MICROPOWER, ULTRA-SENSITIVE HALL EFFECT SWITCH

Description

The AH1803 has two Hall effect plates and a CMOS output driver. The device is primarily designed for battery-operated, handheld equipment (such as cellular and cordless phones, PDAs). The total operation power is down to 24µW in the 3V supply.

Either the north or south pole turns the output on with sufficient strength. The output turns off under no magnetic field.

While the magnetic flux density (B) is larger than operate point (Bop), the output turns on (low). The output is held until B is lower than release point (Brp) then turns off (high).

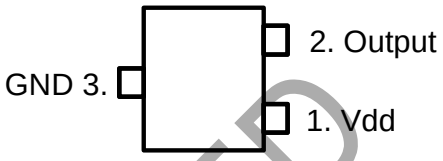
Features

- Micropower Operation
- Operation with North or South Pole
- 2.4 to 5.5V Battery Operation
- Chopper Stabilized
  - Superior Temperature Stability
  - Extremely Low Switch-Point Drift
  - Insensitive to Physical Stress
- Good RF Noise Immunity
- -40°C to +85°C Operating Temperature
- Low-Profile 3-Pin SC59 (Commonly Known as SOT23 in Asia) and DFN2020-6 Package
- ESD (HBM) > 4KV for DFN2020-6
- SC59 (commonly known as SOT23 in Asia) and DFN2020-6: Available in "Green" Molding Compound (No Br, Sb)
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Pin Assignments (Note 4)

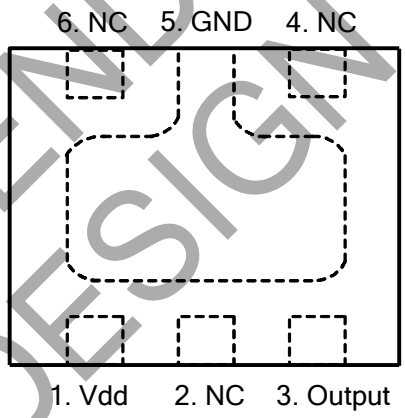
SC59 (commonly known as SOT23 in Asia)

(Top View)



DFN2020-6

(Top View)

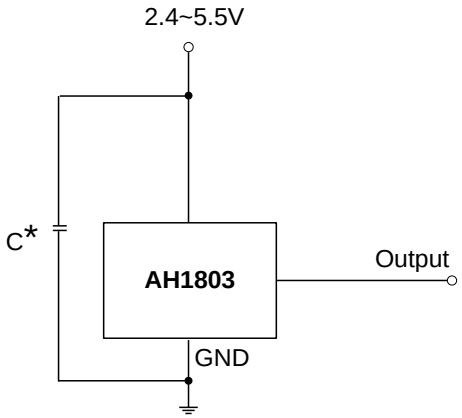


Applications

- Cellular Phone
- PDA
- Cordless Phone

Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3).compliant. All applicable RoHS exemptions applied.
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.
4. NC is "No Connection", which is recommended to be tied to ground.

