

## Description

AH373 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.

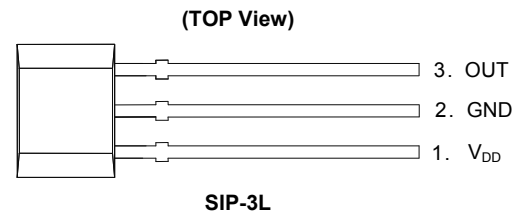
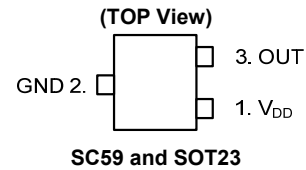
When the magnetic flux density (**B**) perpendicular to the package is larger than operate point (**B<sub>op</sub>**), output is switched on (OUT pin is pulled low). The output state is held on until a magnetic flux density reversal falls below Brp. When **B** is less than Brp, the output is switched off.

The AH373 is available in SIP-3L, 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-3L, SC59 and SOT23 Packages
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Pin Assignments

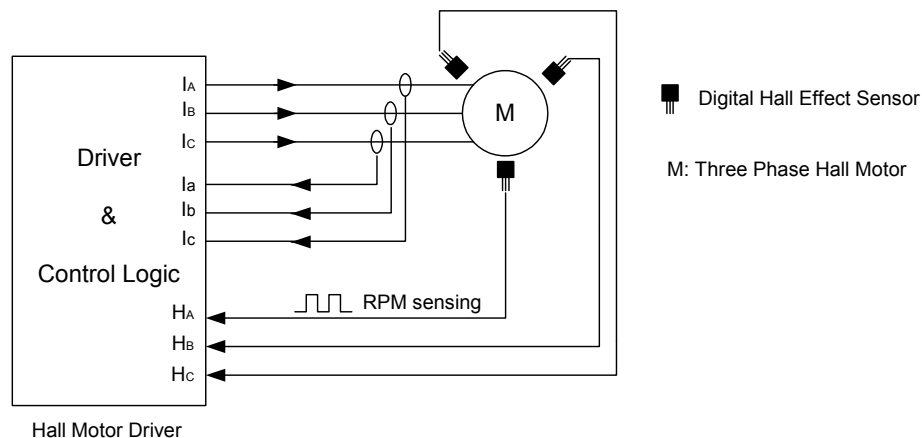


## Applications

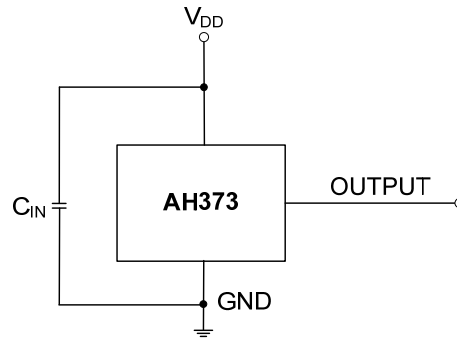
- Rotor Position Sensing for Motor Commutation
- Encoder
- Speed Measurement – RPM Monitor
- Contact-less Current Switch

- 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.

