DIODES
INCORPORATED

HALL SENSORS

- Omnipolar, Unipolar, Latch, and Linear Hall Sensor Products
- Wide Input Voltage Ranges Support Battery-Powered, Industrial, and Automotive Applications
- Ultra-Low Power, Super-Tight Switch Point Distribution and Drift
- Automotive-Compliant Switches Qualified to AEC-Q100 Grade 0

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DIODES' HALL EFFECT SENSORS

Diodes Incorporated offers a comprehensive product line for detecting and responding to changes in magnetic fields in consumer, industrial, and automotive applications. Combining its superior Hall effect technology, extensive analog design expertise, leading package technology, and manufacturing capability, Diodes can offer outstanding system solutions across numerous applications.

Hall Effect Switch ICs

Hall effect switch ICs provide simple and reliable solutions to contactless switching. They are used in many application areas from open and close detection to rotation and flow monitoring.

Using core architectures based on a stable patented Hall effect plate design, Diodes provides three comprehensive Hall effect switch product families:

- **Omnipolar**
- **Unipolar**
- **Latch**

The Diodes' Hall effect switch portfolio is well suited to meeting the requirements of automotive, consumer, communication, computer, home appliances, and industrial applications such as:

- **Proximity detection**
- **Cell Phones**
- **Motor Commutation**
- **Rotation Detection**
- **Level Detection**
- **Contactless Switching**

Diodes' automotive-compliant sensor switches offer superior switching point performance across a wide range of voltages and temperatures—with class-leading robustness.

Further additions to its automotive-compliant family introduce two-wire output formats with and without diagnostics—the former being ISO 26262-Ready.

Linear Hall Sensors

Diodes' linear Hall sensors provide high linearity outputs whose voltage is proportional to the applied magnetic flux density. They provide a simple, compact solution to a wide range of analog magnetic flux/field sensing/ position detection in consumer and industrial applications.

All the Diodes' Hall effect sensors are designed with the end application in mind, enabling highly effective system solutions through wide operating ranges, various operate and release points, and ultra-small and low-profile packaging.

TWO-WIRE HALL SWITCHES

THE **DIODES** ADVANTAGE

Advanced design for position and proximity sensing in automotive applications.

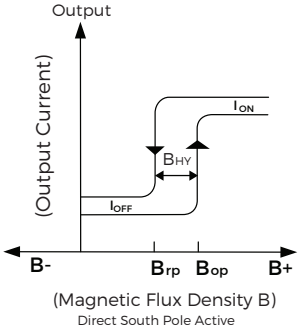
- **Precise and stable unipolar/latch Hall switch points across operating range**
  Maintains integrity of switch points, ensuring correct system operation
- **Wide operating voltage range, 2.7V to 27V****
  Supports automotive battery range
- **AEC-Q100 qualified with wide -40 to +150°C temperature ranges**
  Provides flexible solution for different autmotive application needs
- **Self-diagnostics for increasing functional safety requirements (AH324xQ/AH328xQ)**
  Dedicated safe mode helps to create a safer system
- **Industry-standard SC59 Package, SIP-3 expected in Q4 2021**
  Ease of use and placement

Part		Compliance	Active Pole	Type	Operating Voltage** (V)	Supply Current		Operating Point Bop (gauss)			Release Point Brp (gauss)‡			Temp Range (°C)	Package
Diagnostics						(South) (mA)	(Other) (mA)	Min	Typ	Max	Min	Typ	Max		
Self	None														
AH3280Q*	AH3270Q*	Automotive	Direct South	Latch	2.7 to 27	14.5	3.3	3	18	33	-33	-18	-3	-40 to +150	SC59 SIP-3
AH3281Q*	AH3271Q*	Automotive	Direct South	Latch		14.5	6	3	18	33	-33	-18	-3		
AH3282Q*	AH3272Q*	Automotive	Direct South	Latch		14.5	3.3	10	30	50	-50	-30	-10		
AH3241Q*	AH3231Q*	Automotive	Inverted South	Unipolar		6	14.5	55	90	135	35	70	115		
AH3242Q*	AH3232Q*	Automotive	Direct South	Unipolar		14.5	6	30	60	90	10	40	70		
AH3243Q*	AH3233Q*	Automotive	Direct South	Unipolar		14.5	6	20	45	70	3	28	53		

