LOW SENSITIVITY MICROPOWER OMNIPOLAR HALL-EFFECT SWITCH

Description

The AH1815 is a low-sensitivity, micro-power Omnipolar Hall effect switch IC, designed for portable and battery powered consumer equipment for home appliance and industrial applications such as smart-meter magnetic-tamper detection. Based on two sensitive Hall effect plates and a chopper-stabilized architecture, the AH1815 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.

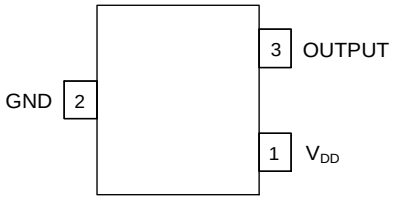
The single open drain output can switch on with either a north or south pole of sufficient strength. When the magnetic flux density (B) perpendicular to the package is larger than operating point (Bop) the output is switched on (pulled low). The output is turned off when B becomes lower than the releasing point (Brp). The output will remain off when there is no magnetic field.

Features

- Omnipolar (North or South pole) Operation
- Low Sensitivity
- Single Open Drain Output
- Micropower Operation
- 2.5V to 5.5V Operating Range
- Chopper Stabilized Design Provides
  - Superior Temperature Stability
  - Minimal Switch Point Drift
  - Enhanced Immunity to Stress
- Good RF Noise Immunity
- -40°C to +125°C Operating Temperature
- ESD (HBM) > 6KV
- Small Low Profile SOT553 and Industry Standard SC59 and SIP-3 Packages
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

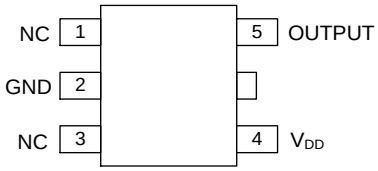
Pin Assignments

(Top View)



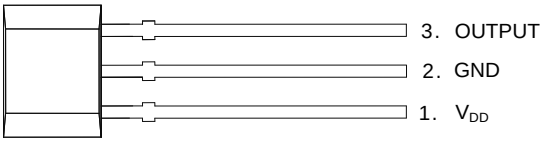
SC59

(Top View)



SOT553

(Front View)



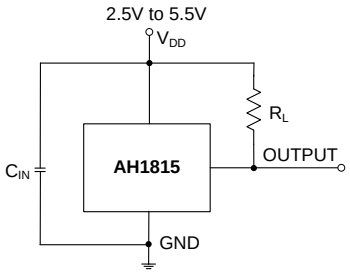
SIP-3

Applications

- Doors, Lids, Covers and Tray Position Detect Switches
- Display Switch for Portable PCs and Tablets
- On/Off Switch for PDAs and Digital Cameras
- Liquid Level Detection for Coffee Machines
- Smart Meters
- Position, Proximity and Level Detection Contactless Switch in Battery Powered Consumer, Home Appliances and Industrial Applications

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 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 Applications Circuit (Note 4)



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

Packages: SC59 and SIP-3

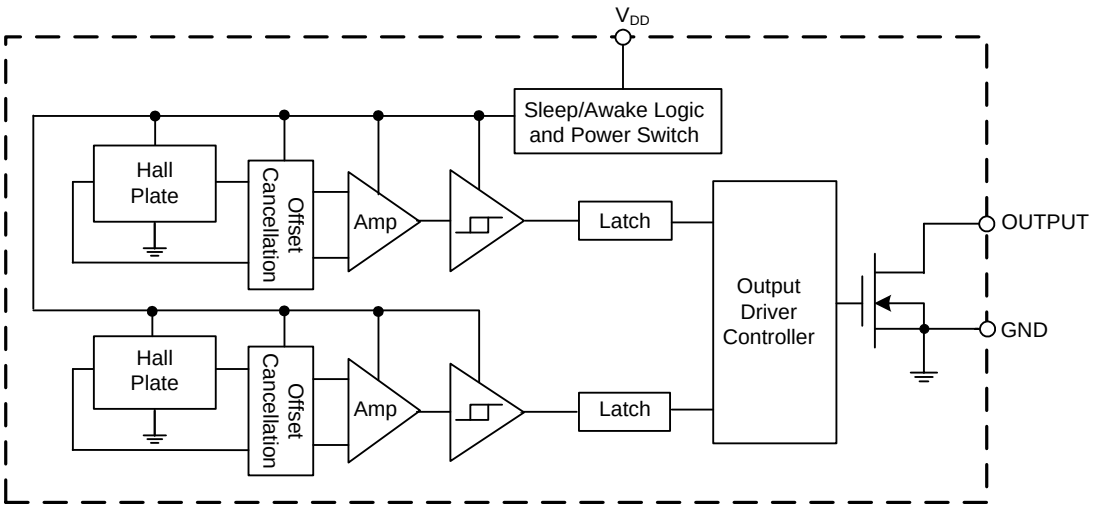
Pin Number	Pin Name	Function
1	V_{DD}	Power Supply Input
2	GND	Ground
3	OUTPUT	Output