## Typical Application Circuits



## Typical Application Circuits (cont.)



Typical AH373 Circuit

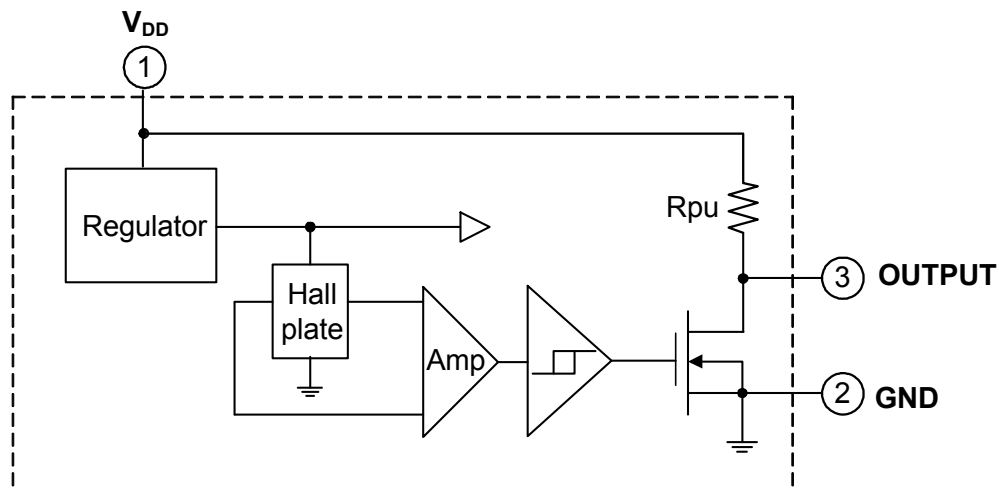
Note: 4.  $C_{IN}$  is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 100nF typical

## Pin Descriptions

Package: SC59, SOT23 and SIP-3L

| Pin Number | Pin Name        | Function           |
|------------|-----------------|--------------------|
| 1          | V <sub>DD</sub> | Power Supply Input |
| 2          | GND             | Ground             |
| 3          | OUTPUT          | Output             |

## Functional Block Diagram



## Absolute Maximum Ratings (Note 5) @T<sub>A</sub> = +25°C, unless otherwise specified.)

| Symbol                 | Characteristics              | Values         | Unit   |
|------------------------|------------------------------|----------------|--------|
| V <sub>DD</sub>        | Supply Voltage (Note 6)      | 28             | V      |
| V <sub>OUT</sub> (Off) | Output "Off" Voltage         | 28             | V      |
| I <sub>O</sub> (sink)  | Output "On" current (sink)   | 25             | mA     |
| B                      | Magnetic Flux Density        | Unlimited      |        |
| P <sub>D</sub>         | Package Power Dissipation    | SIP-3L         | 550 mW |
|                        |                              | SC59 and SOT23 | 230 mW |
| T <sub>S</sub>         | Storage Temperature Range    | -65 to +150    | °C     |
| T <sub>J</sub>         | Maximum Junction Temperature | +150           | °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<sub>DD</sub> 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<sub>A</sub> = +25°C, unless otherwise specified.)

| Symbol          | Characteristic              | Conditions | Rating      | Unit |
|-----------------|-----------------------------|------------|-------------|------|
| V <sub>DD</sub> | Supply Voltage (Note 7)     | Operating  | 2.2 to 20   | V    |
| T <sub>A</sub>  | Operating Temperature Range | Operating  | -40 to +125 | °C   |

- Note:
- 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<sub>A</sub> = +25°C, V<sub>DD</sub> = 12V, unless otherwise specified.)

