

**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 (Rpu). 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.

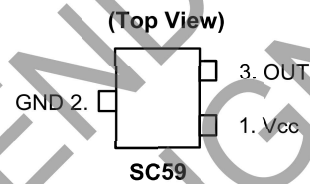
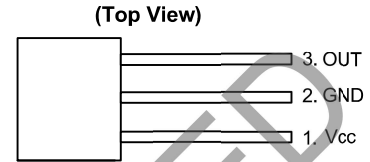
The AH173 is available in SIP-3 and SC59 packages.

**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-3 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](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.

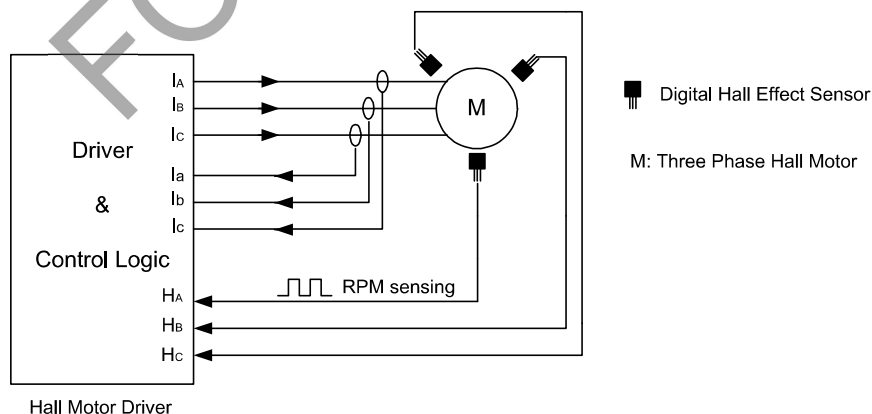
**Pin Assignments**



**Applications**

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

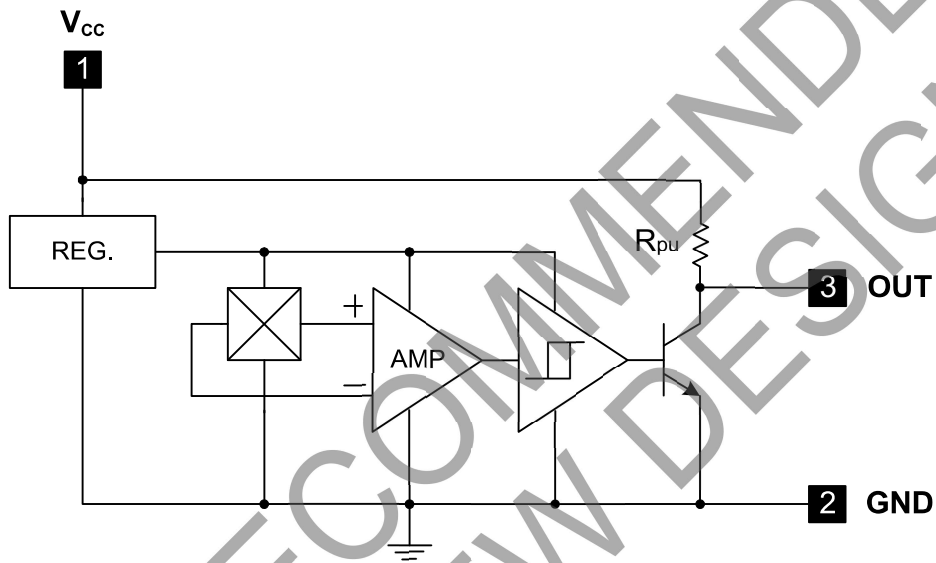
**Typical Applications Circuit**



### 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 (Off)</sub>	Output "Off" Voltage	20	V	
I <sub>O (Sink)</sub>	Output "On" Current	25	mA	
T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C	
T <sub>J</sub>	Maximum Junction Temperature	+150	°C	
P <sub>D</sub>	Power Dissipation	SIP-3	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** ( $T_A = +25^\circ\text{C}$ )

