

MicroPower Hall-Effect Switch

SDC8312/SDC8312A

General Description

SDC8312 is a micropower integrated Hall switch designed to sense the applied magnetic flux density and give a digital output, which indicates the present condition of the magnitude sensed. The typical power consumption is below 10 μ W at 2.7V, so the micropower design is especially suitable for battery-operated systems such as cellular phones or laptop computers, in which power consumption is one major concern. The magnetic switching points are precise and insensitive to process and temperature variations. For SDC8312, the output will be at the “high” level when no magnetic field is applied.

Applications

- Folding, sliding, rotary screen mobile phone
- Notebook computer, digital camera
- Position sensor switch

Features

- Micropower consumption
- 2.4~4.5V power supply
- Chopper amplifier based design: insensitive to noise and offset caused by process variations, operating temperature and mechanical stress
- Switching for both poles of a magnet(Omnipolar)
- Digital output
- CMOS process
- Package: SOT-23-3、TO-92S

Pin Configuration

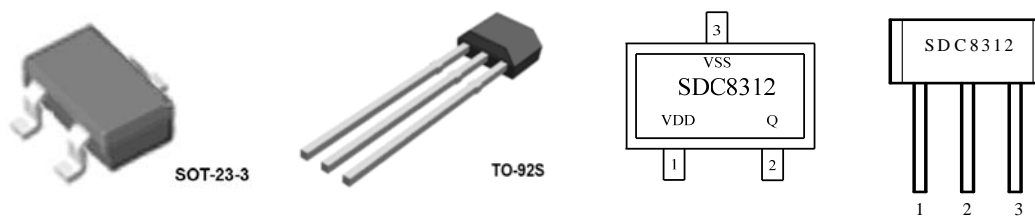


Figure 1. Pin Configuration

Pin Number		Pin Name	Function
SOT-23-3	TO-92S		
1	1	VDD	Power supply
3	2	VSS	Ground
2	3	Q	Output

Table 1. Pin Description

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Functional Block Diagram

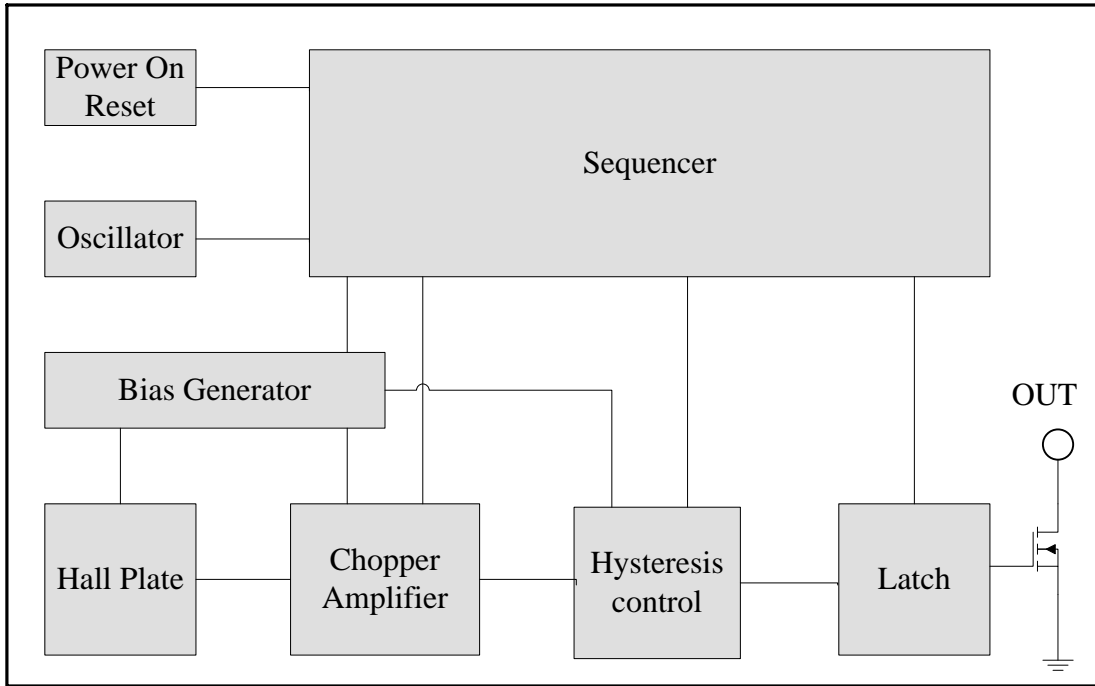
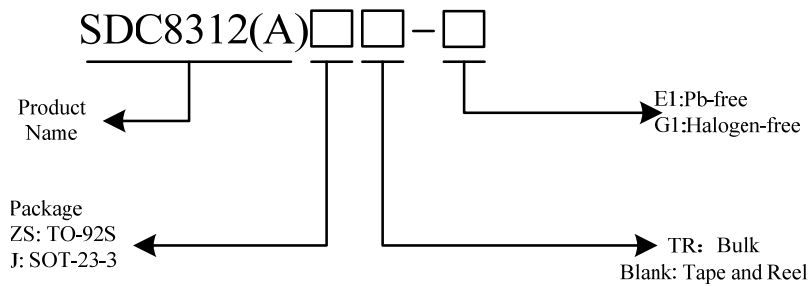