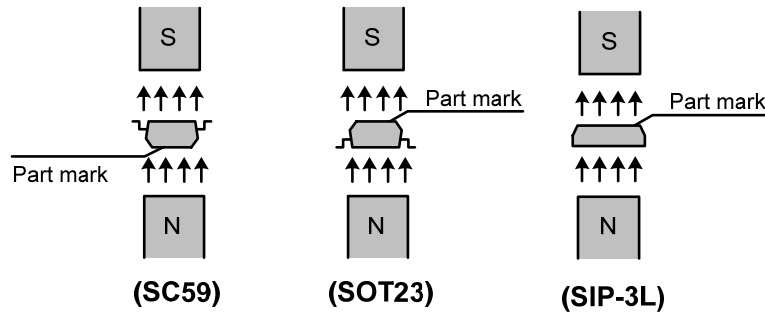
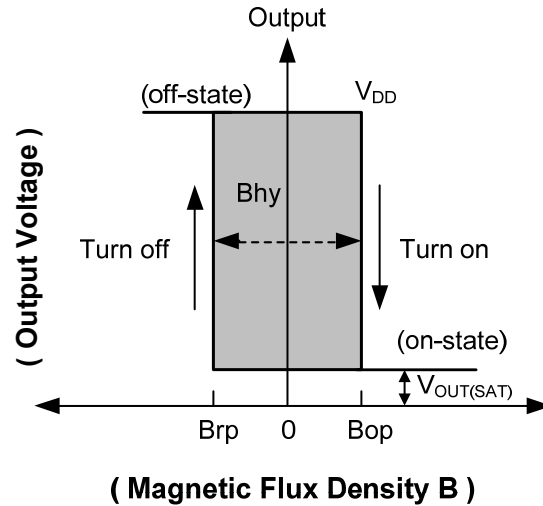
| Symbol           | Characteristic            | Conditions              | Min | Typ   | Max | Unit |
|------------------|---------------------------|-------------------------|-----|-------|-----|------|
| V <sub>OUT</sub> | Output On Voltage         | I <sub>OUT</sub> = 20mA | —   | 300   | 400 | mV   |
| I <sub>DD</sub>  | Supply Current            | B < Brp                 | —   | 2     | 4   | mA   |
| I <sub>OFF</sub> | Output Leakage Current    | Output off              | —   | < 0.1 | 10  | μA   |
| R <sub>pu</sub>  | Internal Pull-up Resistor | —                       | 7   | 10    | 13  | kΩ   |

# Magnetic Characteristics (Note 8) (@T<sub>A</sub> = +25°C, V<sub>DD</sub> = 2.5V to 20V, unless otherwise specified.)

(1mT=10 Gauss)

| Symbol                                                                                                   | Characteristic  | Min | Typ | Max | Unit  |
|----------------------------------------------------------------------------------------------------------|-----------------|-----|-----|-----|-------|
| Bop (South pole to part marking side for SIP-3L and SOT23;<br>North pole to part marking side for SC59 ) | Operation Point | 5   | 30  | 60  | Gauss |
| Brp (South pole to part marking side for SIP-3L and SOT23;<br>North pole to part marking side for SC59 ) | Release Point   | -60 | -30 | -5  |       |
| Bhy ( Bopx - Brpx )                                                                                      | Hysteresis      | —   | 60  | —   |       |

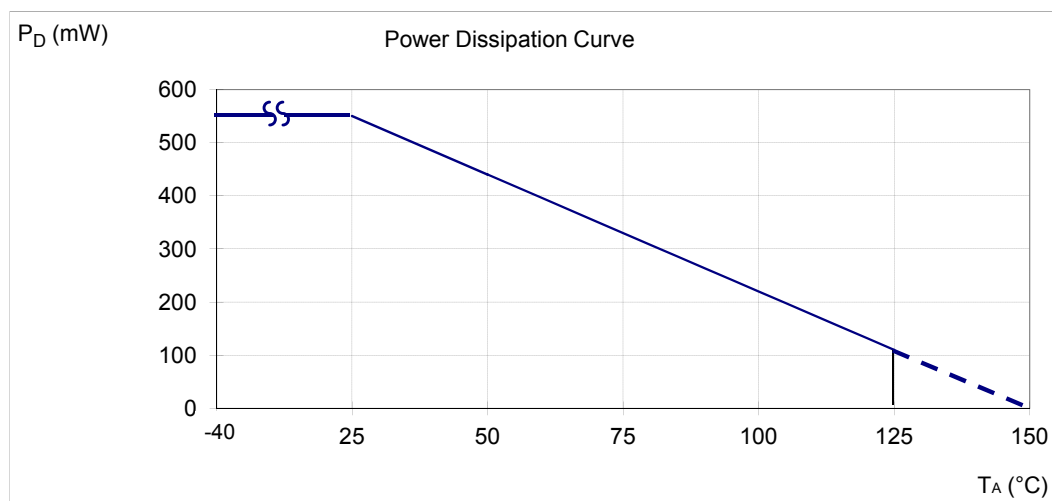
Note: 8. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.



