

## Description

The AH374 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 ( $B_{OP}$ ), 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.

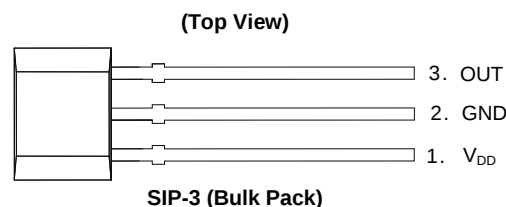
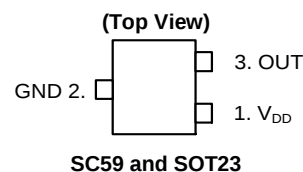
The AH374 is available in SIP-3 (Ammo Pack), SIP-3 (Bulk Pack), SC59 and SOT23 packages.

## Features

- Bipolar Hall Effect Latch Operation
- 2.2V to 20V Operating Range
- Open Drain Pre-Driver
- 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.

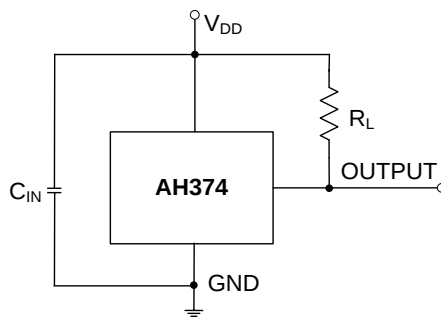
## Pin Assignments



## Applications

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

## Typical Application Circuits



Typical AH374 Circuit

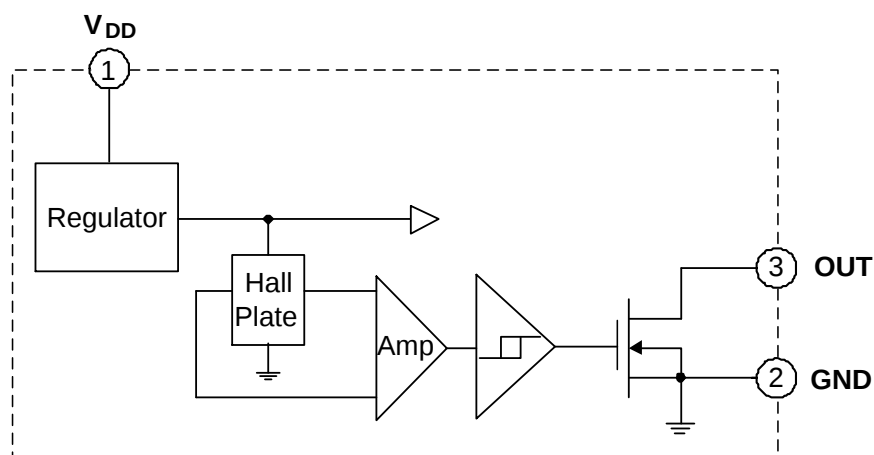
- Note:
4.  $C_{IN}$  is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 10nF ~ 100nF.
  - $R_L$  is the pull-up resistor, the recommended resistance is 10k $\Omega$  ~ 100k $\Omega$ .

## Pin Descriptions

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

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

## Functional Block Diagram



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

| Symbol                 | Characteristic               | Value                                   | 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-3 (Ammo Pack),<br>SIP-3 (Bulk Pack) | 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              | Condition | 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: 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<sub>A</sub> = +25°C, V<sub>DD</sub> = 12V, unless otherwise specified.)