Figure2. Functional Block Diagram

Ordering Information



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Pb-free	Halogen-free	Pb-free	Halogen-free	
TO-92S	-40~85°C	SDC8312ZS-E1	SDC8312ZS-G1	8312	8312	Bulk
SOT-23-3		SDC8312J-E1	SDC8312J-G1	2xx	2xx	Tape and Reel
TO-92S		SDC8312AZS-E1	SDC8312AZS-G1	8312	8312	Bulk
SOT-23-3		SDC8312AJ-E1	SDC8312AJ-G1	2xx	2xx	Tape and Reel

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Absolute Maximum Ratings (NOTE: Stresses greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device.)

Parameter	Conditions	Value	Unit
Operating Temperature	-	-40~85	°C
Storage Temperature	-	-40~150	°C
Supply Voltage	-	2.4~5.0	V
Supply Current	-	-1~2.5	mA
Magnetic Flux Density	-	unlimited	mT
Maximum Lead Soldering Temperature	10 seconds	<260	°C

Table 2. Absolute Maximum Ratings

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage Range	V _{DD}	-	2.4	2.7	4.5	V
Output Voltage Range	V _{OUT}	-	-0.3	2.7	4.5	V
Ambient Temperature	T _a	-	-40	25	85	°C

Table 3. Recommended Operating Conditions

Electrical Characteristics (T_a=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Static Parameter						
Average Supply Current	I _{DD}	V _{DD} =2.7V	-	3	20	uA
Supply Current(operating mode)	I _{ON}	V _{DD} =2.7V	-	1.1	-	mA
Supply Current(stand-by mode)	I _{st}	V _{DD} =2.7V	-	2.5	-	uA
Output Saturation Voltage	V _{SAT}	I _{OUT} =2mA	-	0.1	-	V
Output Leakage Current	I _{LEAK}	V _{OUT} =5.0V	-	0.01	-	uA
Time of operating mode	T _{ON}	V _{DD} =2.7V	-	60	-	us
Time of stand-by mode	T _{OFF}	V _{DD} =2.7V	-	75	-	ms
Magnetic Characteristics						
SDC8312						
Operating Point	B _{OP}	V _{DD} =3.3V	-	30	35	G
Release Point	B _{RP}	V _{DD} =3.3V	15	20	-	G
Hysteresis	B _{HY}	V _{DD} =3.3V	-	10	-	G
SDC8312A						
Operating Point	B _{OP}	V _{DD} =3.3V	-	20	25	G
Release Point	B _{RP}	V _{DD} =3.3V	8	10	-	G
Hysteresis	B _{HY}	V _{DD} =3.3V	-	10	-	G

Table 4. Electrical Characteristics

Typical Performance Characteristics

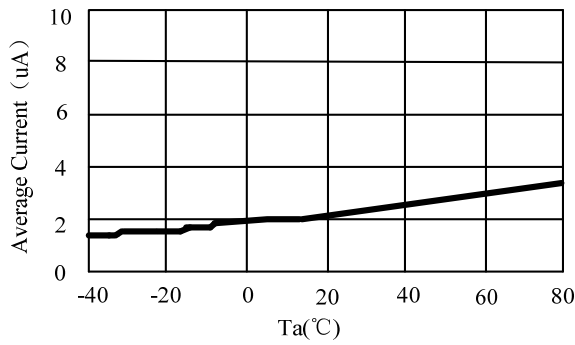


Figure 3. Average current vs ambient temperature (V_{DD}=2.7V)