Package: SOT553

Pin Number	Pin Name	Function
1	NC	No Connection (Note 5)
2	GND	Ground
3	NC	No Connection (Note 5)
4	V_{DD}	Power Supply Input
5	OUTPUT	Output

Note: 5. NC is “No Connection” pin and is not connected internally. This pin can be left open or tied to ground.

Functional Block Diagram



Absolute Maximum Ratings (Note 6) (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter		Values	Unit
V_{DD}	Supply Voltage (Note 7)		7	V
V_{OUT}	Output Pin Voltage (Note 7)		7	V
$V_{DD\ REV}$	Reverse Supply Voltage		-0.3	V
V_{OUT_REV}	Reverse Output Pin Voltage		-0.3	V
I_{OUTPUT}	Output Current (Source and Sink)		2.5	mA
B	Magnetic Flux Density		Unlimited	
P_D	Package Power Dissipation	SC59 and SOT553	230	mW
		SIP-3	230	mW
T_{STG}	Storage Temperature Range		-65 to +150	°C
T_J	Maximum Junction Temperature		+150	°C
ESD HBM	Human Body Model ESD capability		6	kV

Notes: 6. 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.

7. The absolute maximum V_{DD} of 7V 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.

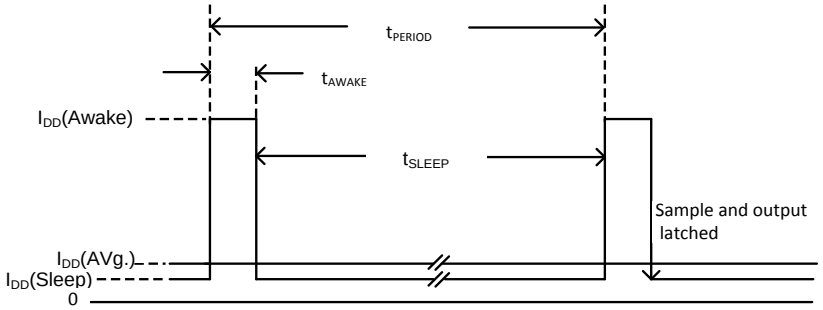
Recommended Operating Conditions (@T_A = +25°C, unless otherwise specified.)

Symbol	Characteristic	Conditions	Rating	Unit
V_{DD}	Supply Voltage	Operating	2.5 to 5.5	V
V_{OUT_MAX}	Maximum Output Pin Voltage	Operating	5.5	V
T_A	Operating Temperature Range	Operating	-40 to +125	°C

Electrical Characteristics (@T_A = +25°C, V_{DD} = 3V, unless otherwise specified.)

Symbol	Characteristic	Conditions	Min	Typ	Max	Unit
V_{OUT_ON}	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
I_{DD} (Awake)	Supply Current	During awake period, T_A = +25°C, V_{DD} = 3V	—	3	6	mA
		During awake period, T_A = -40°C to +125°C, V_{DD} = 2.5V to 5.5V	—	3	12	mA
I_{DD} (Sleep)		During sleep period, T_A = +25°C, V_{DD} = 3V	—	5	10	µA
I_{DD} (Sleep)		During sleep period, T_A = -40°C to +125°C, V_{DD} = 2.5V to 5.5V	—	—	28	µA
I_{DD} (Avg.)	Average Supply Current	T_A = +25°C, V_{DD} = 3V	—	8	16	µA
		T_A = -40°C to +125°C, V_{DD} = 2.5V to 5.5V	—	—	40	µA
t_{AWAKE}	Awake Time	(Note 8)	—	75	125	µs
t_{PERIOD}	Period	(Note 8)	—	75	125	ms
D.C.	Duty Cycle	—	—	0.1	—	%

Note: 8. When power is initially turned on, the operating V_{DD} 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 cycle (typical 150ms).

