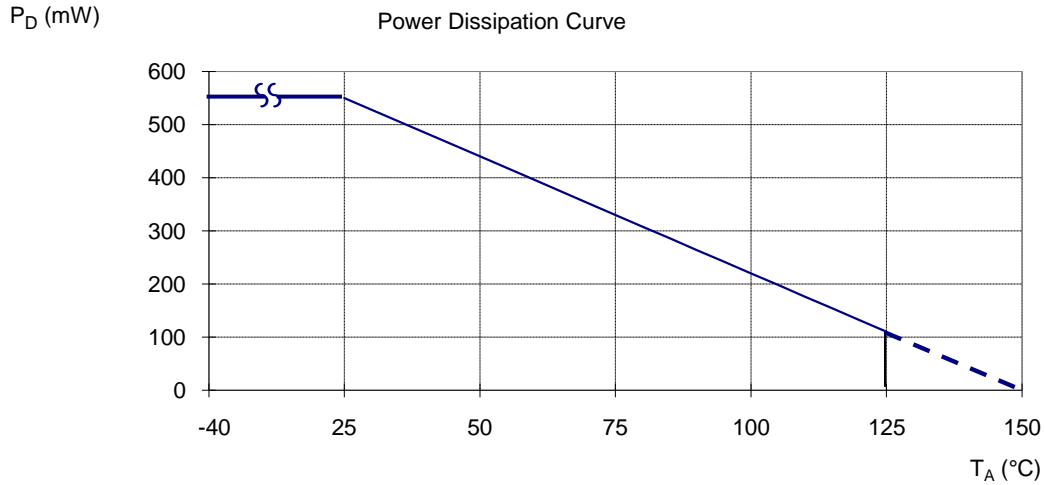


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**Thermal Performance Characteristics**

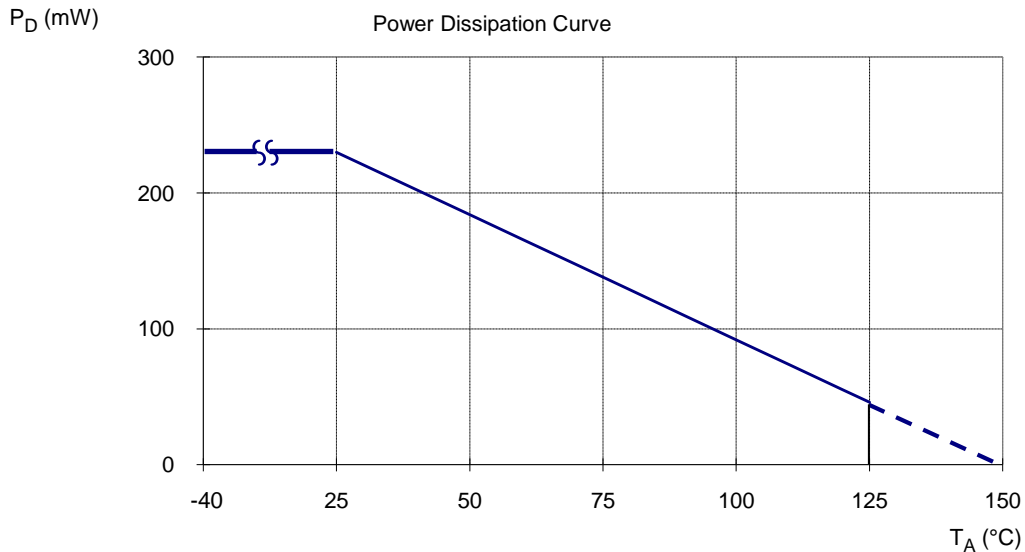
(1) Package Types: SIP-3 (Ammo Pack) and SIP-3 (Bulk Pack)

