



AK8789

Hall Effect Switch

Features

- High sensitive omnipoler operation
- Dual output
- Operating supply voltage : 1.6V to 5.5V
- Micropower operation
 - Typ.6.5 μ A (average : $V_{DD}=1.85V$)
- Ultra small SON package : 1.1 \times 1.4 \times t0.37mm Halogen free

Block Diagram & Circuit Configuration

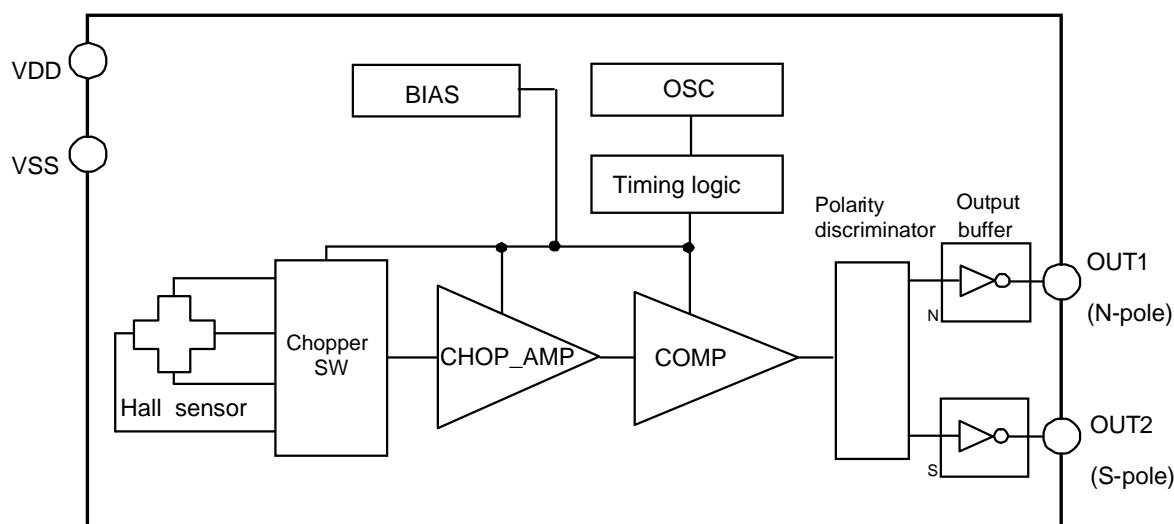


Figure1.Block diagram

Table 1.Circuit configuration

Block	Function
Hall sensor	Hall element fabricated by CMOS process
Chopper SW	Performs chopping in order to cancel the offset voltage of Hall sensor
CHOP_AMP	Reduces offset voltage and amplifies Hall output voltage
COMP	Hysteresis comparator
Polarity discriminator	Discriminate the result of south /north pole detection which is sent out from COMP consequently.
Output buffer	CMOS output
BIAS	Generates bias current to other circuits
OSC	Generates operating clock
Timing logic	Generates timing signal required for Chopper SW, AMP and COMP

Pin/Function

Table 2. Description of pin name and function

No.	Pin name	I/O	Function	Note
1	VDD	–	Power supply pin	
2	VSS	–	Ground pin	
3	OUT2	O	S pole detection output pin	CMOS Output*
4	OUT1	O	N pole detection output pin	CMOS Output*

*) Unused output pin should be left open.

Absolute Maximum Ratings

Table 3. Absolute maximum ratings

Parameter	Symbol	Min.	Max.	Unit
Power supply voltage	V_{DD}	–0.3	+6.5	V
Output current	I_{OUT}	–0.5	+0.5	mA
Storage temperature	T_{STG}	–55	+125	°C

Note: Stresses beyond these listed values may cause permanent damage to the device.