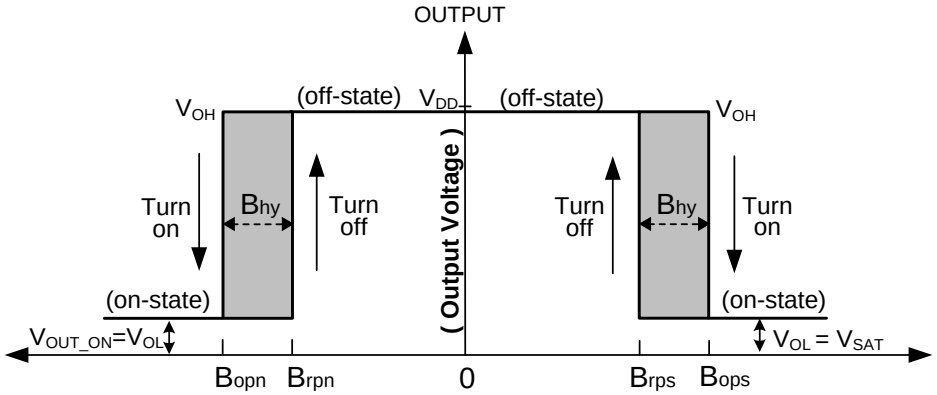


Magnetic Characteristics (Notes 9 & 10) (@T_A = -40°C to +125°C, V_{DD} = 2.5V to 5.5V, unless otherwise specified.)

(1mT=10 Gauss)

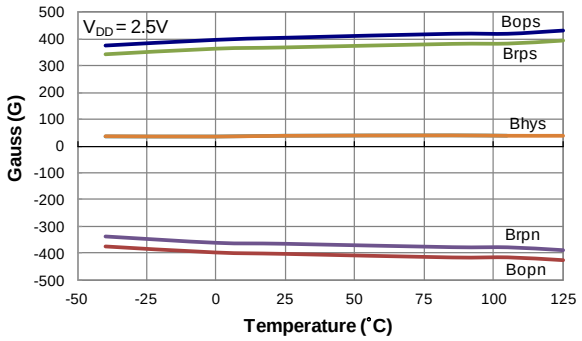
Symbol	Characteristic	Conditions	Min	Typ	Max	Unit
Bops (South Pole to Part Marking Side)	Operating Points	V_{DD} = 2.5V to 5.5V, T_A = -40°C to +125°C,	255	395	540	Gauss
Bopn (North Pole to Part Marking Side)			-540	-395	-255	
Brps (South Pole to Part Marking Side)	Releasing Points	V_{DD} = 2.5V to 5.5V, T_A = -40°C to +125°C,	230	355	490	
Brpn (North Pole to Part Marking Side)			-490	-355	-230	
Bhy (|Bopx|-|Brpx|)	—	Hysteresis (Note 11)	—	40	—	

Notes:
9. Typical data is at T_A = +25°C, V_{DD} = 3V, and for design information only.
10. Maximum and minimum parameters values over the operating temperature range are not tested in production, they are guaranteed by design, characterization and process control. The magnetic characteristics may vary with supply voltage, operating temperature and after soldering.
11. Maximum and minimum hysteresis is guaranteed by design and characterization.