Symbol	Characteristics	Conditions	Min	Typ	Max	Unit
$V_{OUT(SAT)}$	Output Saturation Voltage	$V_{CC} = 12\text{V}$ , OUT "ON" $I_O = 10\text{mA}$	-	300	400	mV
$I_{CC}$	Supply Current	$V_{CC} = 12\text{V}$ , OUT "OFF"	-	3.5	6	mA
$R_{pu}$	Internal Pull-up Resistor	-	7	10	13	K $\Omega$
$V_d$	Dropout Voltage	$V_d = V_{CC} - V_{CE}$	-	-	0.3	V

**Magnetic Characteristics** ( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 12\text{V}$ , unless otherwise specified, Note 4)

(1mT = 10 Gauss)

**A Grade**

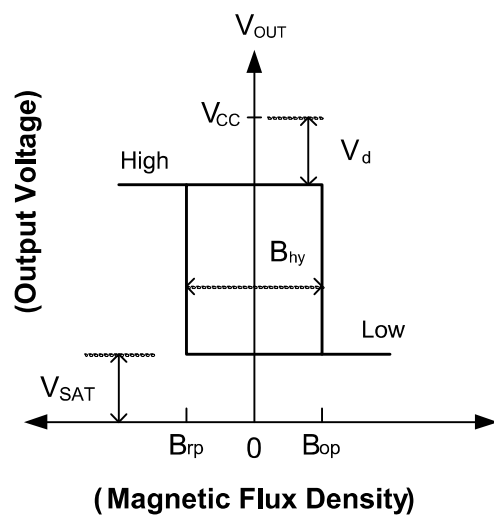
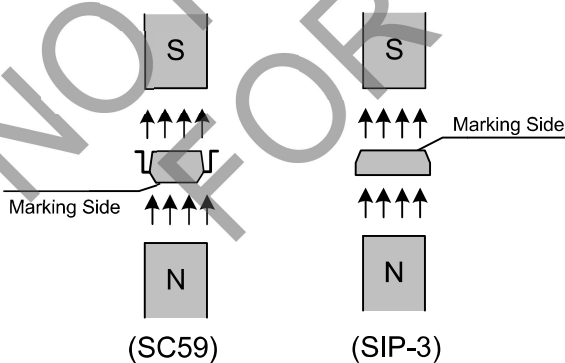
Symbol	Parameter	Min	Typ	Max	Unit
Bops (South Pole to Brand Side)	Operation Point	15	-	60	Gauss
Brps (South Pole to Brand Side)	Release Point	-60	-	-15	Gauss
$B_{hy}( B_{opx}  -  B_{rpx} )$	Hysteresis	-	80	-	Gauss

**B Grade**

Symbol	Parameter	Min	Typ	Max	Unit
Bops (South Pole to Brand Side)	Operation Point	5	-	80	Gauss
Brps (South Pole to Brand Side)	Release Point	-80	-	-5	Gauss
$B_{hy}( B_{opx}  -  B_{rpx} )$	Hysteresis	-	80	-	Gauss