Recommended Operating Conditions

Table 4. Recommended operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{DD}	1.6	1.85	5.5	V
Operating temperature	T_a	–30		+85	°C

Electrical Characteristics

Table 5. Electrical characteristics ($T_a=25^{\circ}\text{C}$, $V_{DD}=1.85\text{V}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Current consumption	I_{DD}		6.5	9	μA	Average, $I_{OUT}=0\text{mA}$
High level output voltage	V_{OH}	$V_{DD}-0.4$			V	$I_{OUT}=-0.5\text{mA}$
Low level output voltage	V_{OL}			0.4	V	$I_{OUT}=+0.5\text{mA}$
Pulse drive period	T_{PD1}	25	50	100	ms	
Pulse drive time	T_{PD2}	73	146	292	μs	

Magnetic Characteristics (1)

Table 6. Magnetic characteristics ($T_a=25^{\circ}\text{C}$, $V_{DD}=1.85\text{V}$ unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating points	BopN	1.4	2.5	3.2	mT	
	BopS	-3.2	-2.5	-1.4	mT	
Releasing points	BrpN	1.2	2.0	3.0	mT	
	BrpS	-3.0	-2.0	-1.2	mT	
Hysteresis	BhN, BhS	0.1	0.5		mT	

The values in Table 6 are design specification.

Magnetic Characteristics (2)

Table 7. Magnetic characteristics ($T_a=-30\sim 85^{\circ}\text{C}$, $V_{DD}=1.6\sim 5.5\text{V}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating points	BopN	1.3*	2.5	3.9	mT	
	BopS	-3.9	-2.5	-1.3*	mT	
Releasing points	BrpN	0.9	2.0	3.7*	mT	
	BrpS	-3.7*	-2.0	-0.9	mT	
Hysteresis	BhN, BhS	0.1*	0.5		mT	

The characteristics with * marks are guaranteed by design.

Operational Characteristics

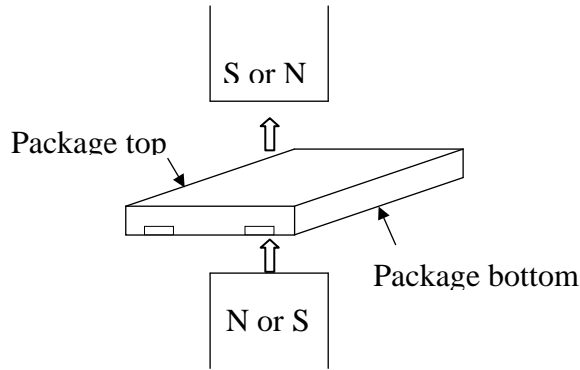


Figure 2. Definition of sensitivity direction

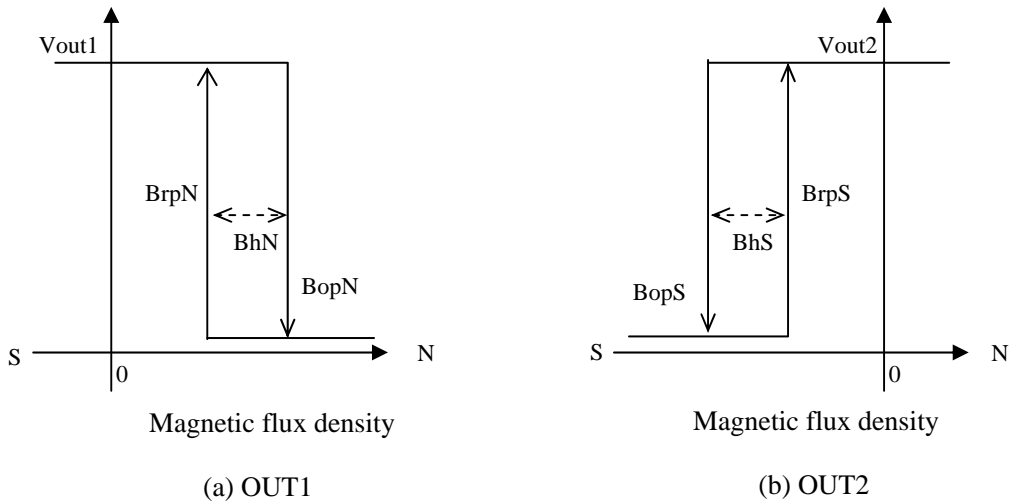


Figure 3. Output switching characteristics

Note) Positive polarity magnetic flux is defined as the magnetic flux from north pole which is facing the marking face of the package.

