Description

The AH180 is a micro-power Omnipolar Hall-Effect switch designed for portable and battery powered equipment such cellular phones, PDAs and portable PCs. Based on two Hall-Effect plates and a chopper stabilized architecture the AH180 provides a reliable solution over the whole operating range. To support portable and battery powered equipment the design has been optimized to operate over the supply range of 2.5V to 5.5V and consumes only 24µW with a supply of 3V.

The single open-drain output switches on with either a north or south pole of sufficient strength.

When the magnetic flux density (**B**) is larger than operate point (**Bop**), output is switched on (OUTPUT pin is pulled low). The output is turned off when **B** becomes lower than the release point (**Brp**). The output will remain off when there is no magnetic field.

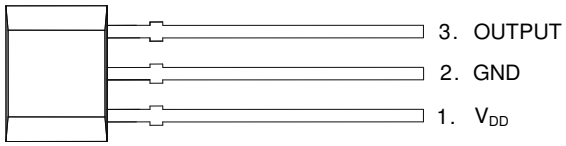
The AH180 is available in SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SC59 packages.

Features

- Omnipolar (North or South pole) Operation
- Micropower Operation
- Single Open Drain Output
- 2.5V to 5.5V Operating Voltage
- Chopper Stabilized Design Provides
  - Superior Temperature Stability
  - Minimal Switch-Point Drift
  - Enhanced Immunity to Stress
- Good RF Noise Immunity
- -40°C to +85°C Operating Temperature
- ESD (HBM) > 6kV for SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) and SC59 Packages
- SIP-3 (Ammo Pack), SIP-3 (Bulk Pack), SC59 (Commonly Known as SOT23 in Asia) Packages
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative.**
  https://www.diodes.com/quality/product-definitions/

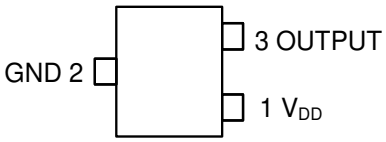
Pin Assignments

(Top View)



SIP-3 (Bulk Pack)

(Top View)



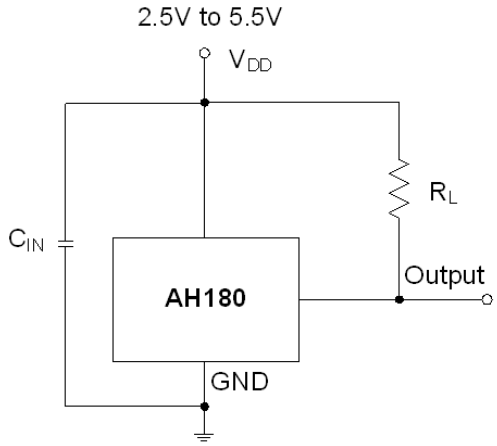
SC59

Applications

- Cover Switch in Clam-Shell Cellular Phones
- Cover Switch in Notebook PC/PDA
- Contactless Switch in Consumer Products

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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 Circuit