Notes: 4. Magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

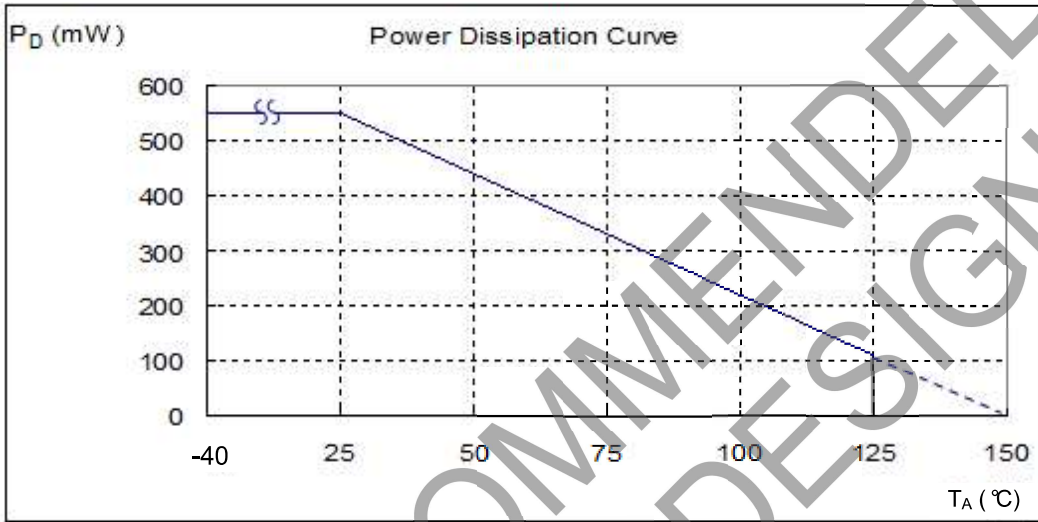
**Operating Characteristics**



**Performance Characteristics**

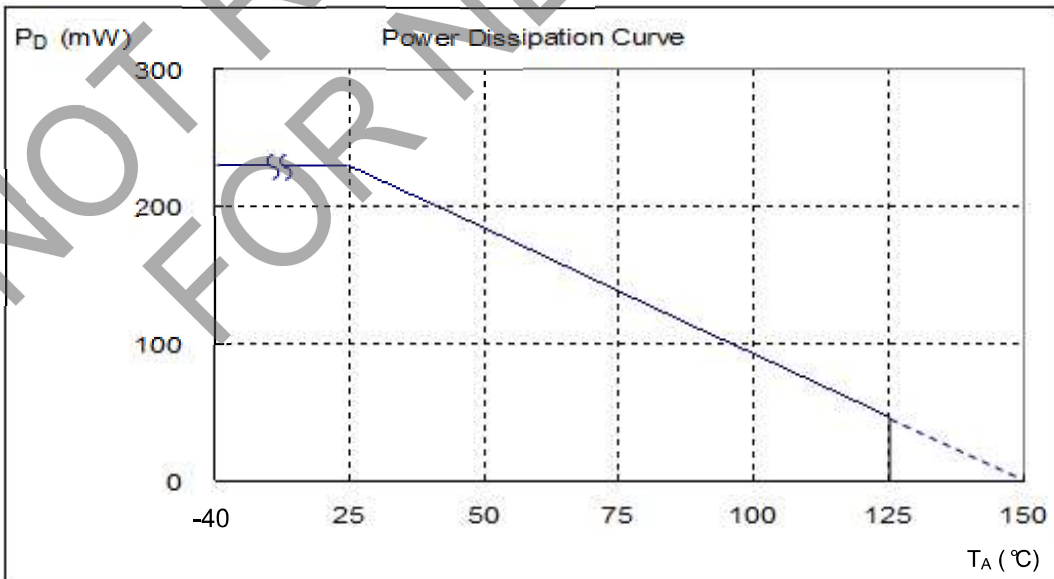
(1) SIP-3

$T_A$ (°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

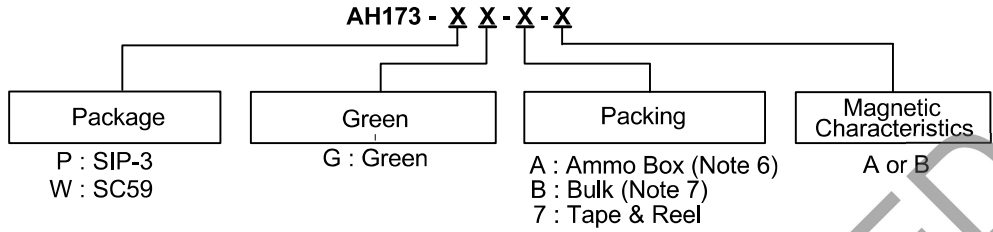


(2) SC59 (Commonly Known as SOT23 in Asia)