I_{DD} Timing Chart

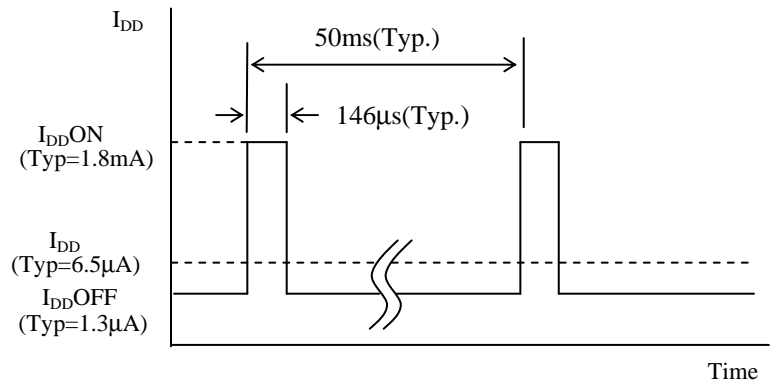


Figure 4. I_{DD} Timing chart

Functional Timing Chart

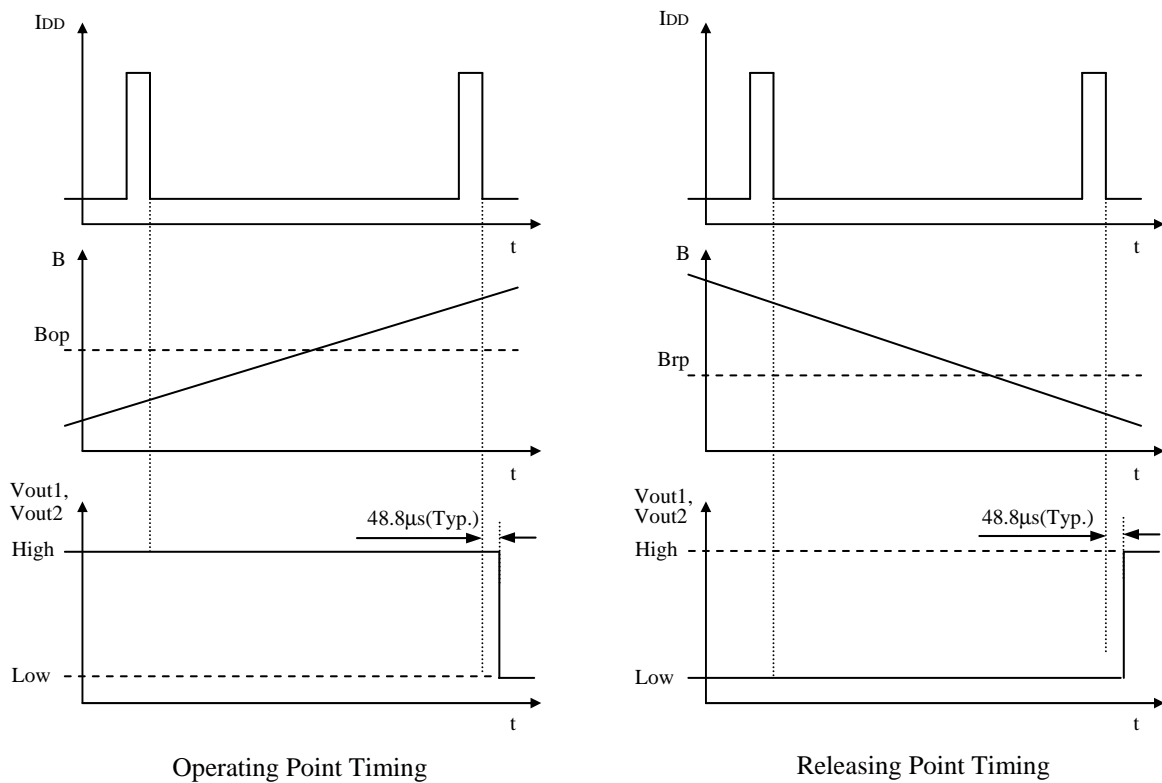


Figure5. Functional timing chart

Note: Hall IC's output is held as internal data just before the internal circuit turns off. And after 48.8μs (Typ.) the output changes.