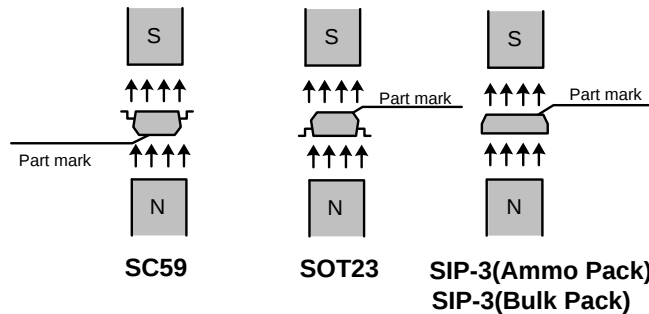
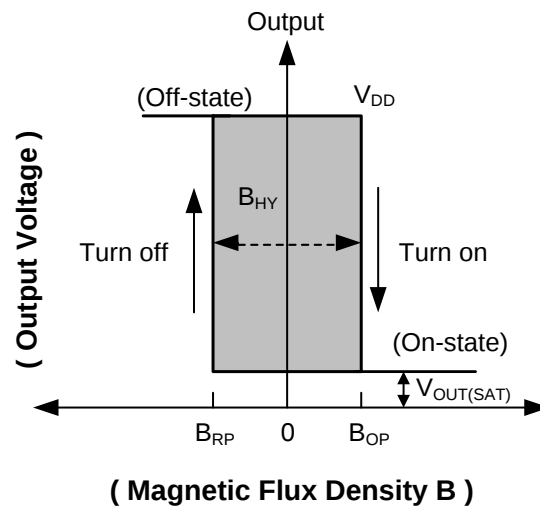
| Symbol           | Characteristic         | Condition               | Min | Typ   | Max | Unit |
|------------------|------------------------|-------------------------|-----|-------|-----|------|
| V <sub>OUT</sub> | Output On Voltage      | I <sub>OUT</sub> = 20mA | —   | 300   | 400 | mV   |
| I <sub>DD</sub>  | Supply Current         | B < B <sub>RP</sub>     | —   | 2     | 4   | mA   |
| I <sub>OFF</sub> | Output Leakage Current | Output off              | —   | < 0.1 | 10  | μA   |

**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 package ; South pole to the non-part marking side for SC59 package. See diagram below) | Operation Point | 5   | 30  | 60  | Gauss |
| $B_{RP}$ (North pole to part marking side for SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SOT23 package; North pole to the non-part marking side for SC59 package. See diagram below)  | Release Point   | -60 | -30 | -5  |       |
| $B_{HY}$ ( $ B_{OP}  -  B_{RP} $ )                                                                                                                                                  | Hysteresis      | —   | 60  | —   |       |

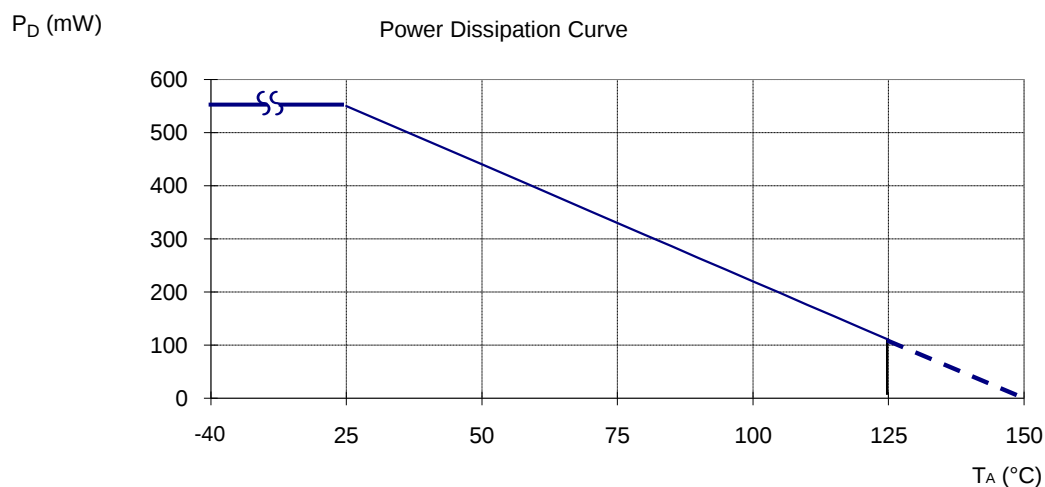
Note: 8. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.