$T_A$ (°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**



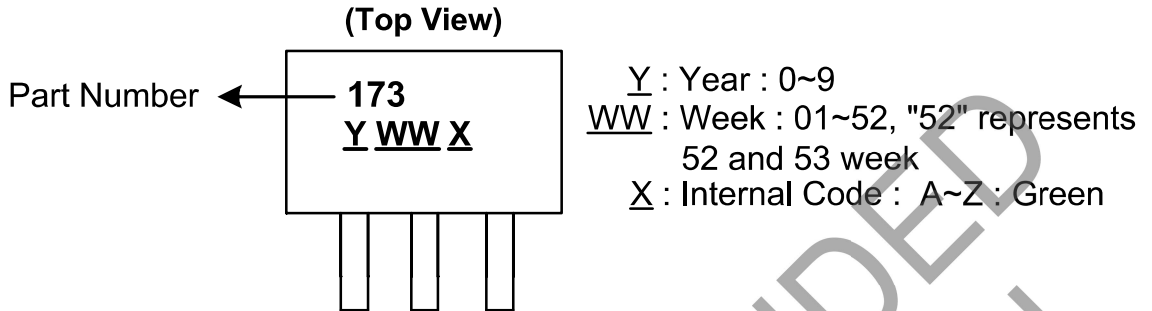
Part Number	Status (Note 8)	Package Code	Packaging (Note 5)	Bulk		7" Tape and Reel		Ammo Box	
				Quantity	Part Number Suffix	Quantity	Part Number Suffix	Quantity	Part Number Suffix
AH173-PG-A-A	NRND	P	SIP-3	NA	NA	NA	NA	4000/Box	-A
AH173-PG-A-B	NRND	P	SIP-3	NA	NA	NA	NA	4000/Box	-A
AH173-PG-B-A	NRND	P	SIP-3	1000	-B	NA	NA	NA	NA
AH173-PG-B-B	NRND	P	SIP-3	1000	-B	NA	NA	NA	NA
AH173-WG-7-A	NRND	W	SC59	NA	NA	3000/Tape & Reel	-7	NA	NA
AH173-WG-7-B	NRND	W	SC59	NA	NA	3000/Tape & Reel	-7	NA	NA

- Notes:
- 5. 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>.
  - 6. Ammo Box is for SIP-3 Spread Lead.
  - 7. Bulk is for SIP-3 Straight Lead.
  - 8: NRND = Not Recommended for New Design

NOT RECOMMENDED FOR NEW DESIGN

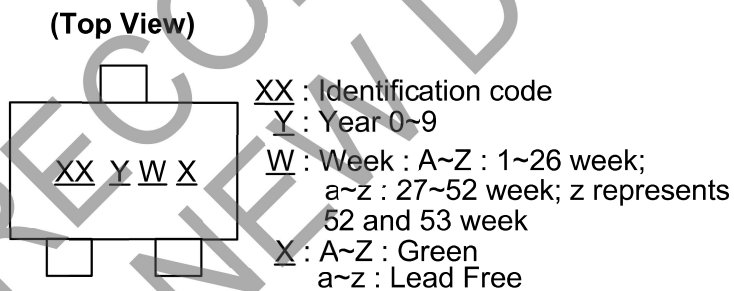
## Marking Information

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



Part Number	Package	Identification Code
AH173	SIP-3 (Ammo Pack)	173
AH173	SIP-3 (Bulk Pack)	173

(2) Package Type: SC59 (Commonly Known as SOT23 in Asia)