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

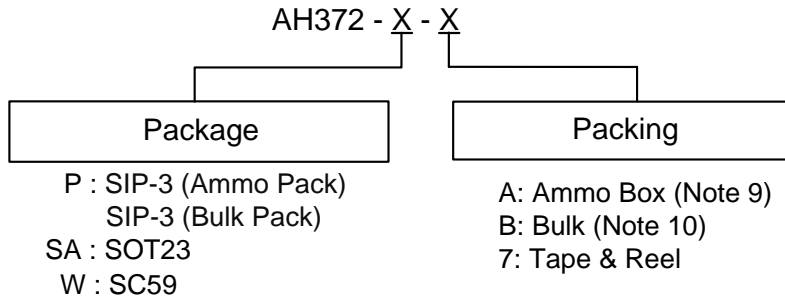


(2) Package Types: SC59 and SOT23

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



## Ordering Information



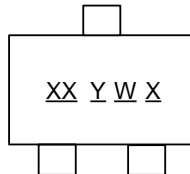
| Part Number | Package Code | Packaging (Note 11) | Bulk     |                    | 7" Tape and Reel |                    | Ammo Box |                    |
|-------------|--------------|---------------------|----------|--------------------|------------------|--------------------|----------|--------------------|
|             |              |                     | Quantity | Part Number Suffix | Quantity         | Part Number Suffix | Quantity | Part Number Suffix |
| AH372-P-A   | P            | SIP-3 (Ammo Pack)   | NA       | NA                 | NA               | NA                 | 4000/Box | -A                 |
| AH372-P-B   | P            | SIP-3 (Bulk Pack)   | 1000     | -B                 | NA               | NA                 | NA       | NA                 |
| AH372-SA-7  | SA           | SOT23               | NA       | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 |
| AH372-W-7   | W            | SC59                | NA       | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 |

Notes: 9. Ammo Box is for SIP-3 (Ammo Pack) Spread Lead.  
 10. Bulk is for SIP-3 (Bulk Pack) Straight Lead.  
 11. 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>.

## Marking Information

### (1) Package Types: SC59 and SOT23

( Top View )

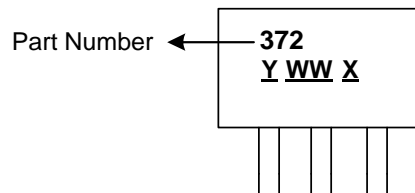


XX : Identification Code  
 Y : Year 0 to 9  
 W : Week : A to Z : 1 to 26 Week;  
       a to z : 27 to 52 Week; z Represents  
       52 and 53 Week  
 X : Internal Code

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH372       | SC59    | XH                  |
| AH372       | SOT23   | YH                  |

### (2) Package Types: SIP-3 (Ammo Pack) and SIP-3 (Bulk Pack)

( Front View )

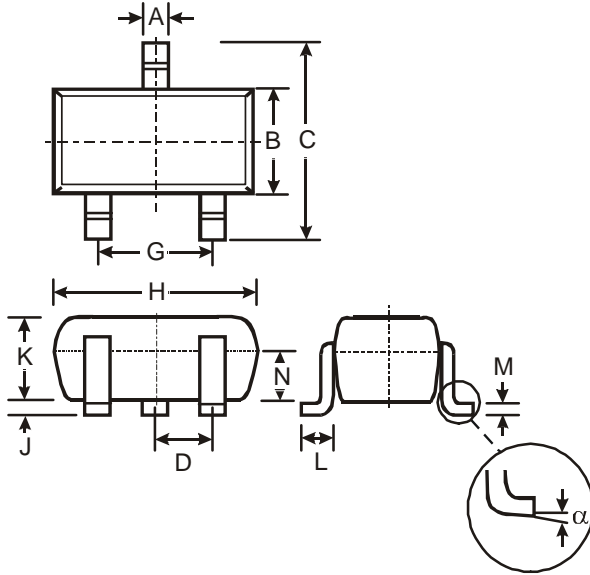


Y : Year : 0~9  
 WW : Week : 01~52, "52" Represents  
       52 and 53 Week  
 X : Internal Code