Typical Characteristic Data (for reference)

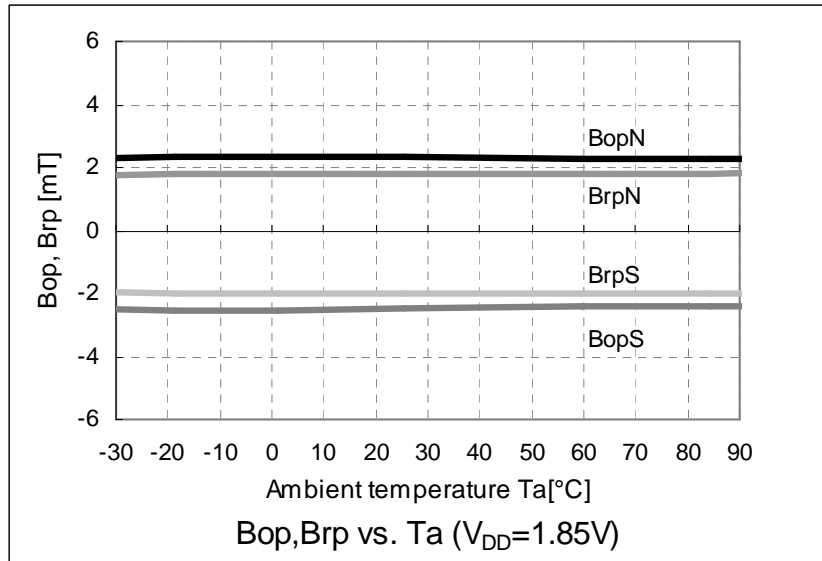


Figure 6. Temperature dependence of sensitivity

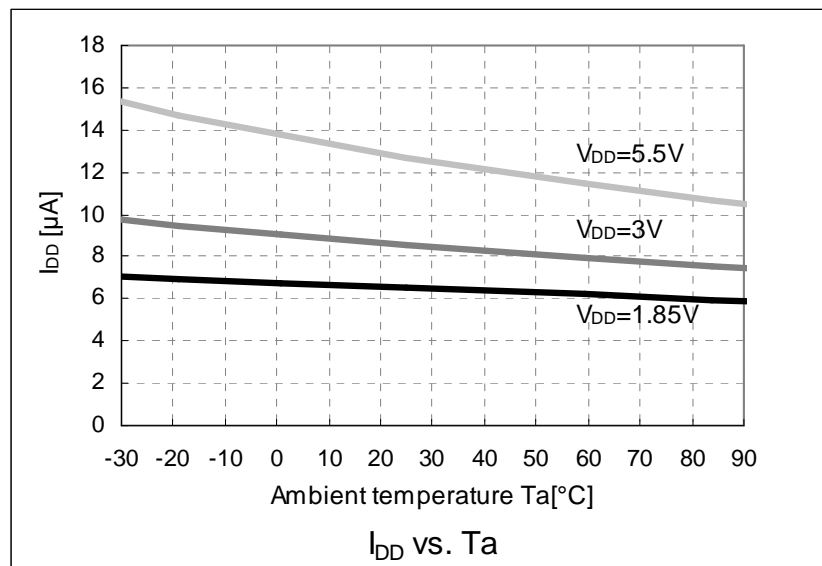


Figure 7. Temperature dependence of current consumption (average)