Typical Applications Circuit

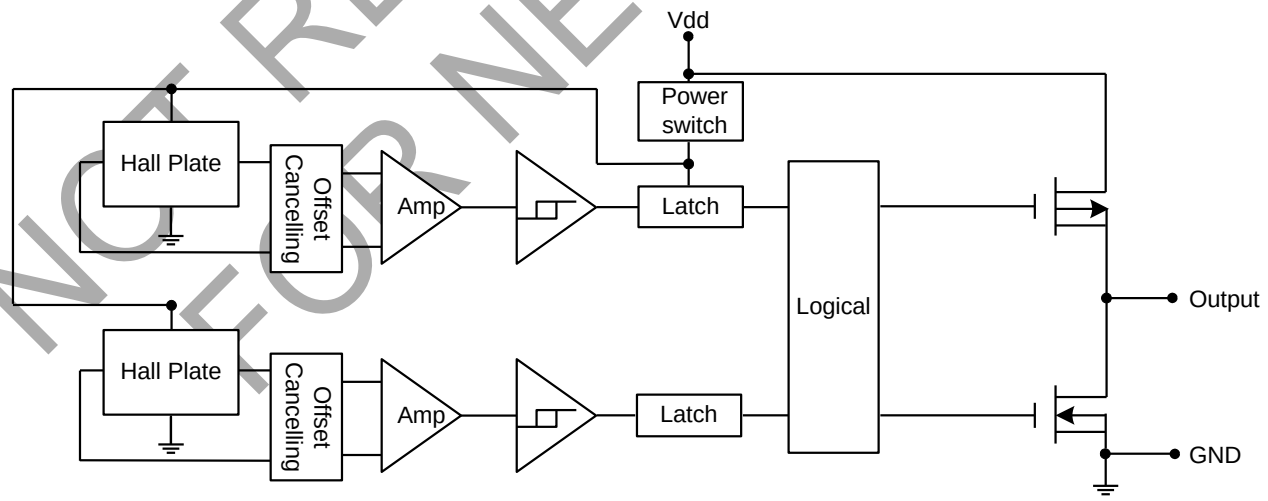


* C is for power stabilization and to strengthen the noise immunity, the recommended capacitance is 10nF~100nF.

Pin Descriptions

Pin Name	P/I/O	Description
Vdd	P/I	Power Supply Input
GND	P/I	Ground
Output	O	Output Pin
NC	—	No Connected

Functional Block Diagram



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

Symbol	Characteristics		Values	Unit
Vdd	Supply Voltage		7	V
B	Magnetic Flux Density		Unlimited	
Ts	Storage Temperature Range		-65 to +150	°C
P_D	Package Power Dissipation	SC59	230	mW
		DFN2020-6	230	mW
T_J	Maximum Junction Temperature		+150	°C

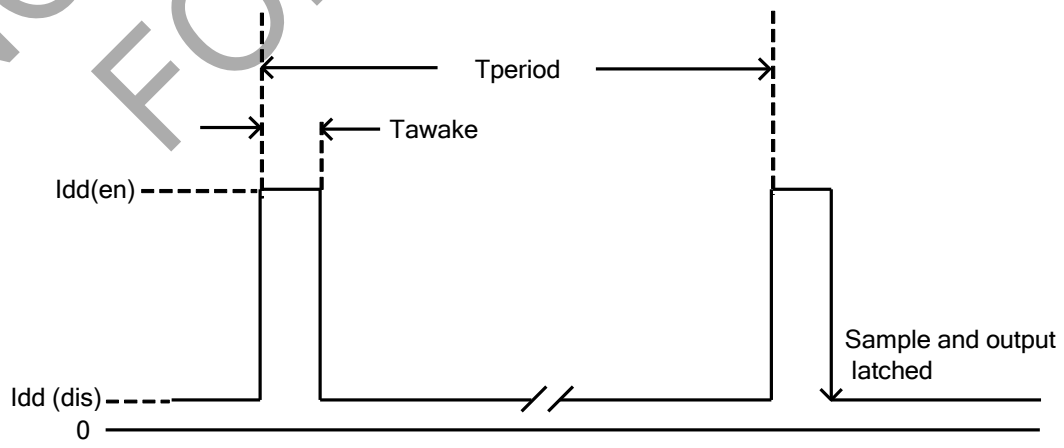
Recommended Operating Conditions (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Rating	Unit
Vdd	Supply Voltage	Operating	2.4 ~ 5.5	V
T_A	Operating Temperature Range	Operating	-40 to +85	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Symbol	Characteristic	Conditions	Min	Typ.	Max	Unit
V_{OH}	Output On Voltage (High Side)	I_{OUT} = -1mA	Vdd-0.2	—	—	V
V_{OL}	Output On Voltage (Low Side)	I_{OUT} = 1mA	—	—	0.1	V
Idd(en)	Supply Current	Chip enable, T_A = +25°C, Vdd = 3V	—	3	6	mA
		Chip enable, T_A = -40°C ~ +85°C, Vdd = 2.4V ~ 5.5V	—	3	9	mA
Idd(dis)		Chip disable, T_A = +25°C, Vdd = 3V	—	5	10	µA
		Chip disable, T_A = -40°C ~ +85°C, Vdd = 2.4V ~ 5.5V	—	5	18	µA
Idd(avg)		Average supply current, T_A = +25°C, Vdd = 3V	—	8	16	µA
		Average supply current, T_A = -40°C ~ +85°C, Vdd = 2.4 ~ 5.5V	—	8	27	µA
t_{awake}	Awake Time	(Note 5)	—	75	150	µs
t_{period}	Period	(Note 5)	—	75	150	ms
D.C.	Duty Cycle	—	—	0.1	—	%