## Thermal Performance Characteristics

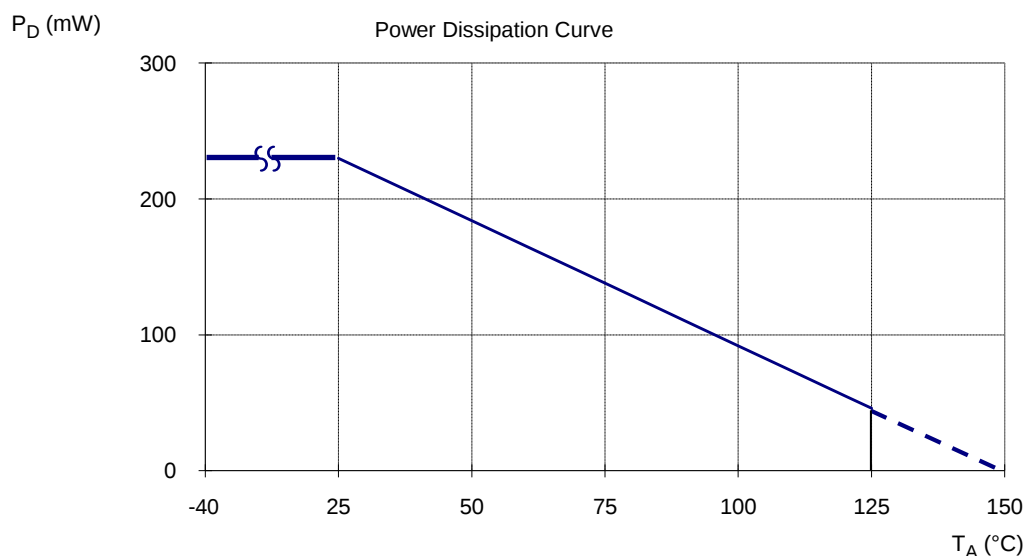
(1) Package Type: SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)

| 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   |

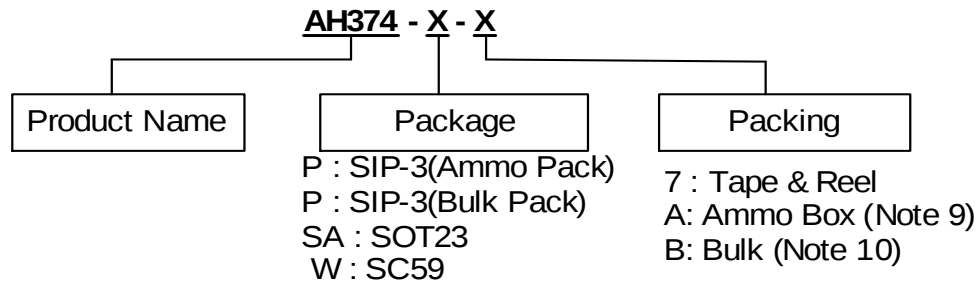


(2) Package Type: SC59 and SOT23

| 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 Box |                    | 7" Tape and Reel |                    | Ammo Box |                    |
|-------------|--------------|---------------------|----------|--------------------|------------------|--------------------|----------|--------------------|
|             |              |                     | Quantity | Part Number Suffix | Quantity         | Part Number Suffix | Quantity | Part Number Suffix |
| AH374-P-A   | P            | SIP-3 (Ammo Pack)   | NA       | NA                 | NA               | NA                 | 4000/Box | -A                 |
| AH374-P-B   | P            | SIP-3 (Bulk Pack)   | 1000     | -B                 | NA               | NA                 | NA       | NA                 |
| AH374-SA-7  | SA           | SOT23               | NA       | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 |
| AH374-W-7   | W            | SC59                | NA       | NA                 | 3000/Tape & Reel | -7                 | NA       | NA                 |