## Thermal Performance Characteristics

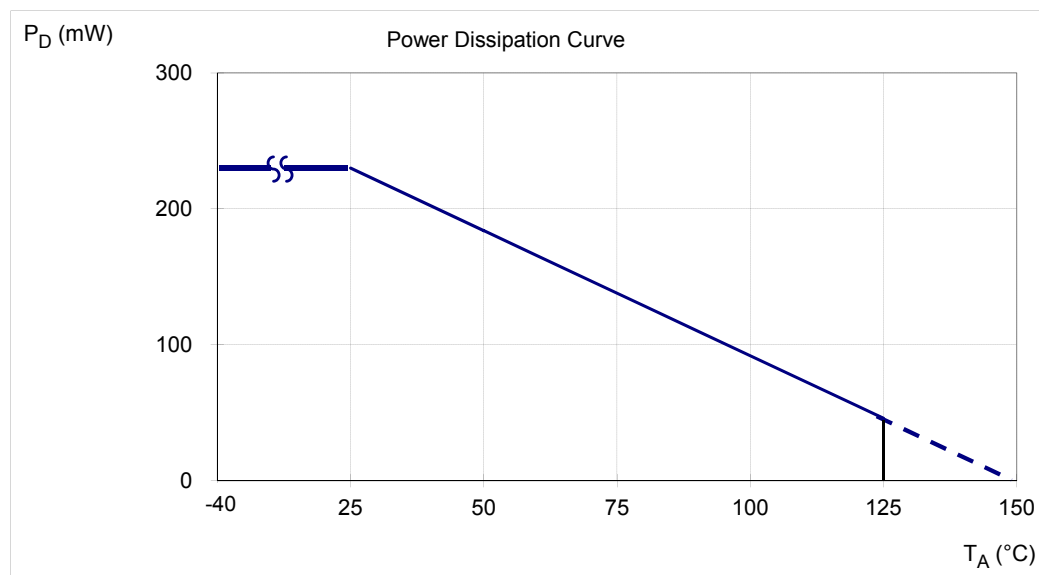
### (1) Package Type: SIP-3L

| 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   |

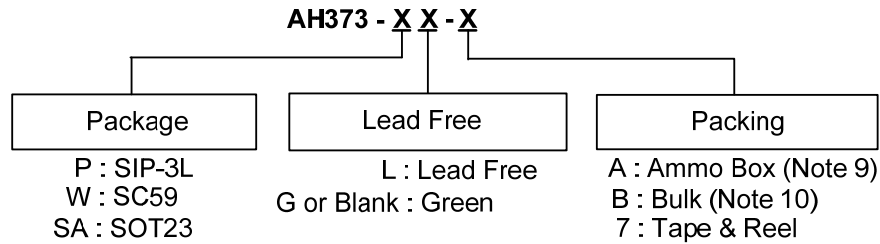


### (2) Package Type: SC59 and SOT23

| T <sub>A</sub> (°C) | 25  | 50  | 60  | 70  | 80  | 85  | 90  | 100 | 105 | 110 | 120 | 125 | 130 | 140 | 150 |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| P <sub>D</sub> (mW) | 230 | 184 | 166 | 147 | 129 | 120 | 110 | 92  | 83  | 74  | 55  | 46  | 37  | 18  | 0   |