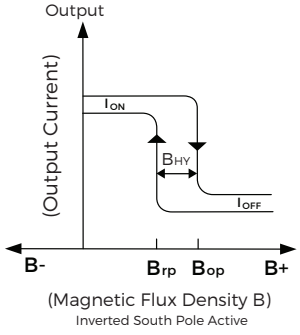
*All Q parts are automotive-compliant, qualified to AEC-Q100 Grade 0 supporting PPAP documents, with ambient temperature of -40°C to +150°C and ESD HBM of 8kV.
** Operating voltage range is between VDD and GND pins. ‡ Negative numbers mean North polarity flux density

Automotive Two-Wire Hall Latch Switch Integrated Self-Diagnostics

Designed with functional safety in mind monitor key functional blocks within the IC and also temperature and supply voltage to ensure correct operation of the system. If the device detects an abnormal condition it drives a lower than normal output current to alert the system of the situation.



Direct South Pole Active



Inverted South Pole Active

OMNIPOLAR HALL SENSOR SWITCHES

THE **DIODES** ADVANTAGE

High/Medium Sensitivity Omnipolar Family and Internal Pullup
- Operates with either a north or south pole
- No external pullup required—minimal external components

Designed for Portable and Battery-Powered Equipment
- 1.6V to 5.5V V_{IN}—operates over typical battery voltage range
- 1.6µA ultra-low power operation extends battery life
- Industry-standard SC59, SIP-3 and DFN packages

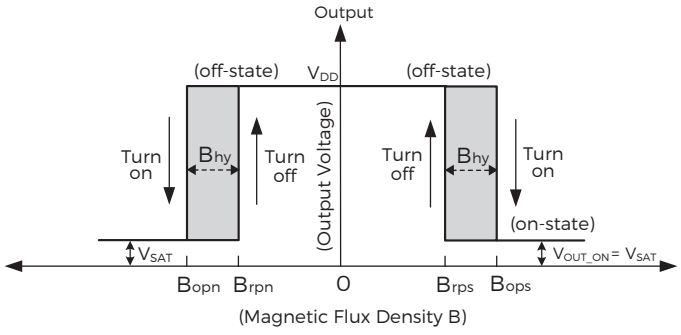
High Performance and Reliability
- Super tight magnetic operating window (less magnetic threshold spread) with minimal switch-point drift and superior temperature stability

Part Number	Output Type	Operating Voltage Range (V)	I_{DD} Typical	Min Bop (gauss)	Typ Bop (gauss)	Max Bop (gauss)	Min Brp (gauss)	Typ Brp (gauss)	Max Brp (gauss)	Typical Hysteresis Bhys (gauss)	Features	Packages
AH1903	Push Pull	1.6 to 3.6	4.3µA	±21	±33	±48	±9	±23	±38	±10	Selective Uni or Omnipolar	X1-DFN1216-4
AH1902				±23	±33	±47	±12	±23	±35	±10	Ultra-Low Voltage	X1-DFN1216-4 X2-DFN2015-6, SOT553
AH1897				±14	±30	±40	±10	±20	±35	±10		X1-DFN1216-4
AH1913	Push Pull	1.6 to 5.5	12µA	±6	±18	±30	±2	±11	±24	±7	Ultra-Low Supply Current	X1-DFN1216-4, SC59
AH1912			1.6µA	±19	±30	±42	±12	±23	±33	±7		X1-DFN1216-4, SC59
AH1911				±30	±60	±90	±22	±45	±67	±15		SC59
AH1921	Open Drain			±30	±60	±90	±22	±45	±67	±15		
AH1925		1.6 to 3.6	1.4µA	±14	±25	±35	±9	±20	±30	±5		X2-DFN1410-4
AH1806		2.5 to 5.5	8µA	±15	±30	±45	±10	±20	±40	±10	Low Voltage	SC59, SOT553, SIP-3
AH1808				±20	±40	±60	±10	±30	±50	±10		
AH1807				±50	±80	±115	±40	±65	±100	±15		
AH1809				±90	±130	±185	±80	±115	±170	±15		
AH3572		3 to 28	3mA	±8	±20	±30	±2	±10	±25	10	Reverse Blocking, Overcurrent Protection, Overvoltage Clamp	SOT23, SIP-3
AH3574				±20	±40	±60	±10	±25	±45	15		
AH3582	Pullup Resistor			±20	±40	±60	±10	±25	±45	15		
AH3562Q*	Open Drain			±8	±20	±30	±2	±10	±25	10		
AH3563Q*				±15	±30	±45	±5	±20	±35	10		
AH3564Q*				±20	±40	±60	±10	±25	±45	15		