**Package Outline Dimensions**

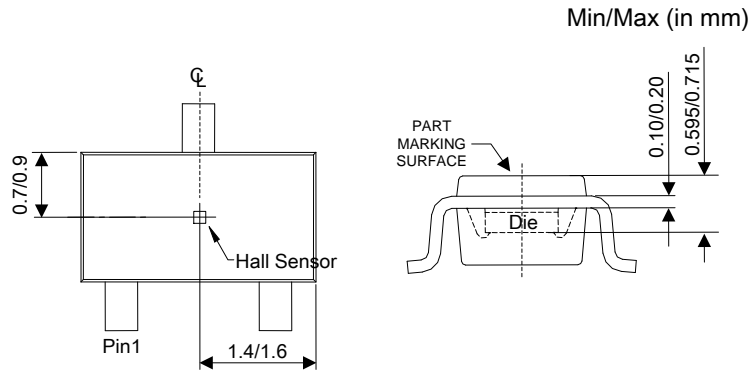
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(1) Package Type: SC59



| 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 |       |      |      |

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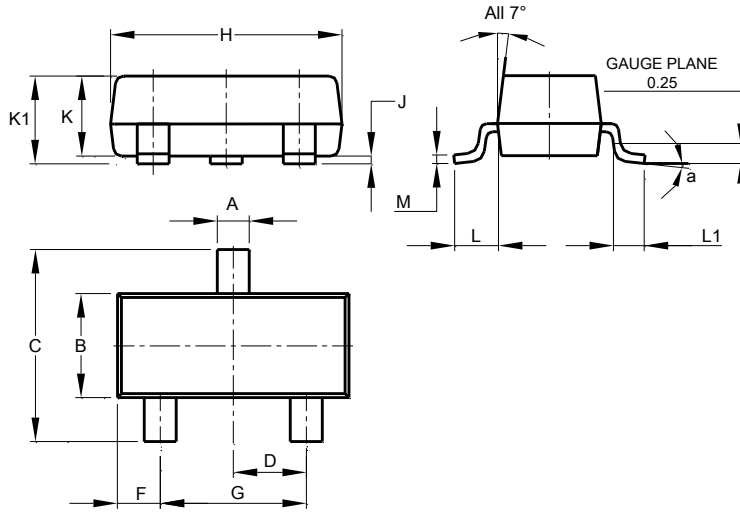


**Sensor Location**

**Package Outline Dimensions (cont.)**

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

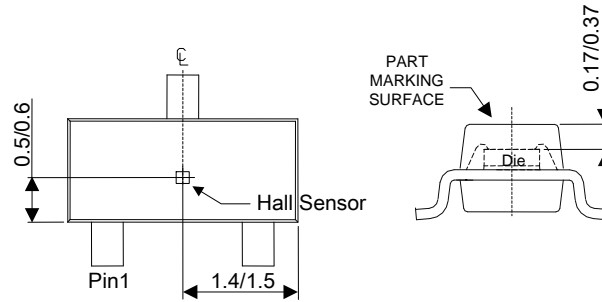
**(2) Package Type: SOT23**



| SOT23                       |       |       |       |
|-----------------------------|-------|-------|-------|
| Dim                         | Min   | Max   | Typ   |
| A                           | 0.37  | 0.51  | 0.40  |
| B                           | 1.20  | 1.40  | 1.30  |
| C                           | 2.30  | 2.50  | 2.40  |
| D                           | 0.89  | 1.03  | 0.915 |
| F                           | 0.45  | 0.60  | 0.535 |
| G                           | 1.78  | 2.05  | 1.83  |
| H                           | 2.80  | 3.00  | 2.90  |
| J                           | 0.013 | 0.10  | 0.05  |
| K                           | 0.890 | 1.00  | 0.975 |
| K1                          | 0.903 | 1.10  | 1.025 |
| L                           | 0.45  | 0.61  | 0.55  |
| L1                          | 0.25  | 0.55  | 0.40  |
| M                           | 0.085 | 0.150 | 0.110 |
| a                           | 0°    | 8°    | --    |
| <b>All Dimensions in mm</b> |       |       |       |

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Min/Max (in mm)