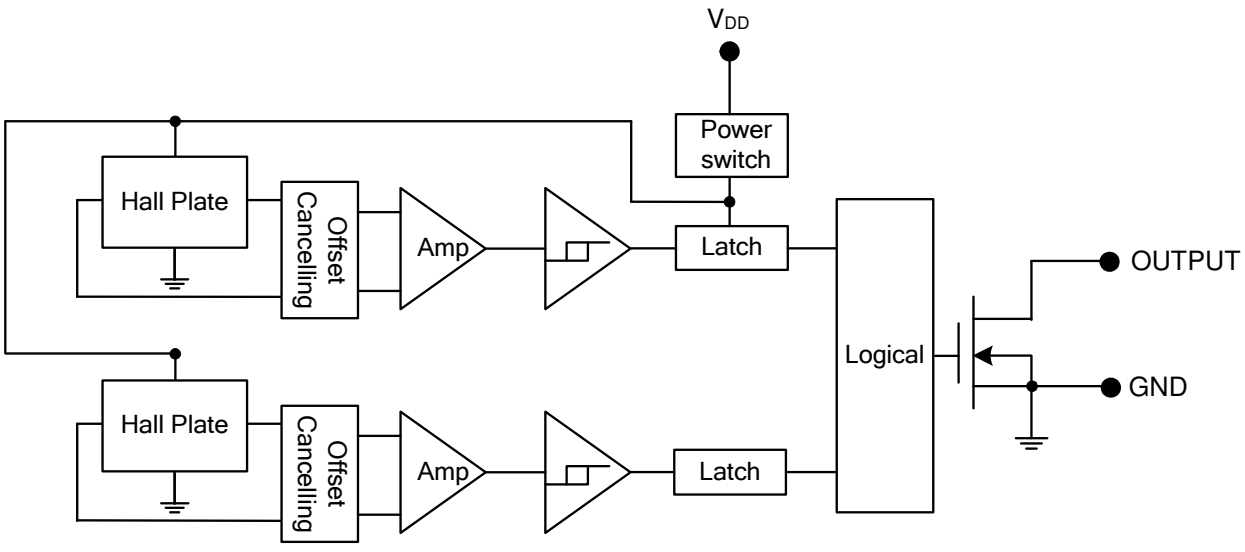


Note: 4. C_{IN} is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 10nF to 100nF.
R_L is the pull-up resistor, the recommended resistance is 10kΩ to 100kΩ.

Pin Descriptions

Pin Name	P/I/O	Description
V_{DD}	P/I	Power Supply Input
GND	P/I	Ground
OUTPUT	O	Output Pin

Functional Block Diagram



Absolute Maximum Ratings (T_A = +25°C)

Symbol	Characteristics		Values	Unit
Vdd	Supply Voltage		7	V
B	Magnetic Flux Density		Unlimited	
T_S	Storage Temperature Range		-65 to +150	°C
P_D	Package Power Dissipation	SIP-3 (Ammo Pack) SIP-3 (Bulk Pack)	550	mW
		SC59	230	mW
T_J	Maximum Junction Temperature		+150	°C

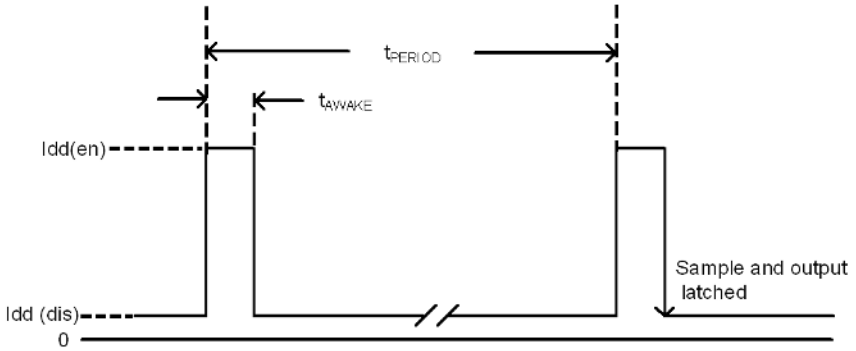
Recommended Operating Conditions

Symbol	Parameter	Conditions	Min	Max	Unit
Vdd	Supply Voltage	Operating	2.5	5.5	V
T_A	Operating Ambient Temperature	Operating	-40	+85	°C

Electrical Characteristics (T_A = +25°C, Vdd = 3V; unless otherwise specified.)