*All Q parts are automotive-compliant, qualified to AEC-Q100 Grade 0 supporting PPAP documents, with ambient temperature of -40°C to +150°C and ESD HBM of 8kV.

AH3562Q High-Voltage, High-Sensitivity, Omnipolar Hall Effect Switches

With its ability to detect north and south poles, the AH3562Q enables easier placement of lower strength magnets, simplifying the assembly process. In this electric soft door closure mechanism, two hall sensors are commonly used, one for detection of door proximity and engaging the motor to close the door, and a second for detecting the closing and latching of the door lock. Its built-in reverse blocking capability, overvoltage clamps, and 8kV ESD makes it well-suited to the harsh automotive electric door closure environment.



UNIPOLAR HALL SENSOR SWITCHES

THE **DIODES** ADVANTAGE

High-Performance Automotive and Industrial Unipolar Hall Switches

- Ten sensitivity options with good tolerance and low magnetic spread with low temperature coefficients for switch points
- Magnetic characteristics specified over the whole operating range
- Fast "power on" (10µs) and response time (3.75µs) with wide bandwidth

Product Flexibility

- Designed for a wide range of applications: 1.6V to 28V and -40˚C to +150˚C
- Open-drain output for pullup flexibility or internal pullup for reduced components
- SOT23, SC59 (opposite polarity Bop to SOT23) SIP-3 and DFN packages

Reliability and Robustness

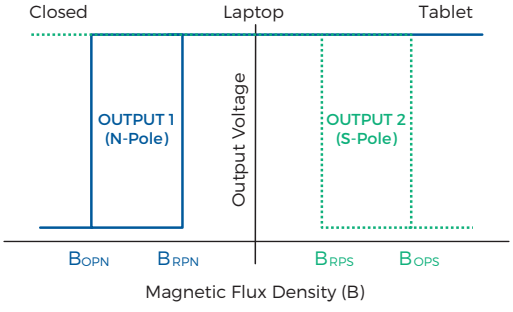
- Input and output clamps with output current limit (AH33 series)
- Reverse voltage protection (32V on automotive-compliant Q-parts)

Part Number	Output Type	Operating Voltage Range (V)	I_{DD} Typical	Min Bop (gauss)	Typ Bop (gauss)	Max Bop (gauss)	Min Brp (gauss)	Typ Brp (gauss)	Max Brp (gauss)	Typical Hysteresis Bhys (gauss)	Features	Packages
AH1389	Push Pull	1.6 to 3.6	4.3µA	13	25	39	9	20	37	5	Dual Output	X2-DFN1410-4
AH1903				21	33	48	9	23	38	10	Selective Uni or Omnipolar	X1-DFN1216-4
AH1390			1.3µA	6	17	25	2	11	20	6	Dual Output	X2-DFN1410-4
AH3372	Open Drain	3 to 28	3mA	15	30	45	5	20	35	10	Reverse Blocking, Overcurrent Protection, Overvoltage Clamp	SC59, SOT23, SIP-3
AH3373				38	55	72	20	35	50	20		
AH3382	Pullup Resistor			40	55	70	20	35	50	20		
AH3376	Open Drain			65	100	135	50	85	120	15		
AH3377				95	115	140	70	90	120	25		
AH3362Q*	Open Drain			15	30	45	5	20	35	10		
AH3363Q*				40	55	72	20	35	50	20		
AH3364Q*				60	80	100	40	60	80	20		SOT23, SIP-3
AH3365Q*				80	100	120	60	80	100	20		
AH3366Q*				65	100	135	50	85	120	15		SC59, SOT23, SIP-3
AH3367Q*				95	115	140	70	90	120	25		
AH3368Q*				130	155	180	105	130	160	25		SOT23, SIP-3
AH3369Q*				150	175	200	125	150	180	25		
AH3390Q*				180	220	240	155	195	220	25		SC59, SOT23, SIP-3
AH3391Q*				235	275	295	210	250	275	25		SOT23, SIP-3