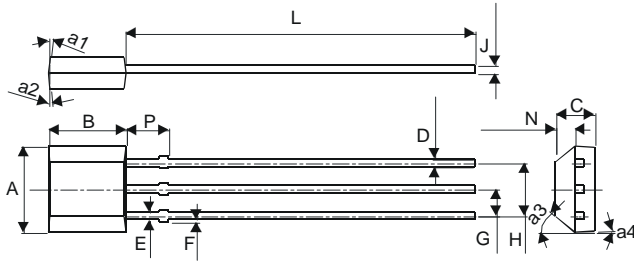
**Sensor Location**



**Package Outline Dimensions (cont.)**

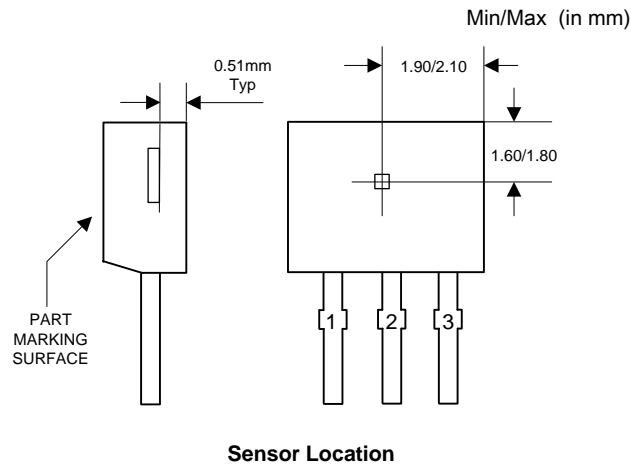
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

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



| SIP-3<br>(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 |      |       |

Note: 12. SIP-3 (Bulk Pack) - Thickness J includes Burrs

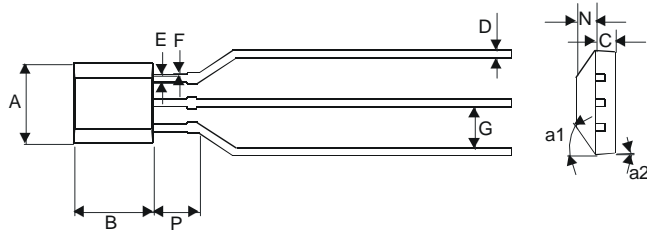


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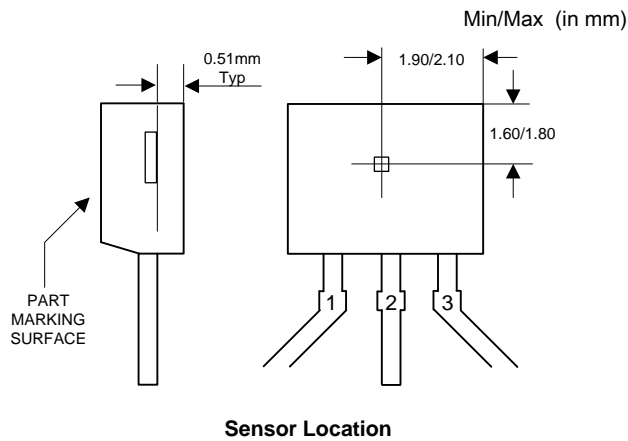
**Package Outline Dimensions (cont.)**

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

**(4) Package Type: SIP-3 (Ammo Pack)**



| SIP-3<br>(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 | -    |
| <b>All Dimensions in mm</b> |      |      |

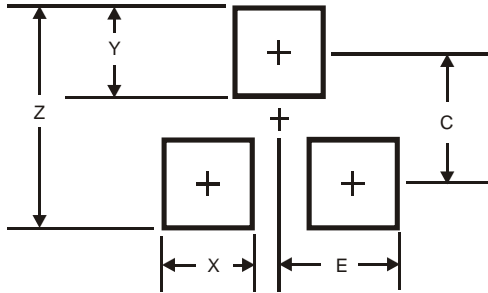


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**Suggested Pad Layout**

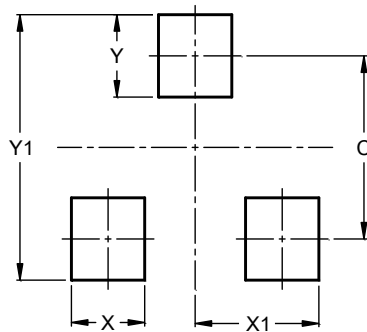
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(1) Package Type: SC59



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

(2) Package Type: SOT23



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 2.0           |
| X          | 0.8           |
| X1         | 1.35          |
| Y          | 0.9           |
| Y1         | 2.9           |

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