Symbol	Characteristic	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output On Voltage	I_{OUT} =1mA	—	0.1	0.3	V
I_{OFF}	Output Leakage Current	V_{OUT} =5.5V, Output off	—	<0.1	1	µA
Idd(en)	Supply Current	Chip enable, T_A = +25°C, Vdd = 3V	—	3	6	mA
Idd(en)		Chip enable, T_A = -40 to +85°C, Vdd = 2.5V to 5.5V	—	3	9	mA
Idd(dis)		Chip disable, T_A = +25°C, Vdd = 3V	—	5	10	µA
Idd(dis)		Chip disable, T_A = -40 to +85°C, Vdd = 2.5V to 5.5V	—	5	15	µA
Idd(avg)		Average supply current, T_A = +25°C, Vdd = 3V	—	8	16	µA
Idd(avg)		Average supply current, T_A = -40 to +85°C, Vdd = 2.5V to 5.5V	—	8	24	µA
t_{AWAKE}	Awake Time	(Note 5)	—	75	125	µs
t_{PERIOD}	Period	(Note 5)	—	75	125	ms
D.C.	Duty Cycle	—	—	0.1	—	%

Note: 5. When power is initially turned on, Vdd must be within its correct operating range (2.5V to 5.5V) to guarantee the output sampling. The output state is valid after the second operating phase (typical 150ms).



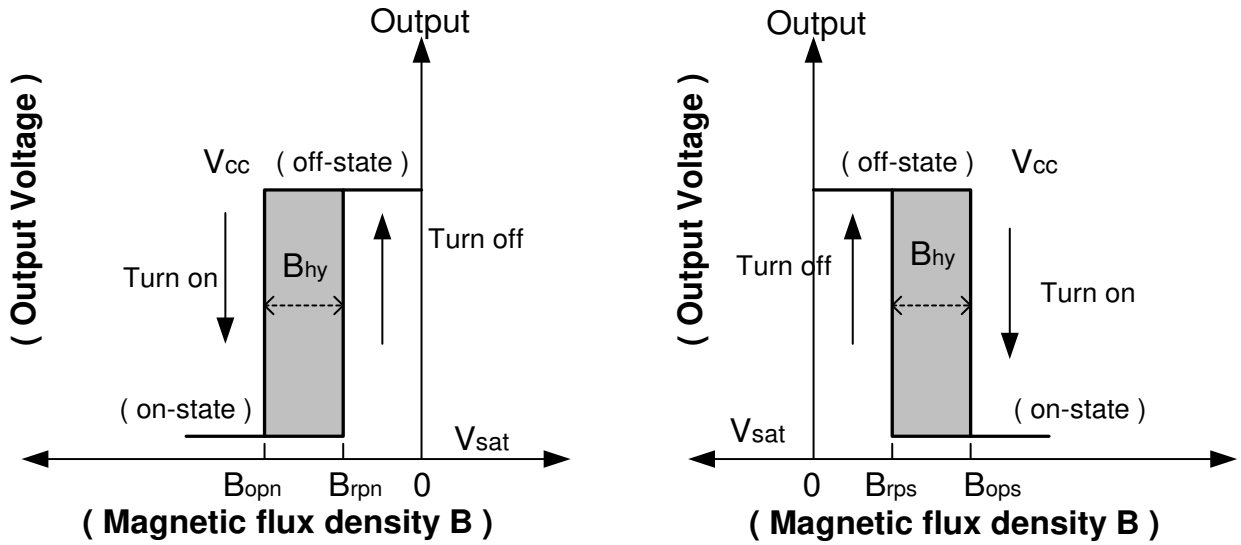
Magnetic Characteristics (T_A = +25°C, Vdd = 3V, Notes 6 & 7)

(1mT=10 Gauss)

Symbol	Parameter	Min	Typ	Max	Unit
Bops (South Pole to Brand Side)	Operation Point	—	40	60	Gauss
Bopn (North Pole to Brand Side)		-60	-40	—	
Brps (South Pole to Brand Side)	Release Point	10	30	—	
Brpn (North Pole to Brand Side)		—	-30	-10	
Bhy (|Bopx|-|Brpx|)	Hysteresis	—	15	—	

Notes: 6. Typical data is at T_A = +25°C, Vdd = 3V, and for design information only.
7. Magnetic characteristics may vary with supply voltage, operating temperature and after soldering.