## Ordering Information



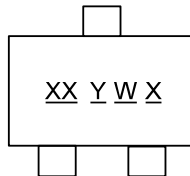
| Part Number | Package Code | Packaging (Note 11) | Bulk     |                    | 7" Tape and Reel |                    | Ammo Box |                    |
|-------------|--------------|---------------------|----------|--------------------|------------------|--------------------|----------|--------------------|
|             |              |                     | Quantity | Part Number Suffix | Quantity         | Part Number Suffix | Quantity | Part Number Suffix |
| AH373-PL-A  | P            | SIP-3L              | NA       | NA                 | NA               | NA                 | 4000/Box | -A                 |
| AH373-PL-B  | P            | SIP-3L              | 1000     | -B                 | NA               | NA                 | NA       | NA                 |
| AH373-PG-A  | P            | SIP-3L              | NA       | NA                 | NA               | NA                 | 4000/Box | -A                 |
| AH373-PG-B  | P            | SIP-3L              | 1000     | -B                 | NA               | NA                 | NA       | NA                 |
| AH373-SA-7  | SA           | SOT23               | NA       | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 |
| AH373-WL-7  | W            | SC59                | NA       | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 |
| AH373-WG-7  | W            | SC59                | NA       | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 |

Notes: 9. Ammo Box is for SIP-3L Spread Lead.  
 10. Bulk is for SIP-3L 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 Type: SC59 and SOT23

( Top View )

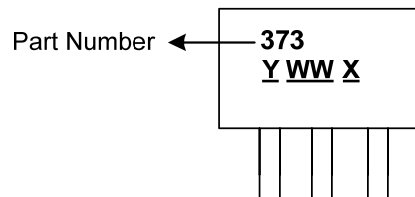


XX : Identification code  
 Y : Year 0 to 9  
 W : Week : A to Z : 1 to 26 week;  
 a to z : 27 to 52 week; z represents  
 52 and 53 week  
 X : Internal Code: A ~ Z : Green  
 a ~ z : Lead Free

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH373       | SC59    | P2                  |
| AH373       | SOT23   | S2                  |

### (2) Package Type: SIP-3L

( Top View )

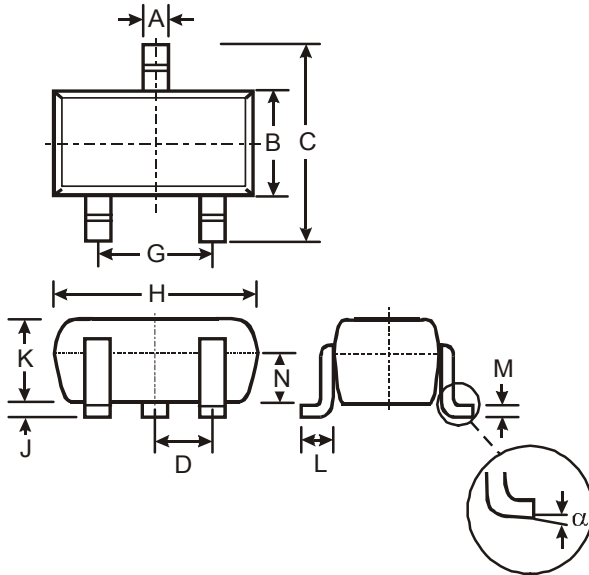


Y : Year : 0~9  
 WW : Week : 01~52, "52" represents  
 52 and 53 week  
 X : Internal Code: A ~ Z : Green  
 a ~ z : Lead Free

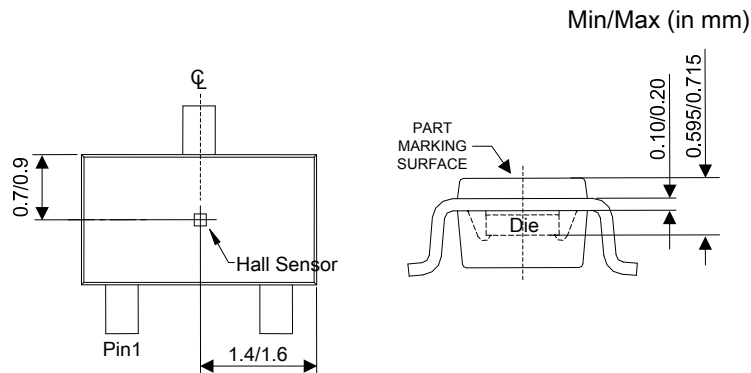
## Package Outline Dimensions (All dimensions in mm.)