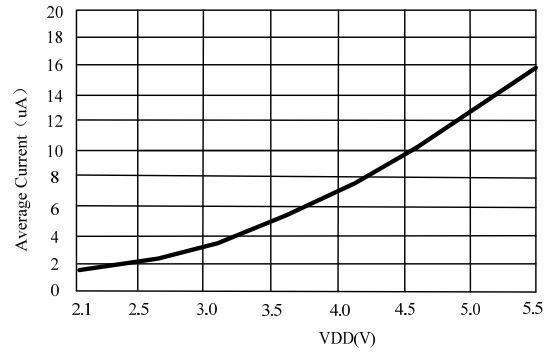


Figure 4. Average current vs supply voltage (Ta=25°C)

Magnetic Characteristics

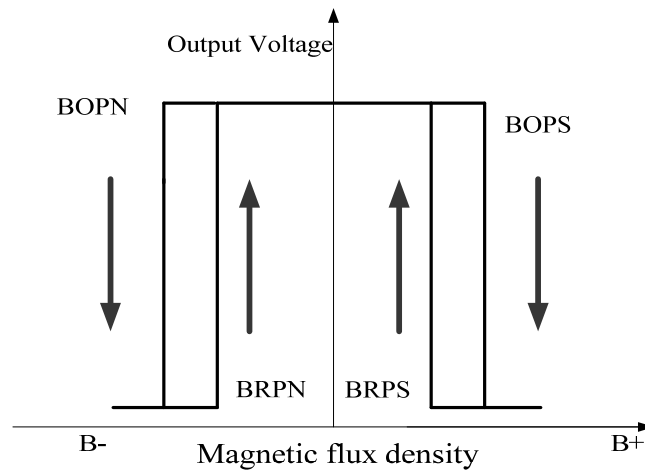


Figure 5. Magnetic Characteristics

Typical Application

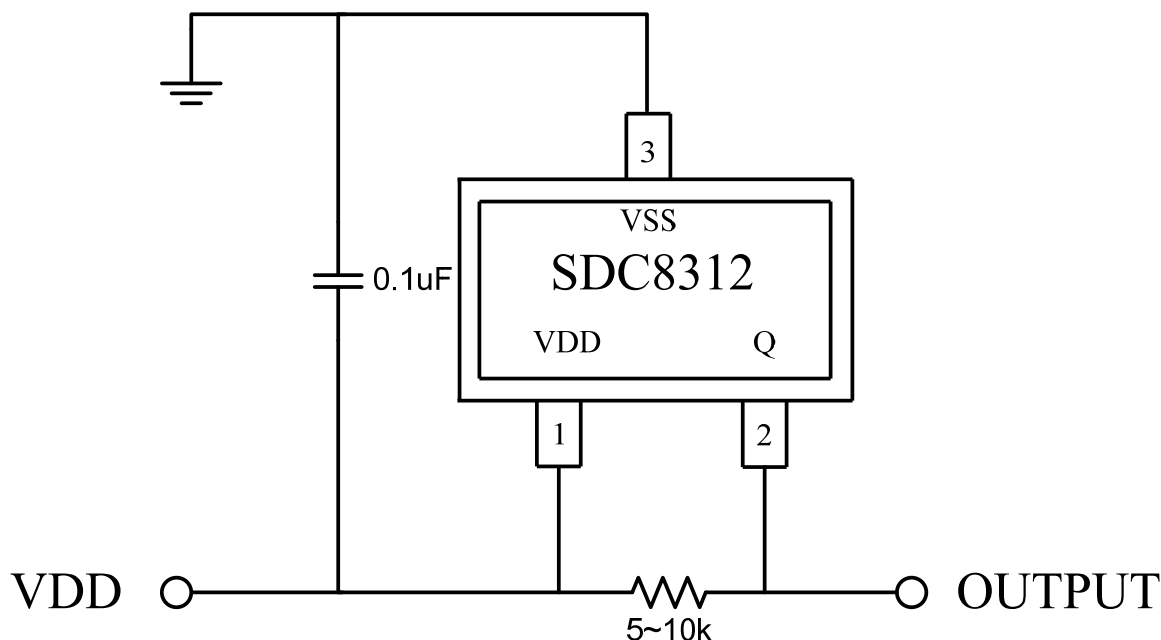


Figure 6. Typical Application

Function Description

Power On Reset

Used to detect the power-up ramp and reset the digital circuits to attain correct operation as soon as the power is ready.

Oscillator + Sequencer

The built-in oscillator provides the clock signal, which is taken by the sequencer to determine the periods of the operating mode and the stand-by mode. Typically the operating time is about 60 us and the stand-by time is 75 ms. Using such a clocking scheme, the average power consumption is almost equal to the stand-by mode, which is under 10 uW at 2.7V.