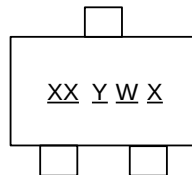
Notes:

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 Incorporated. 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 )

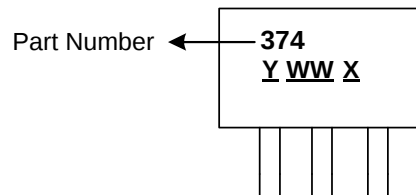


XX : Identification code  
Y : Year 0 to 9  
W : Week : A to Z : 1 to 26 week;  
           a to z : 27 to 52 week; z represents  
           52 and 53 week  
X : Internal Code:

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH374       | SC59    | XJ                  |
| AH374       | SOT23   | YJ                  |

### (2) Package Type: SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)

( Top View )



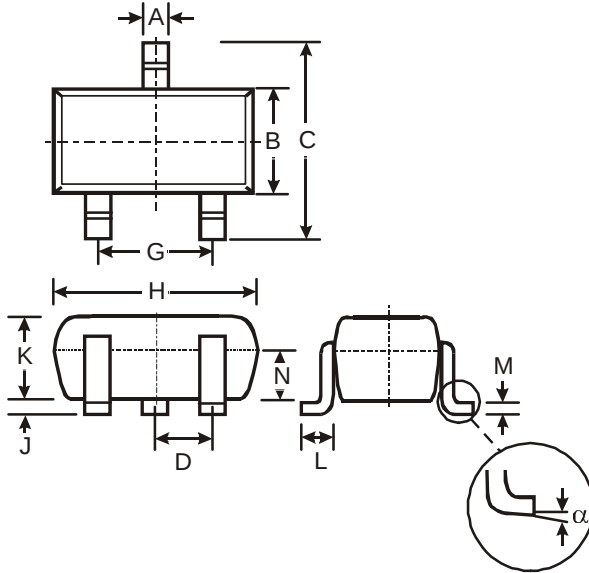
Y : Year : 0~9  
WW : Week : 01~52, "52" represents  
           52 and 53 week  
X : Internal Code:

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| AH374       | SIP-3   | 374                 |

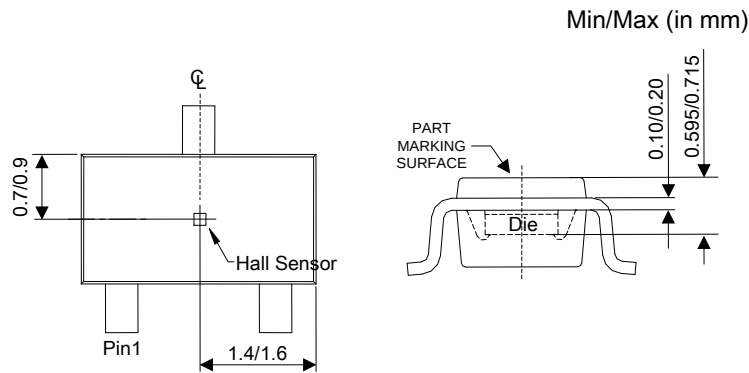
## Package Outline Dimensions (All dimensions in mm.)