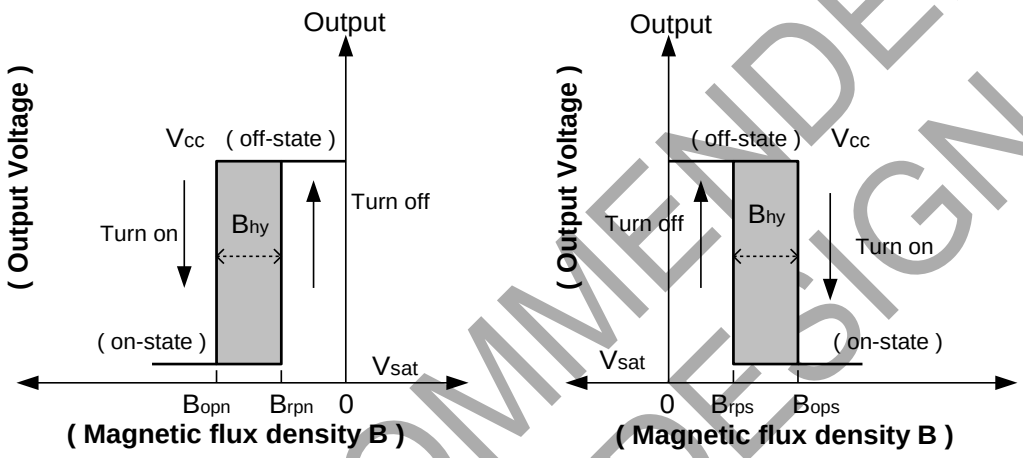
Note: 5. When power is initially on, the operating Vdd (2.4V to 5.5V) must be applied to be guaranteed for the output sampling. The output state is valid after the second operating phase (typical 150ms).



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

Symbol	Parameter	Min	Typ.	Max	Unit
Bops (South Pole to Brand Side)	Operation Point	2	3	4	mT
Bopn (North Pole to Brand Side)		-4	-3	-2	
Brps (South Pole to Brand Side)	Release Point	1	2	—	
Brpn (North Pole to Brand Side)		—	-2	-1	
Bhy(|Bopx – Brpx|)	Hysteresis	0.5	1	—	

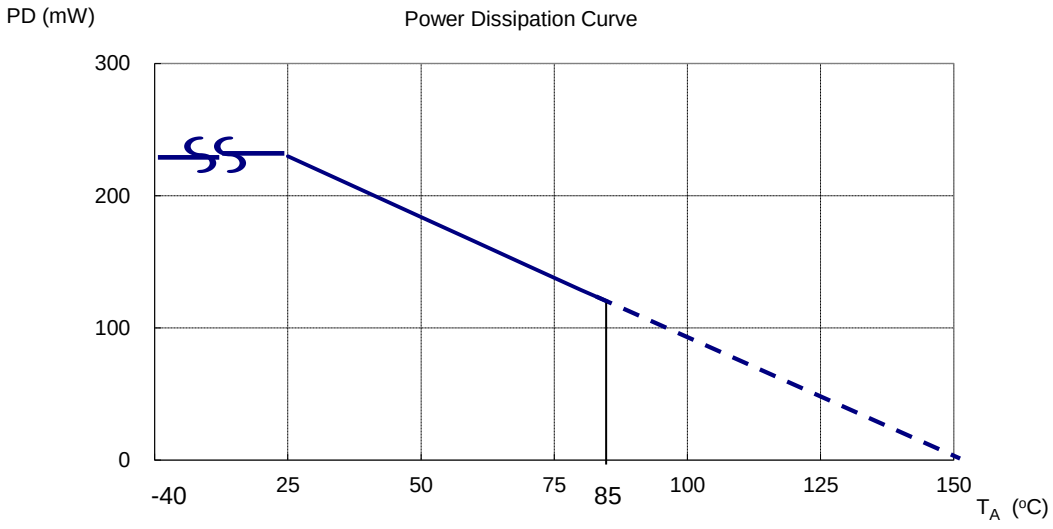
Notes: 6. Typical data is at T_A=+25°C, Vdd=3V, and for design information only.
7. Magnetic characteristics are for design information, which will vary with supply voltage, operating temperature, and after soldering.