Bias Generator

Bias generator provides precise, temperature and process insensitive current sources for both the Hall plate and chopper amplifier. These current sources in turn guarantee proper operation of the chip and a accurate switching point.

Chopper Amplifier

In order to get a higher resolution, IC uses the chopper amplifier in the design. It can dynamically remove the offset and interference.

Hysteresis Control

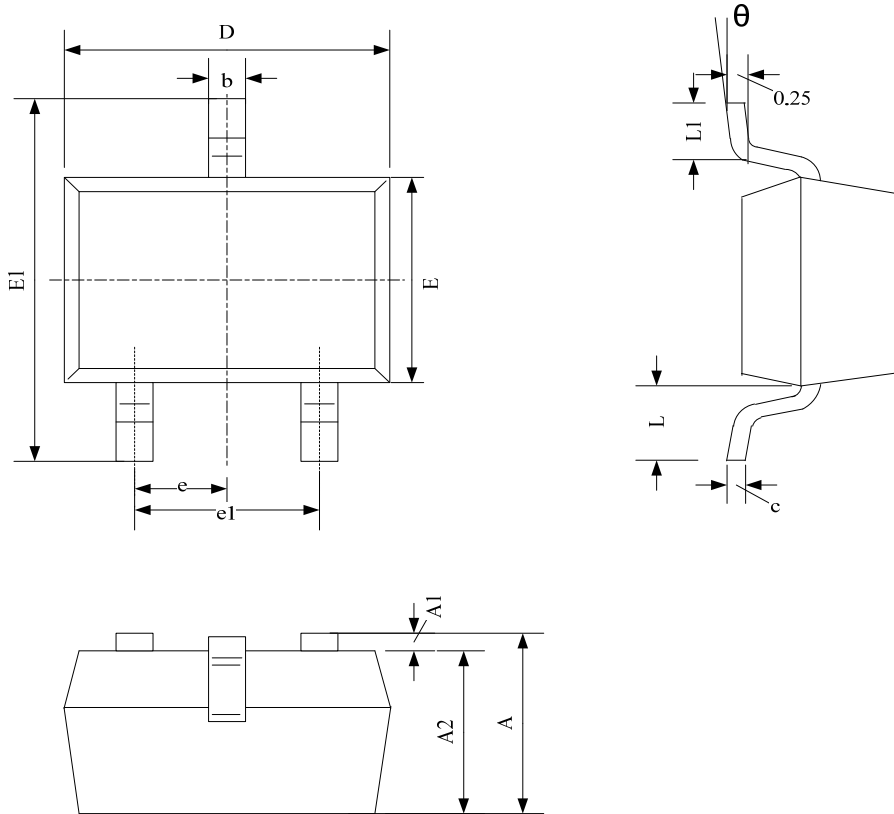
This block determines the switching threshold of the Hall switch in different situations.

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Package Dimension

SOT-23-3

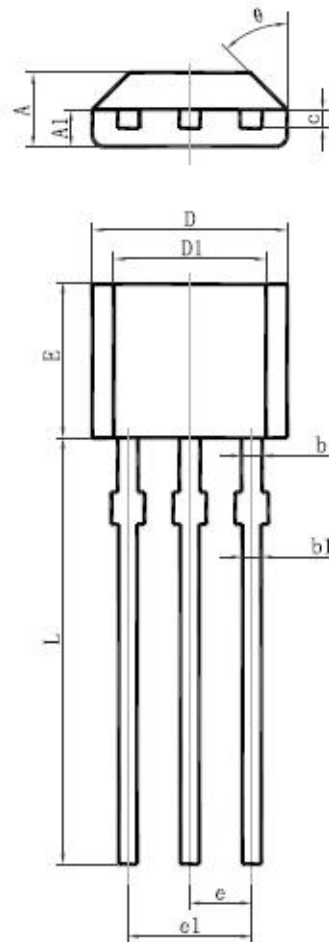


Symbol	Dimensions in millimeters		Dimensions in inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	6°

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TO-92S



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.420	1.620	0.056	0.064
A1	0.660	0.860	0.026	0.034
b	0.420	0.550	0.017	0.022
b1	0.360	0.480	0.014	0.019
c	0.360	0.510	0.014	0.020
D	3.900	4.100	0.154	0.161
D1	2.970	3.270	0.117	0.129
E	2.900	3.100	0.114	0.122
e	1.270TYP		0.050TYP	
e1	2.440	2.640	0.096	0.104
L	13.500	13.900	0.531	0.547
θ	45°TYP		45°TYP	