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

### (1) Package Type: SC59



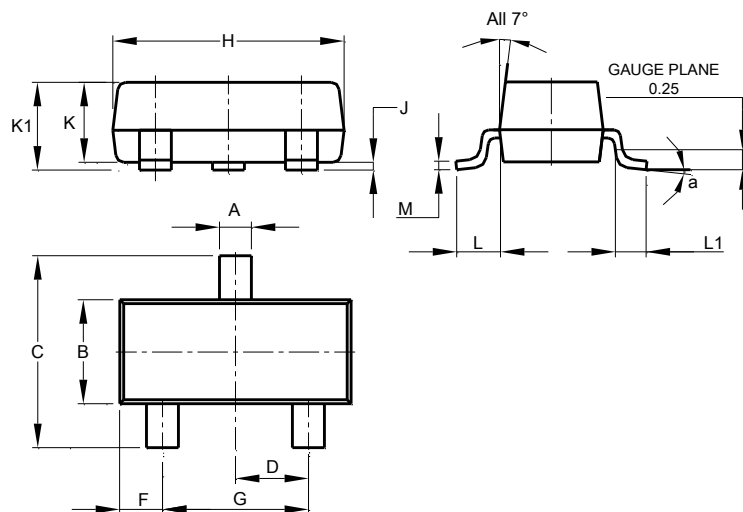
| SC59                 |       |      |      |
|----------------------|-------|------|------|
| Dim                  | Min   | Max  | Typ  |
| A                    | 0.35  | 0.50 | 0.38 |
| B                    | 1.50  | 1.70 | 1.60 |
| C                    | 2.70  | 3.00 | 2.80 |
| D                    | -     | -    | 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 |
| $\alpha$             | 0°    | 8°   | -    |
| All Dimensions in mm |       |      |      |



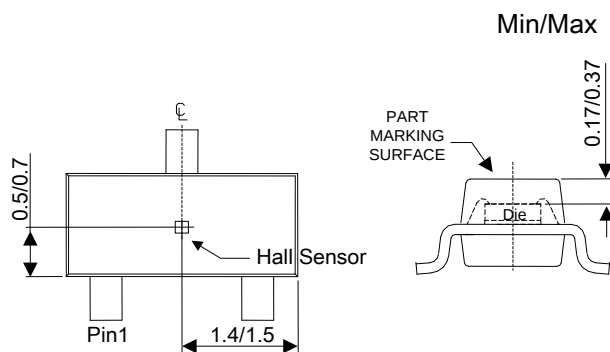
Sensor location

**Package Outline Dimensions** (Cont.) (All dimensions in mm.)

(2) Package Type: SOT23



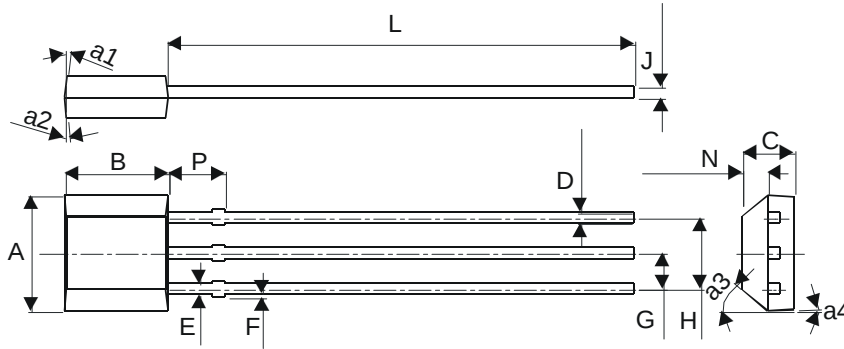
| SOT23                |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | Min   | Max   | Typ   |
| A                    | 0.37  | 0.51  | 0.40  |
| B                    | 1.20  | 1.40  | 1.30  |
| C                    | 2.30  | 2.50  | 2.40  |
| D                    | 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°    | --    |
| All Dimensions in mm |       |       |       |