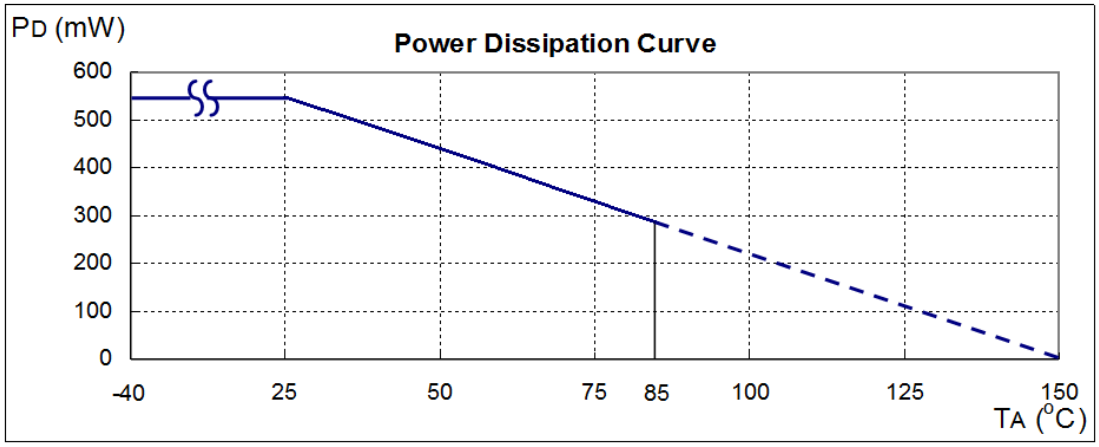
Operating Characteristics



Performance Characteristics

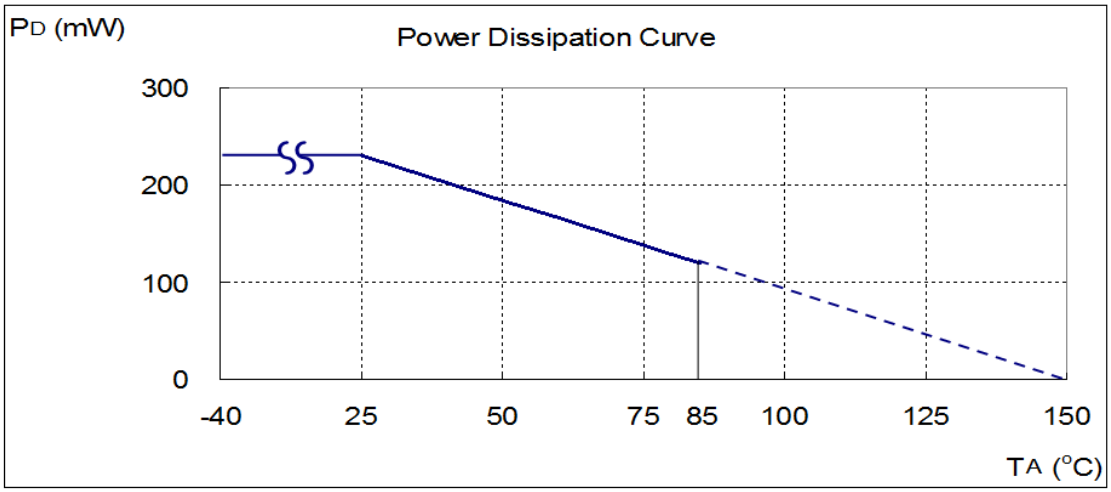
(1) SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)

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

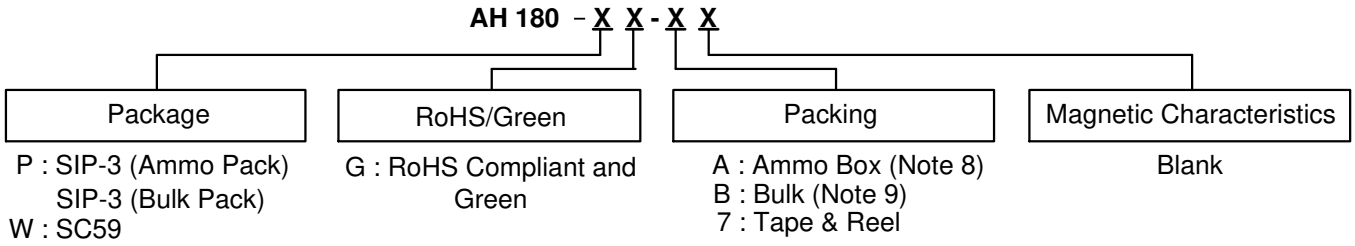


(2) SC59 (Commonly Known as SOT23 in Asia)