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for 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 |       |      |      |

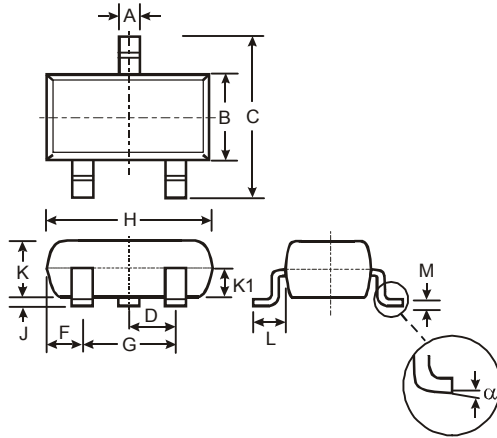


### Sensor location

## Package Outline Dimensions (cont.) (All dimensions in mm.)

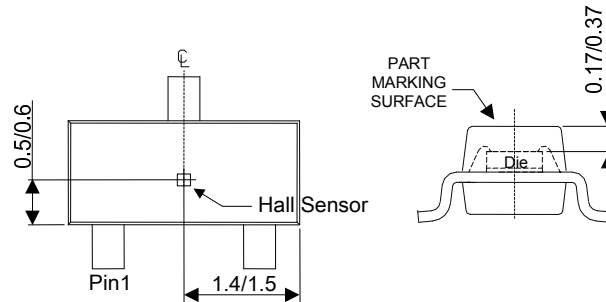
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

### (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                    | 0.903 | 1.10 | 1.00  |
| K1                   | -     | -    | 0.400 |
| L                    | 0.45  | 0.61 | 0.55  |
| M                    | 0.085 | 0.18 | 0.11  |
| $\alpha$             | 0°    | 8°   | -     |
| All Dimensions in mm |       |      |       |

Min/Max (in mm)

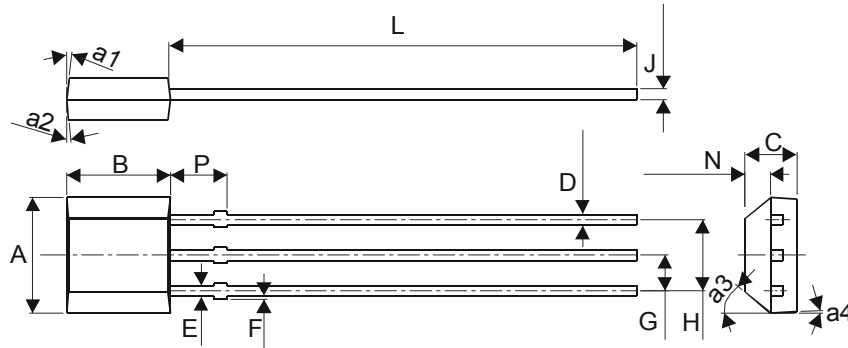


**Sensor location**

## Package Outline Dimensions (cont.) (All dimensions in mm.)

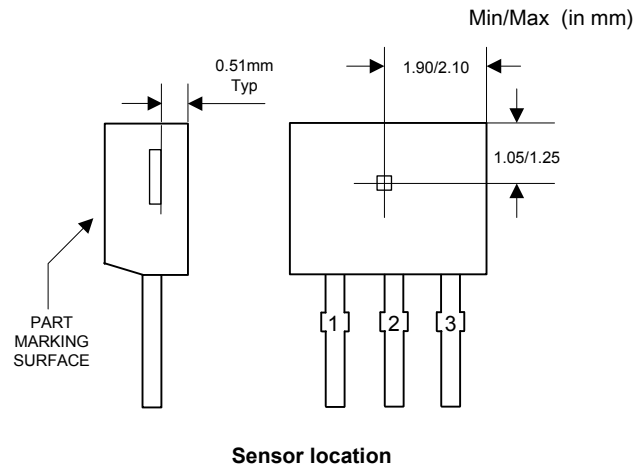
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