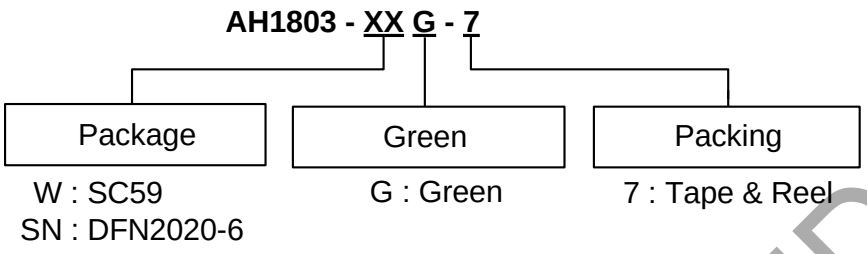
Performance Characteristics

(1) SC59 (commonly known as SOT23 in Asia) and DFN2020-6

T_A (°C)	25	50	60	70	80	85	90	100	110	120	130	140	150
PD (mW)	230	184	166	147	129	120	110	92	74	55	37	18	0



Ordering Information



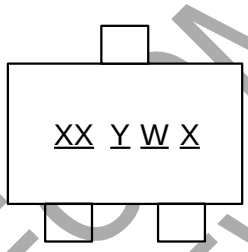
Product	Status (Note 9)	Package Code	Packaging (Note 8)	7" Tape and Reel	
				Quantity	Part Number Suffix
AH1803-WG-7	NRND	W	SC59	3000/Tape & Reel	-7
AH1803-SNG-7	NRND	SN	DFN2020-6	3000/Tape & Reel	-7

Notes: 8. Pad layout as shown on Diodes Incorporated's suggested pad layout document, which can be found at http://www.diodes.com/package-outlines.html.
9. NRND = Not Recommended for New Design.

Marking Information

(1) SC59 (Commonly known as SOT23 in Asia)

(Top View)

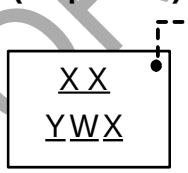


XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Green

Part Number	Package	Identification Code
AH1803	SC59	KD

(2) DFN2020-6

(Top View)



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

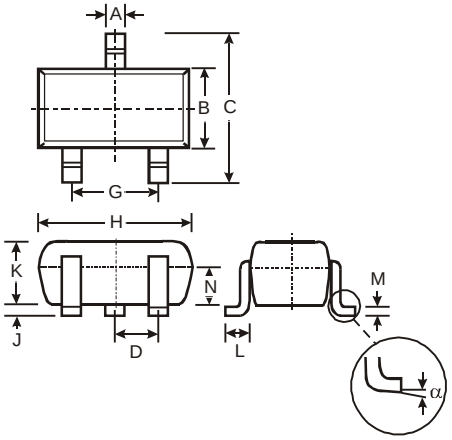
Part Number	Package	Identification Code
AH1803	DFN2020-6	KD

Package Outline Dimensions (All dimensions in mm.)