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 (Note 10)

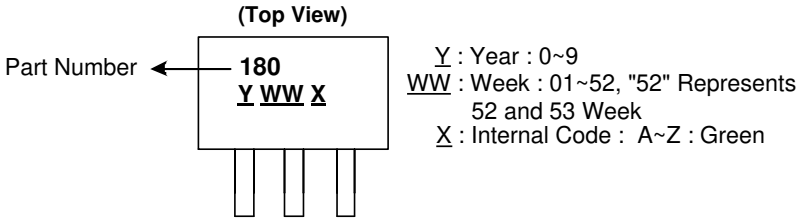


Device	Package Code	Packaging	Bulk		7" Tape and Reel		Ammo Box		Magnetic Characteristics
			Quantity	Part Number Suffix	Quantity	Part Number Suffix	Quantity	Part Number Suffix	
AH180-PG-B	P	SIP-3 (Bulk Pack)	1000	-B	NA	NA	NA	NA	Blank
AH180-PG-A	P	SIP-3 (Ammo Pack)	NA	NA	NA	NA	-A	4000/Box	Blank
AH180-WG-7	W	SC59	NA	NA	3000/Tape & Reel	-7	NA	NA	Blank

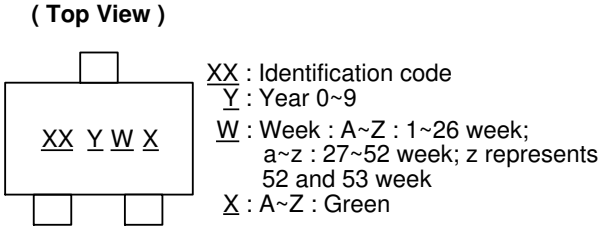
Notes: 8. Ammo Box is for SIP-3 (Ammo Pack) Spread Lead.
9. Bulk is for SIP-3 (Bulk Pack) Straight Lead.
10. Pad layout as shown on Diodes Incorporated's suggested pad layout document, which can be found on our website at http://www.diodes.com/package-outlines.html.

Marking Information

(1) SIP-3 (Ammo Pack), SIP-3 (Bulk Pack)