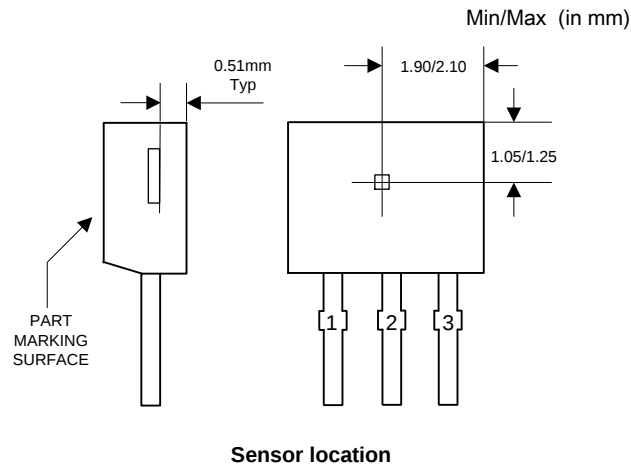
**Sensor Location**

**Package Outline Dimensions** (Cont.) (All dimensions in mm.)

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

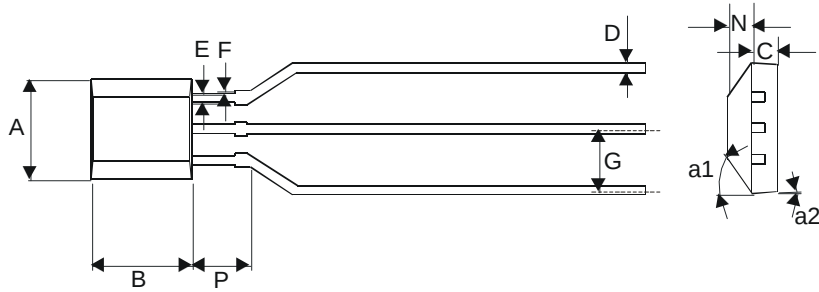


| SIP-3 (Bulk Pack)    |         |       |
|----------------------|---------|-------|
| Dim                  | Min     | Max   |
| A                    | 3.9     | 4.3   |
| a1                   | 5° Typ  |       |
| a2                   | 5° Typ  |       |
| a3                   | 45° Typ |       |
| 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 |         |       |

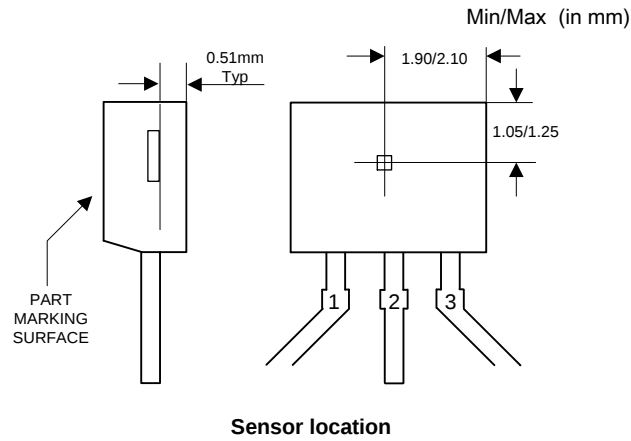


**Package Outline Dimensions** (Cont.) (All dimensions in mm.)

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



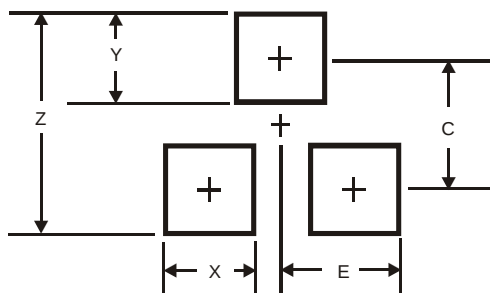
| SIP-3 (Ammo Pack)    |         |      |
|----------------------|---------|------|
| Dim                  | Min     | Max  |
| A                    | 3.9     | 4.3  |
| a1                   | 45° Typ |      |
| a2                   | 3° Typ  |      |
| B                    | 2.8     | 3.2  |
| C   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



## Suggested Pad Layout

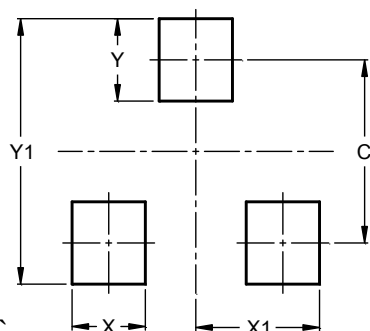
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

### (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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- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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