*All Q parts are automotive-compliant, qualified to AEC-Q100 Grade 0 supporting PPAP documents, with ambient temperature of -40˚C to +150˚C and ESD HBM of 8kV.

AH1389 Ultra-Sensitive Dual-Output Unipolar Hall Effect Switch

Its separate north and south pole-detecting hall plates and outputs enables accurate orientation proximity detection. Its incredibly low quiescent current minimizes current consumption in all modes of operation—especially sleep.



2-In-1, 360 degree Laptop using Diodes Dual Output Hall Sensor

2-in-1 Mode	Magnetic Relative Position	AH1389 Detected Condition	AH1389	
			Output 1	Output 2
Closed	North pole (-) pointing towards AH1389	$B_{FLUX} < B_{OPN}$	Low	High
Laptop	Neither pole pointing towards AH1389	$B_{RPN} < B_{FLUX} < B_{RPS}$	High	High
Tablet	South pole (+) pointing towards AH1389	$B_{FLUX} > B_{OPS}$	High	Low

HALL LATCHES

THE **DIODES** ADVANTAGE

High-Performance Stable Hall Effect Latch Range
- Eight sensitivity options with good tolerance and low magnetic spread with low temperature coefficients for switch points
- Magnetic characteristics specified over the whole operating range
- Fast "power on" (10µs) and response time (3.75µs) with wide bandwidth

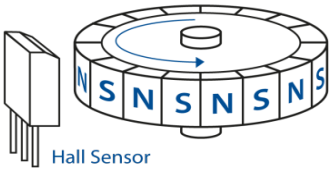
Product Flexibility
- Designed for a wide range of applications: 3V to 28V and -40°C to +150°C
- Open-drain output for pullup flexibility
- SOT23, SC59 (inverse operating magnetic polarity to SOT23) and SIP-3 packages

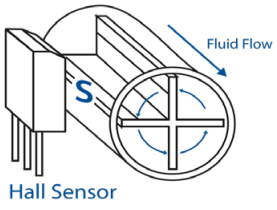
Reliability and Robustness
- Input and output clamps with output current limit
- Reverse voltage protection (32V on automotive-compliant Q-parts)

Part Number	Output Type	Operating Voltage Range (V)	I_{DD} Typical (mA)	Min Bop (gauss)	Typ Bop (gauss)	Max Bop (gauss)	Min Brp (gauss)	Typ Brp (gauss)	Max Brp (gauss)	Typical Hysteresis Bhys (gauss)	Features	Packages
AH3774	Open Drain	3 to 28	3	20	40	60	-60	-40	-20	80	Reverse Blocking, Overcurrent Protection, Overvoltage Clamp	SC59, SOT23, SIP-3
AH3782	Pullup Resistor		3.8	20	40	60	-60	-40	-20	80		
AH3775	Open Drain		3	50	70	90	-90	-70	-50	140		
AH3776				80	110	140	-140	-110	-80	220		SOT23, SIP-3
AH3777				110	140	170	-170	-140	-110	280		
AH3763Q*				15	30	45	-45	-30	-15	60		SC59, SOT23, SIP-3
AH3764Q*				20	40	60	-60	-40	-20	80		
AH3765Q*				50	70	90	-90	-70	-50	140		
AH3766Q*				80	110	140	-140	-110	-80	220		SOT23, SIP-3
AH3767Q*				110	140	170	-170	-140	-110	280		
AH3768Q*				140	175	200	-200	-175	-200	350		
AH3769Q*				170	220	250	-250	-220	-170	440		