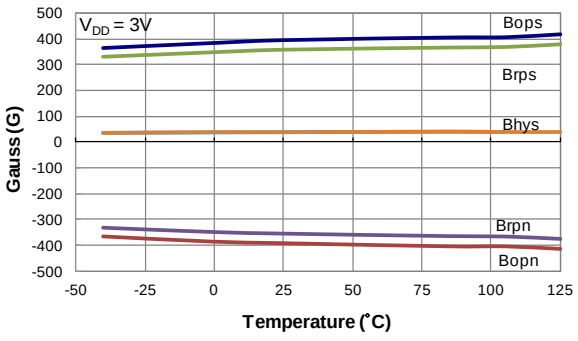


Typical Operating Characteristics

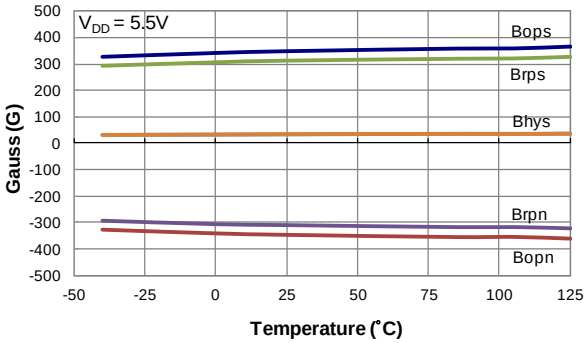
Magnetic Operating Switch Points – Bop and Brp