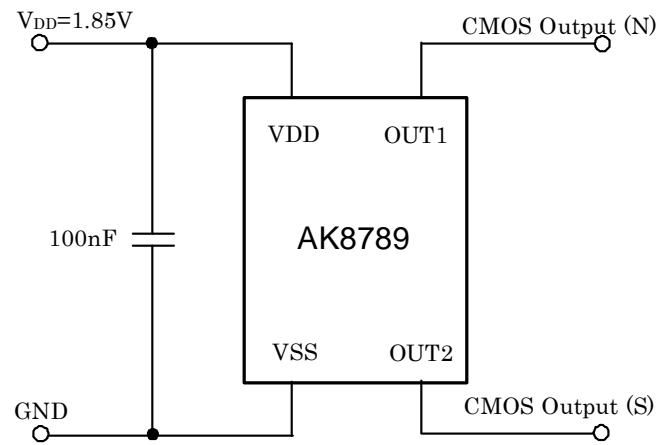
Recommended External Circuit

Figure 8.Recommended external circuit

Package

Unit: mm

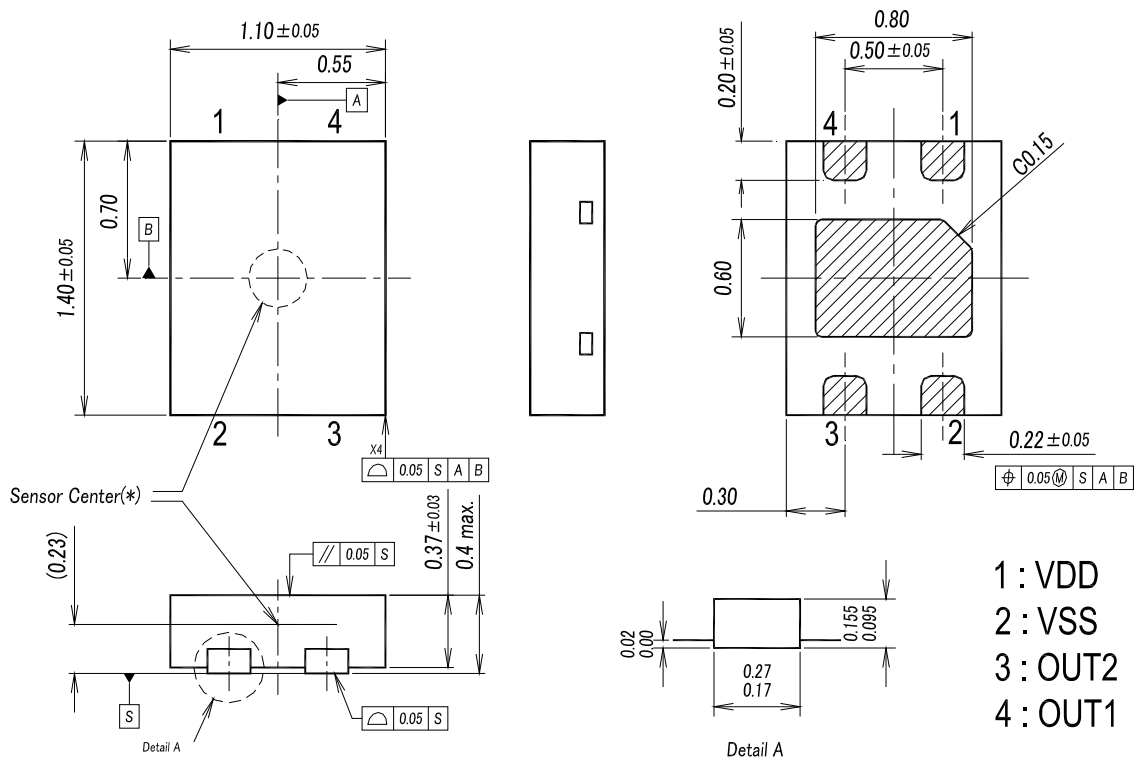


Figure 9. Package dimensions

Note 1) Sensitive area position referenced to the center of package within $\phi 0.3$ mm circle.

Note 2) Tolerances of dimension otherwise noted is ± 0.05 mm.

Note 3) Hatched area is plated.

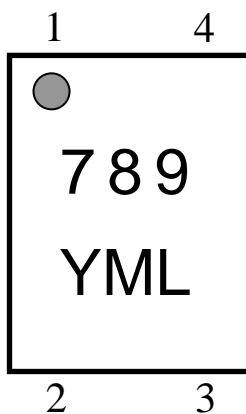
Note 4) Center pad area (TAB) should be tied to the VSS or floating

Material of terminals : Copper alloy

Material of plating : Sn 100%

Thickness of plating : 7 μ m(Typ.)

Marking



Marking is performed by laser

Product name : 789

Date code : YML

Y : Last one digit of manufactured year (0~9)

M : Manufactured month (1~9,X,Y,Z)

L : Lot(1~9,A~Z)

Figure 10. Marking

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