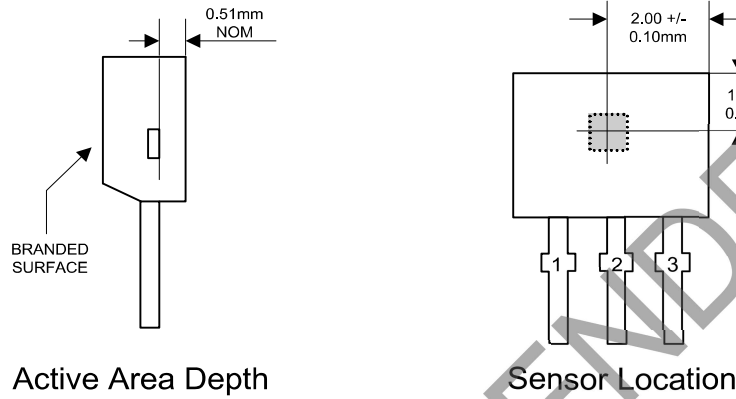


Part Number	Package	Identification Code
AH173	SC59	J3

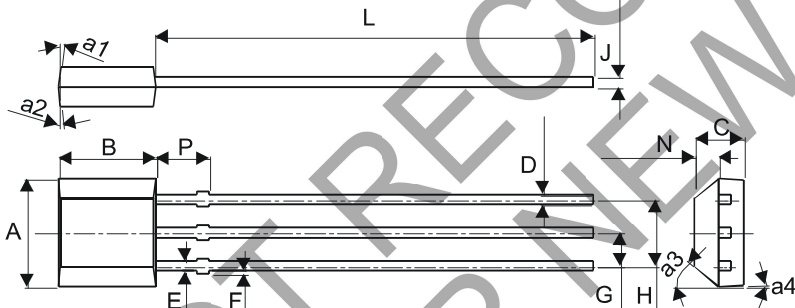
**Package Outline Dimensions** (All Dimensions in mm)

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

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



**Package Dimension**

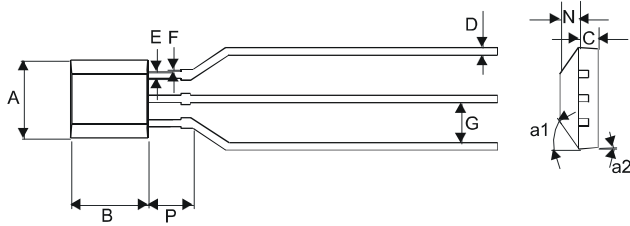


SIP-3 (Bulk Pack)		
Dim	Min	Max
A	3.9	4.3
a1	5° Typ	
a2	5° Typ	
a3	45° Typ	
a4	3° Typ	
B	2.8	3.2
C	1.40	1.60
D	0.33	0.432
E	0.40	0.508
F	0	0.2
G	1.24	1.30
H	2.51	2.57
J	0.35	0.43
L	14.0	15.0
N	0.63	0.84
P	1.55	-
All Dimensions in mm		

**Package Outline Dimensions** (Continued)

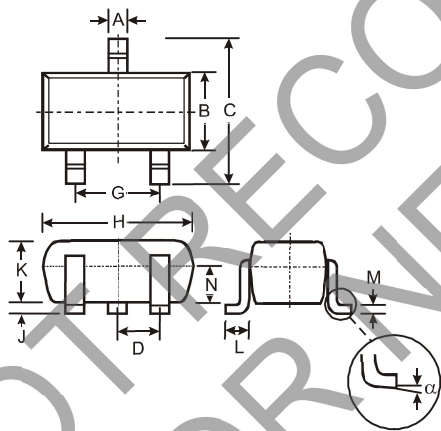
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

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

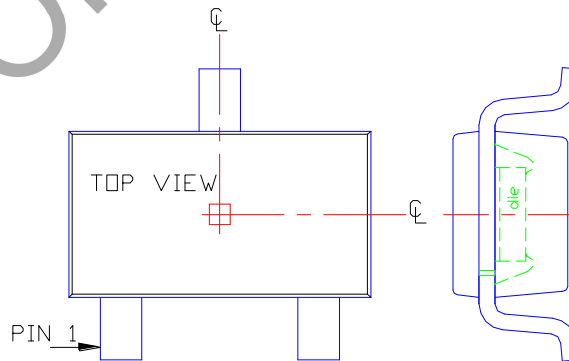


SIP-3 (Ammo Pack)		
Dim	Min	Max
A	3.9	4.3
a1	45° Typ	
a2	3° Typ	
B	2.8	3.2
C	1.40	1.60
D	0.35	0.41
E	0.43	0.48
F	0	0.2
G	2.4	2.9
N	0.63	0.84
P	1.55	-
All Dimensions in mm		

(3) 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			



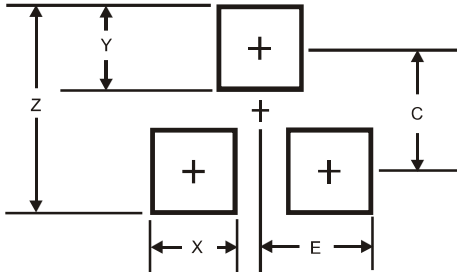
⌀ = Package Center Line



## 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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