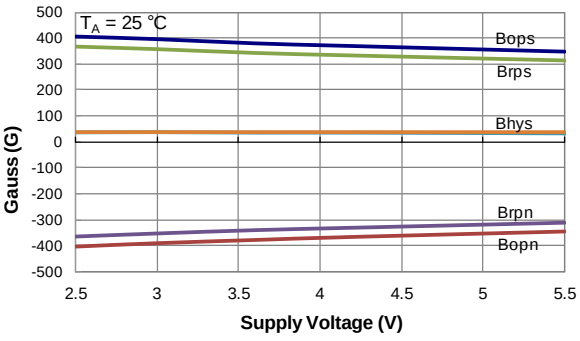
Switch Points vs Temperature



Switch Points vs Temperature

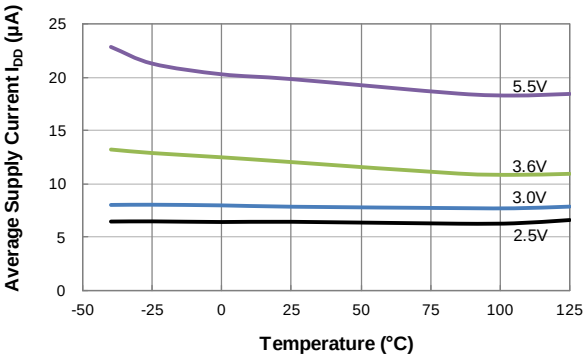


Switch Points vs Temperature

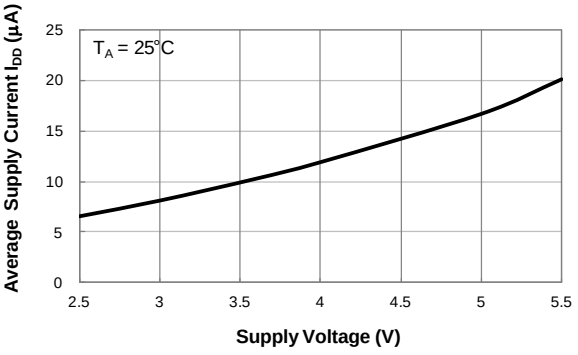


Switch Points vs Supply Voltage

Average Supply Current



Average Supply Current vs Temperature

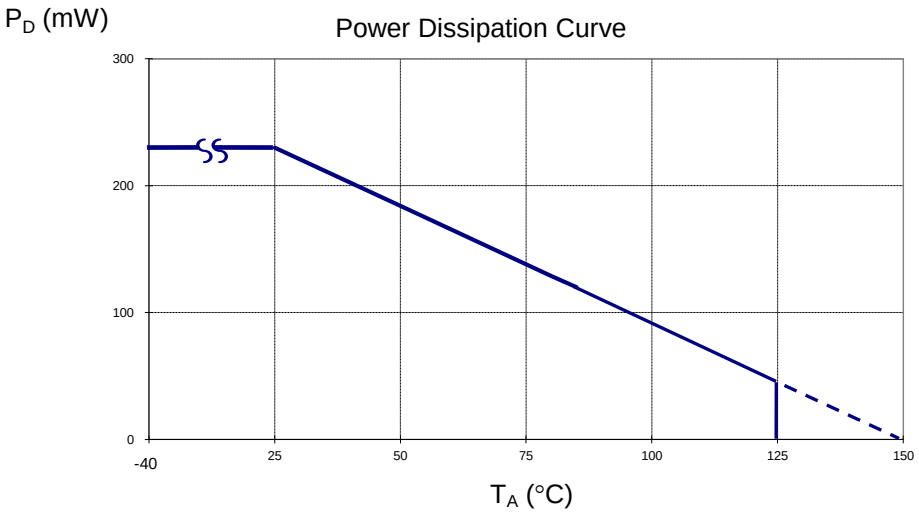


Average Supply Current vs Supply Voltage

Thermal Performance Characteristics

(1) Package Types: SC59, SOT553 and SIP-3

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

AH1815 - X - X

Package	Packing
W : SC59 Z : SOT553 P : SIP-3	7 : Tape & Reel A : Ammo Box (Note 12) B : Bulk (Note 13)

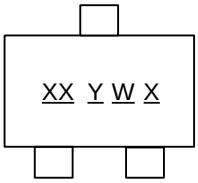
Device	Package Code	Packaging	Bulk		7" Tape and Reel		Ammo Box	
			Quantity	Part Number Suffix	Quantity	Part Number Suffix	Quantity	Part Number Suffix
AH1815-P-A	P	SIP-3	NA	NA	NA	NA	4,000/Box	-A
AH1815-P-B	P	SIP-3	1000	-B	NA	NA	NA	NA
AH1815-W-7	W	SC59	NA	NA	3,000/Tape & Reel	-7	NA	NA
AH1815-Z-7	Z	SOT553	NA	NA	3,000/Tape & Reel	-7	NA	NA

Notes: 12. Ammo Box is for SIP-3 Spread Lead.
13. Bulk is for SIP-3 Straight Lead.

Marking Information

(1) Package Type: SC59

(Top View)

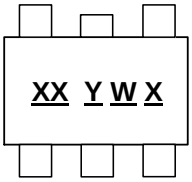


XX : Identification Code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 week;
a to z : 27 to 52 week; z represents
52 and 53 week
X : Internal Code

Part Number	Package	Identification Code
AH1815	SC59	AG

(2) Package Type: SOT553

(Top View)

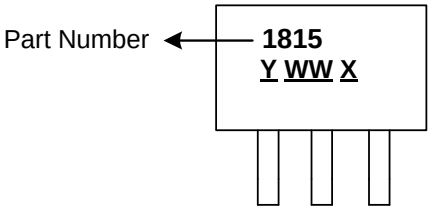


XX : Identification Code
Y : Year : 0 to 9
W : Week : A to Z : 1~26 week;
a to z : 27~52 week; z represents
52 and 53 week
X : Internal code

Part Number	Package	Identification Code
AH1815	SOT553	AG

(3) Package Type: SIP-3

(Front View)

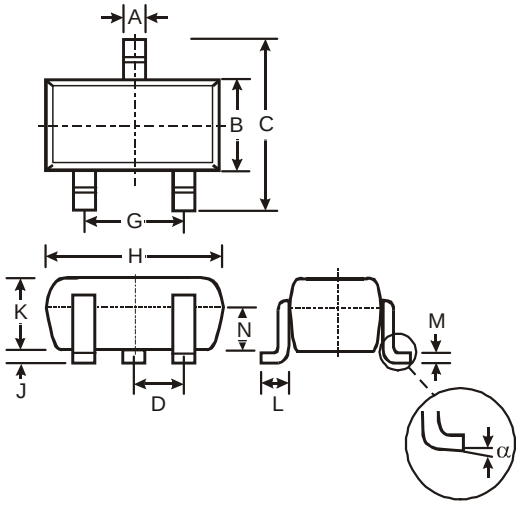


Y : Year : 0 to 9
WW : Week : 01~52, "52" represents
52 and 53 week
X : Internal Code

Package Outline Dimensions (All dimensions in mm.)