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

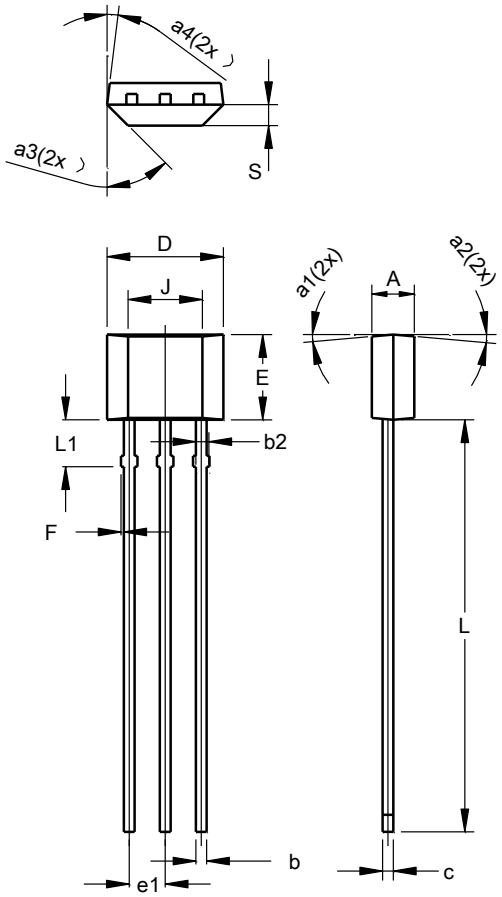


Part Number	Package	Identification Code
AH180	SC59	K0

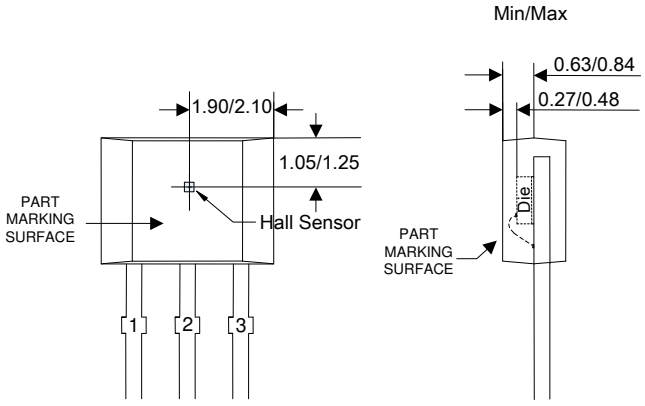
Package Outline Dimensions (All Dimensions in mm)

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

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



SIP-3 (Bulk Pack)			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
b	0.33	0.43	0.38
b2	0.40	0.508	0.46
c	0.35	0.41	0.38
D	3.90	4.30	4.10
E	2.80	3.20	3.00
e1	1.24	1.30	1.27
F	0.00	0.20	--
J	2.62 REF		
L	14.00	15.00	14.50
L1	1.55	1.75	1.65
S	0.63	0.84	0.74
a1	--	--	5°
a2	--	--	5°
a3	--	--	45°
a4	--	--	3°
All Dimensions in mm			