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

(1) Package Type: SC59 (Commonly known as SOT23 in Asia)

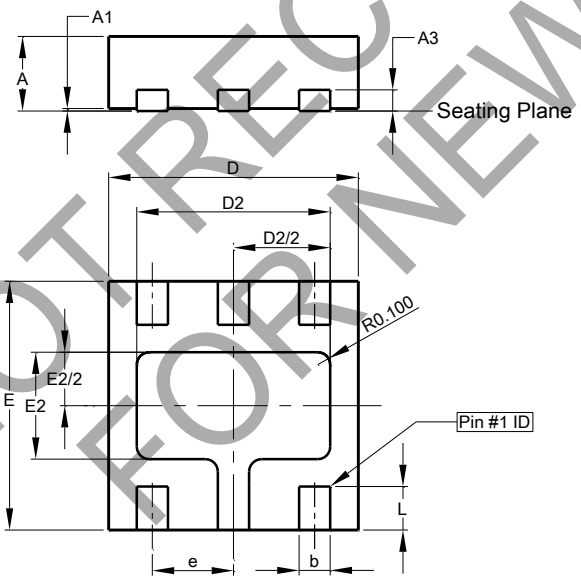
SC59



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
□.0°	8°	-	
All Dimensions in mm			

(2) Package Type: DFN2020-6

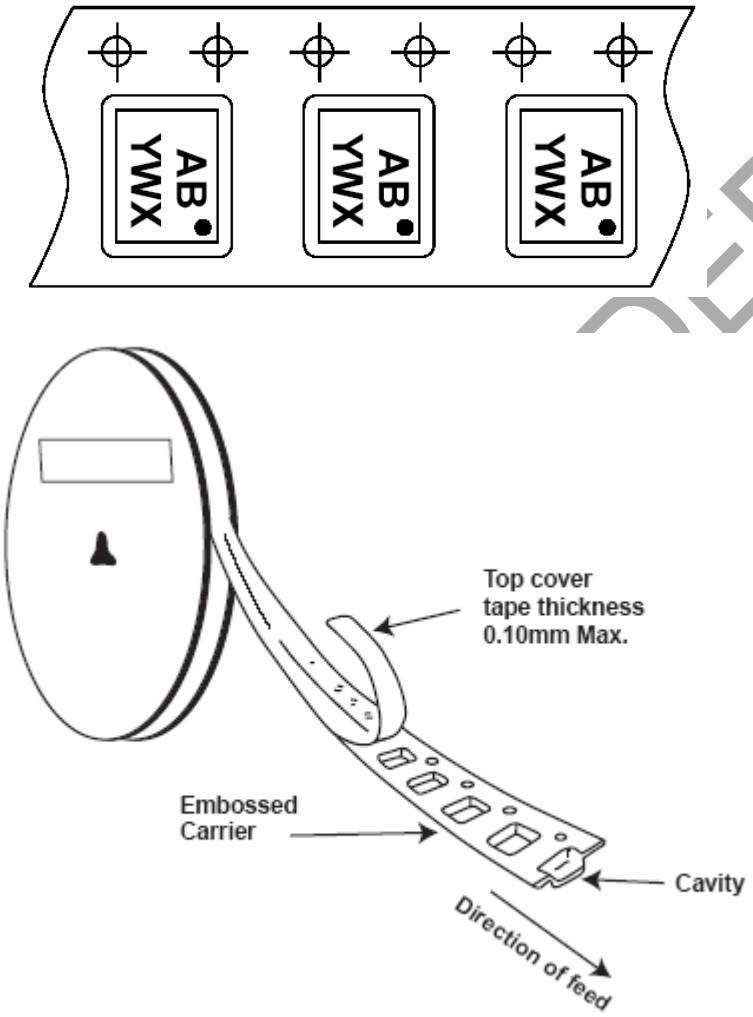
DFN2020-6



DFN2020-6			
Dim	**Min**	**Max**	**Typ**
A	0.57	0.63	0.60
A1	0	0.05	0.03
A3	-	-	0.15
b	0.20	0.30	0.25
D	1.95	2.075	2.00
D2	1.45	1.65	1.55
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.76	0.96	0.86
L	0.30	0.40	0.35
All Dimensions in mm			

Taping Orientation

DFN2020-6



Notes: 10. The taping orientation of the other package type can be found on our website at http://www.diodes.com/datasheets/ap02007.pdf.

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