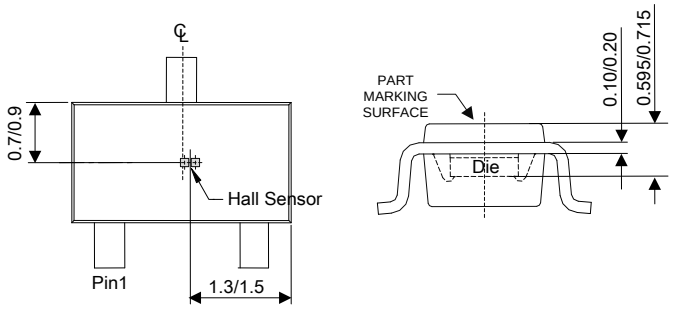
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.

(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			

Min/Max

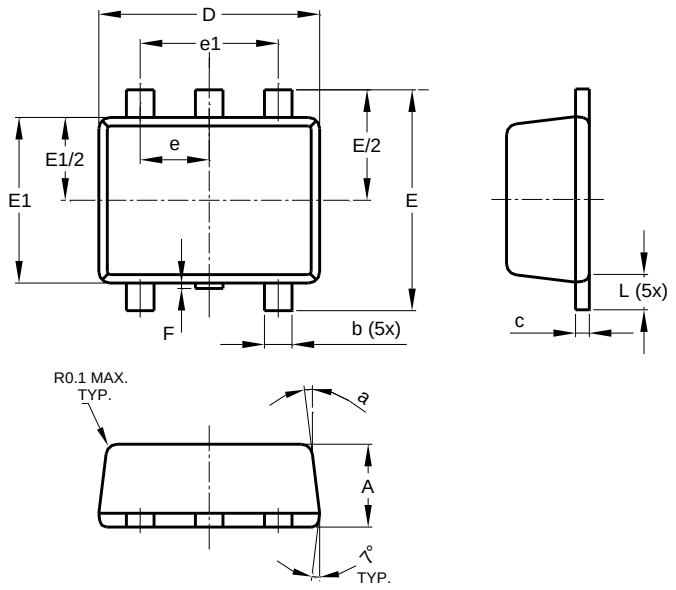


Sensor Location

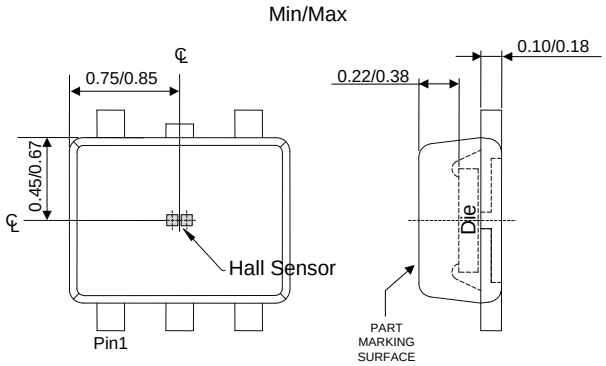
Package Outline Dimensions (cont.) (All dimensions in mm.)

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

(2) Package Type: SOT553



SOT553			
Dim	**Min**	**Max**	**Typ**
A	0.55	0.62	0.60
b	0.15	0.30	0.20
c	0.10	0.18	0.15
D	1.50	1.70	1.60
E	1.55	1.70	1.60
E1	1.10	1.25	1.20
e	0.50 BSC		
e1	1.00 BSC		
F	0.00	0.10	—
L	0.10	0.30	0.20
a	6°	8°	7°
All Dimensions in mm			