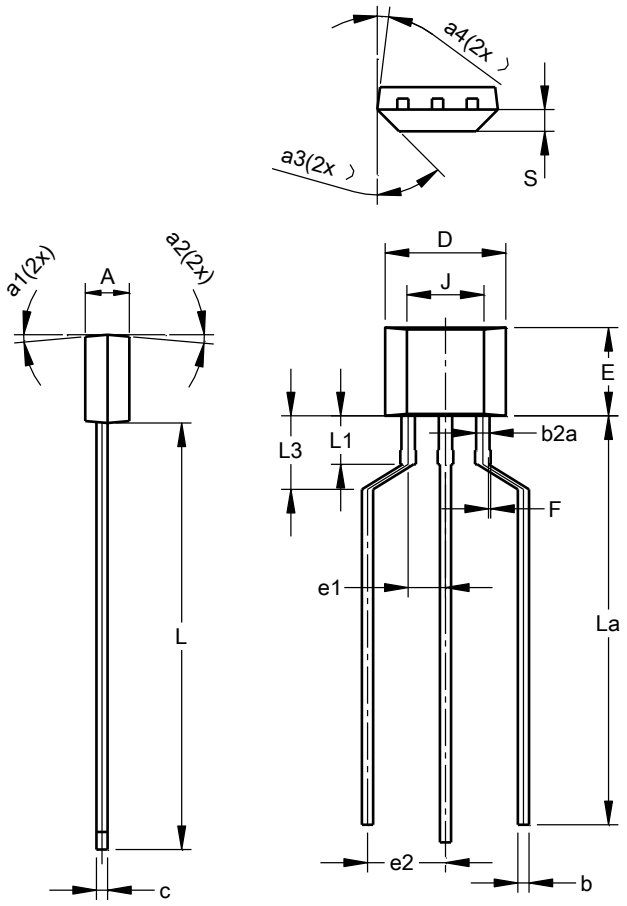


Sensor Location

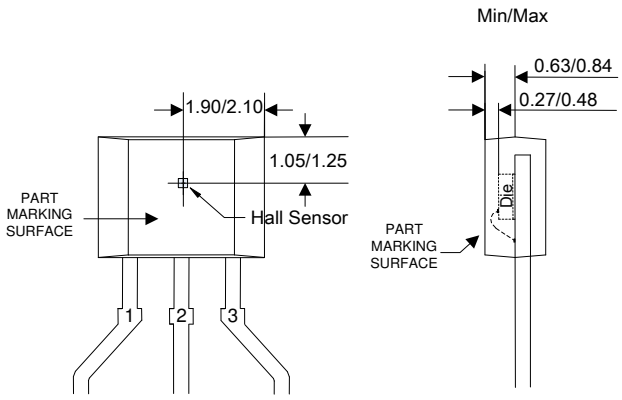
Package Outline Dimensions (All Dimensions in mm) (Continued)

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**	**Typ**
A	1.40	1.60	1.50
b	0.33	0.43	0.38
b2a	0.40	0.52	0.46
c	0.35	0.41	0.38
D	3.90	4.30	4.10
E	2.80	3.20	3.00
e1	1.24	1.30	1.27
e2	2.40	2.90	2.65
F	0.00	0.20	—
J	2.62 REF		
L	14.00	15.00	14.50
La	12.90	14.90	13.90
L1	1.55	1.75	1.65
L3	2.00	3.00	2.50
S	0.63	0.84	0.74
a1	—	—	5°
a2	—	—	5°
a3	—	—	45°
a4	—	—	3°
All Dimensions in mm			

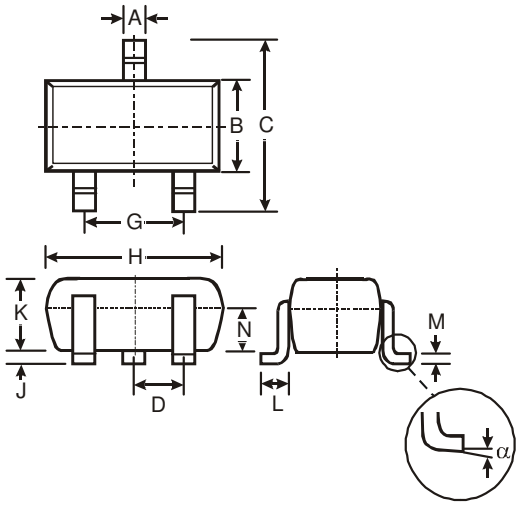


Sensor Location

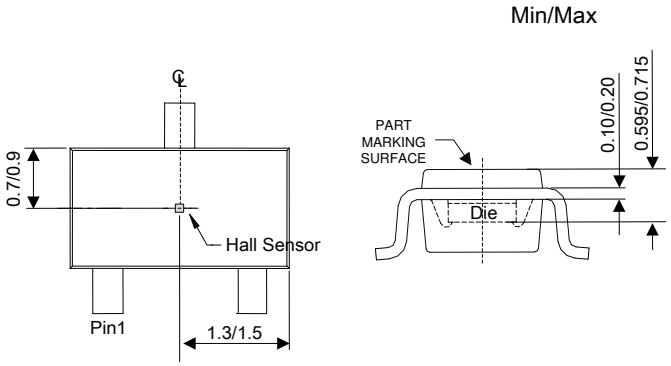
Package Outline Dimensions (All dimensions in mm.) (Continued)

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

(3) 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			

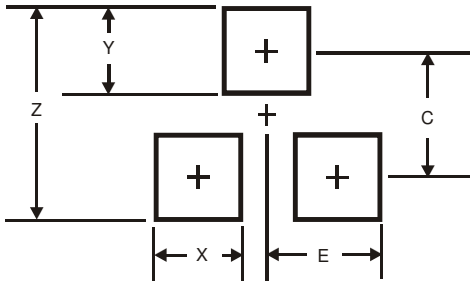


Sensor Location

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

Mechanical Data

SIP-3 (Ammo Pack), SIP-3 (Bulk Pack) Packages

- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.12 grams (Approximate)

SC59 Package

- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.014 grams (Approximate)

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