### (3) Package Type: SIP-3L for Bulk pack



| SIP-3 for 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 |         |       |

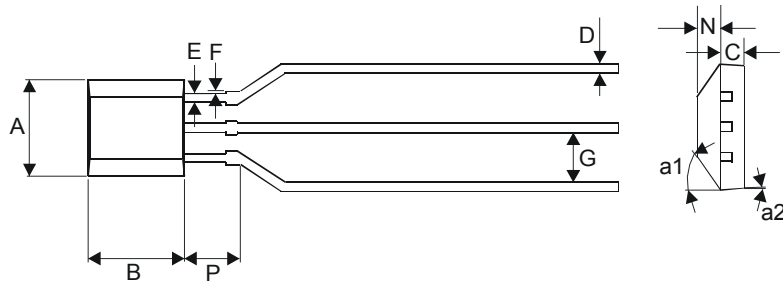
Notes: 13. SIP-3L Bulk pack - Thickness J includes Burrs



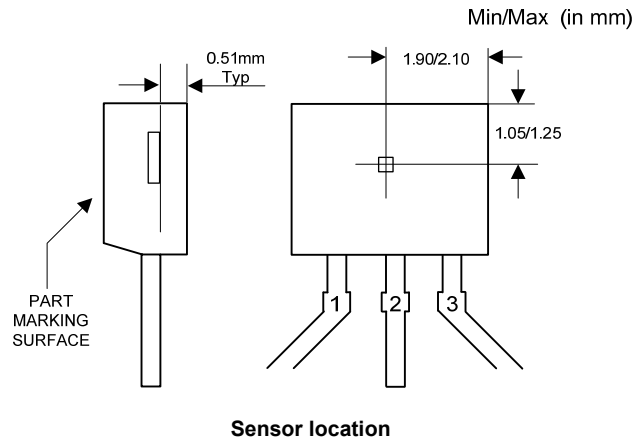
## Package Outline Dimensions (cont.) (All dimensions in mm.)

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

### (4) Package Type: SIP-3L for Ammo pack



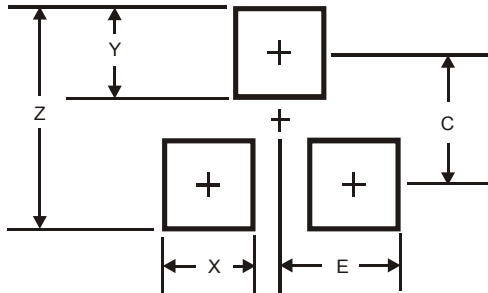
| SIP-3 for Ammo Pack  |         |      |
|----------------------|---------|------|
| Dim                  | Min     | Max  |
| A                    | 3.9     | 4.3  |
| a1                   | 45° Typ |      |
| a2                   | 3° Typ  |      |
| B                    | 2.8     | 3.2  |
| C                    | 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 |         |      |



## Suggested Pad Layout

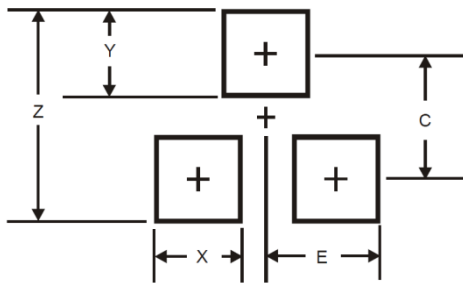
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

### (1) Package Type: SC59



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

### (2) Package Type: SOT23



| Dimensions | Value (in mm) |
|------------|---------------|
| <b>Z</b>   | 2.9           |
| <b>X</b>   | 0.8           |
| <b>Y</b>   | 0.9           |
| <b>C</b>   | 2.0           |
| <b>E</b>   | 1.35          |

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