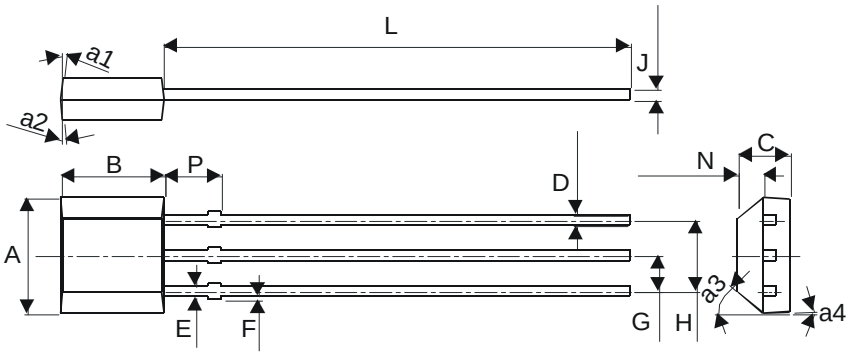


Sensor Location

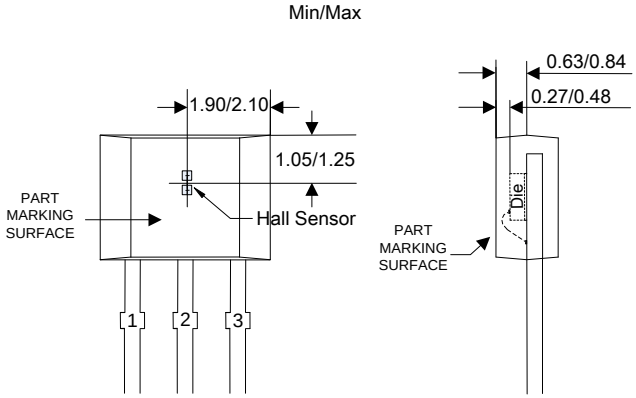
Package Outline Dimensions (cont.) (All dimensions in mm.)

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

(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		

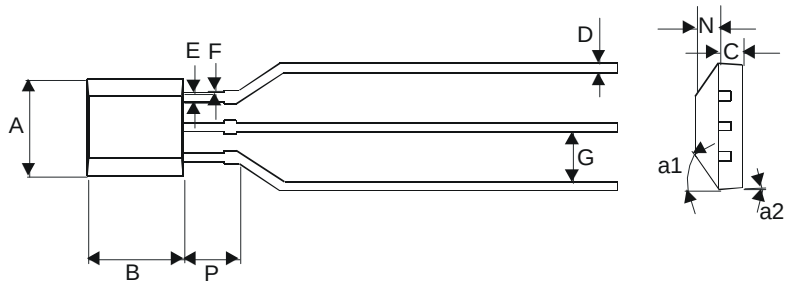


Sensor Location

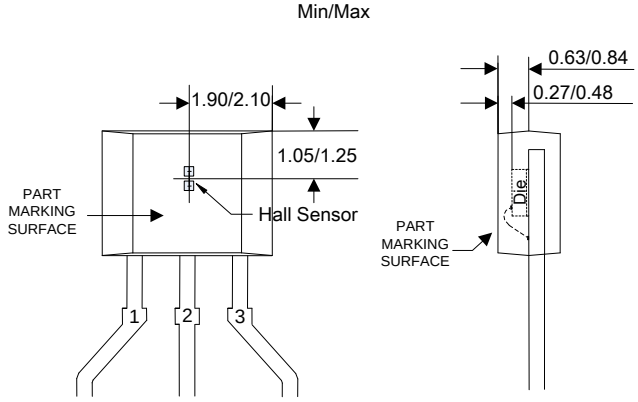
Package Outline Dimensions (cont.) (All dimensions in mm.)

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

(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		

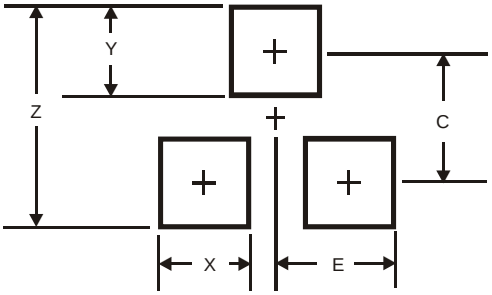


Sensor Location

Suggested Pad Layout

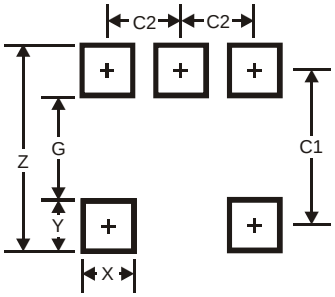
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(1) Package Type: SC59



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

(2) Package Type: SOT553



Dimensions	Value (in mm)
Z	2.2
G	1.2
X	0.375
Y	0.5
C1	1.7
C2	0.5

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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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Океан Электроники
Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

AVIC JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

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