*All Q parts are automotive-compliant, qualified to AEC-Q100 Grade 0 supporting PPAP documents, with ambient temperature of -40°C to +150°C and ESD HBM of 8kV.

Automotive Hall Latches, with their bipolar-flux switching characteristic, are commonly used in sensing rotating magnetic fields. Automotive-compliant single halls are used in BLDC for motor commutation as they detect the rotational position of the rotor. Dual hall latches provide additional speed and direction information.





DUAL HALL LATCHES†

Part		Compliance	V_{DD} (V)	I_{DD} (mA)	Bop (Gauss)			Brp (Gauss)			Hysteresis (Gauss)			Matching (Gauss)		Offset (Gauss)		Output			
No Diagnostics	Self Diagnostic				Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Max	Min	Max	OUT1	OUT2	SPD	DIR
AH3965Q	AH3975Q	Automotive	2.7~27	50	-10	10	30	-30	-10	10	5	20	35	-25	25	-15	15	–	–	V	V
AH3966Q	AH3976Q	Automotive			10	25	40	-40	-25	-10	40	50	60	-15	15	-15	15	–	–	V	V
AH3967Q	AH3977Q	Automotive			50	75	100	-100	-75	-50	120	150	180	-30	30	-20	20	–	–	V	V
AH3968Q	AH3978Q	Automotive			50	75	100	-100	-75	-50	120	150	180	-30	30	-20	20	V	V	–	–

†Expected in Q1 2022.

Automotive Dual-Hall Latch Switch with Integrated Self-Diagnostics

Designed with functional safety in mind, key functional blocks within the IC as well as its temperature and supply voltage are monitored, ensuring correct operation of the system. If the device detects an abnormal condition, it drives a lower-than-normal output current to alert the system of the situation.

LINEAR HALL SENSORS

THE **DIODES** ADVANTAGE

Low-Voltage, Low-Power Linear Halls—with Micropower Mode
- Supply voltage of 1.6V to 3.6V is ideal for interfacing with ADC
- AH8500/1: Sleep, Auto-Run, and External Drive Modes
- AH8502/3: Micropower, Turbo, and External Drive Modes

High Sensitivity with High Accuracy (Trimmed) Options
- AH8501/3: sensitivity of 2.25mV/G @ 1.8V and 3.8mV/G @ 3V ±3% accuracy
- AH8500/2: Sensitivity of 2.1mV/G @ 1.8V ±15% accuracy

High Performance, Reliability, and Robustness
- Low 0.36G input noise and null voltage offset <1% of V_{DD}
- Low temperature coefficient for sensitivity ±3% over full temp

Part Number	Type	Output Type	Supply Voltage (V)	Supply Current	Sensitivity (mV/gauss)	Output Voltage Span (V)	Typical Magnetic Flux Density Range (gauss)	Sampling /Speed Control Pin	Operating Temperature (°C)	Packages
AH8500	Linear	Analog Voltage	1.6 to 3.6	12µA	2.10 @ 1.8V, 3.55 @ 3.0V	1.6 to 3.6	±430	Y	-40 to +85	U-DFN2020-6
AH8501					2.25 @ 1.8V, 3.80 @ 3.0V		±400			
AH8502				13µA	2.10 @ 1.8V, 3.55 @ 3.0V		±430			
AH8503					2.25 @ 1.8V, 3.80 @ 3.0V		±400			
AH49F			3 to 8	3mA	2.1 @ 5.0V	0.8 to (VCC - 0.8)	±800	N	-40 to +105	U-DFN2020-6, SC59, TO-92S

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