

# AK8788

Shipped in packet-tape reel(5000pcs/Reel)

AK8788 is ultra-small Hall effect IC of a single silicon chip composed of Hall element and a signal processing IC.

Omnipolar Hall Effect Switch

Supply Voltage 1.6~5.5V

Hall Element Pulse Excitation

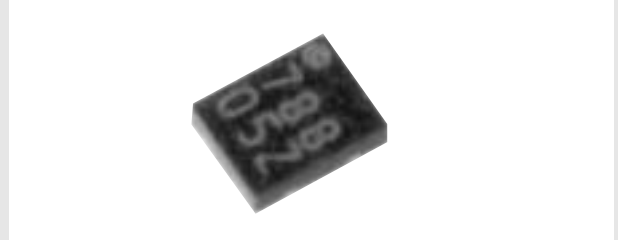
High Sensitivity Bop:3mT

Output CMOS

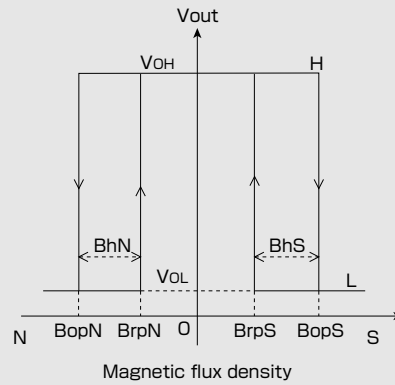
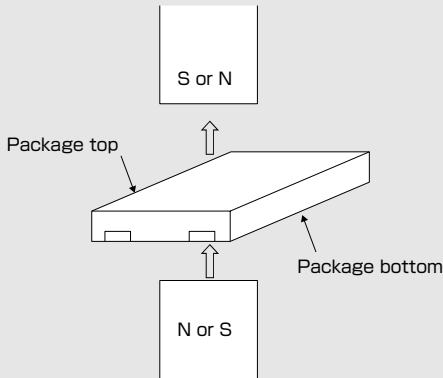
SON

## ●Features

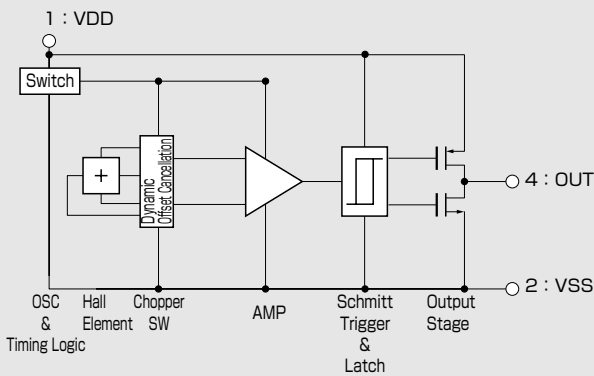
- High sensitive omnipolar operation
- Micropower operation  
Typ.4.5μA (average : VDD=1.85V)
- Ultra small SON package : 1.1×1.4×t0.37mm  
Halogen free



## ●Operational Characteristics



## ●Functional Block Diagram



| Item            | Function   |
|-----------------|--|
| OSC             | Generates operating clock  |
| Timing logic    | Generates timing signal requires for Chopper SW, AMP and COMP                    |
| Hall Element    | Hall element fabricated by CMOS process  |
| Chopper SW      | Performs chopping in order to cancel the offset voltage of Hall sensor           |
| AMP             | Reduce offset voltage and amplifies Hall output voltage                          |
| Schmitt Trigger | Hysteresis comparator  |
| Output Stage    | CMOS output, During the power down mode, output is latched in its previous state |

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### ●Absolute Maximum Ratings

| Item                 | 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

| Item                  | 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 Characteristics① ( $T_a=25^\circ\text{C}$ $V_{DD}=1.85\text{V}$ Unless otherwise noted)

| Item                      | symbol    | Min.         | Typ. | Max. | Unit          | Note                          |
|---------------------------|-----------|--------------|------|------|---------------|-------------------------------|
| Current consumption       | $I_{DD}$  |              | 4.5  | 9    | $\mu\text{A}$ | Average                       |
|                           | $I_{DD2}$ |              | 7.5  | 12   | $\mu\text{A}$ | Average, $V_{DD}=5.5\text{V}$ |
| 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          | $T_{PD2}$ | 43           | 85.4 | 170  | $\mu\text{s}$ |                               |

### ●Electrical Characteristics② ( $T_a=-30^\circ\text{C}\sim 85^\circ\text{C}$ $V_{DD}=1.6\sim 5.5\text{V}$ )

| Item                      | symbol    | Min.         | Typ. | Max. | Unit          | Note                    |
|---------------------------|-----------|--------------|------|------|---------------|-------------------------|
| Current consumption       | $I_{DD}$  |              | 4.5  | 15   | $\mu\text{A}$ |                         |
| 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          | $T_{PD2}$ | 43           | 85.4 | 170  | $\mu\text{s}$ |                         |

Note) The specifications in Electrical Characteristics ② are design targets.

### ●Magnetic Characteristics① ( $T_a=25^\circ\text{C}$ $V_{DD}=1.85\text{V}$ )

| Item             | symbol       | Min.  | Typ. | Max.  | Unit |
|------------------|--------------|-------|------|-------|------|
| Operating points | $B_{opS}$    | *1.4  | 3.0  | 4.0   | mT   |
|                  | $B_{opN}$    | -4.0  | -3.0 | *-1.4 | mT   |
| Releasing points | $B_{rpS}$    | 1.1   | 2.2  | *3.7  | mT   |
|                  | $B_{rpN}$    | *-3.7 | -2.2 | -1.1  | mT   |
| Hysteresis       | $B_hS, B_hN$ | *0.3  | 0.8  | *1.5  | mT   |

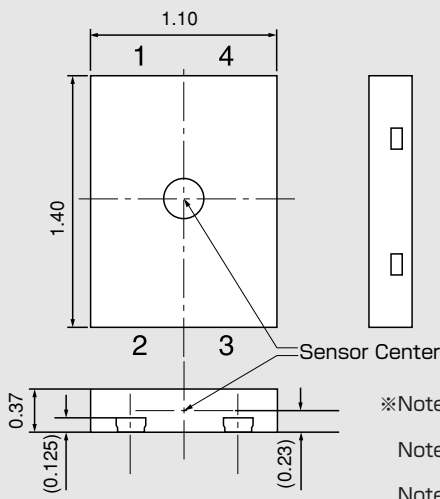
Note) The characteristics with \* mark are design targets.

### ●Magnetic Characteristics② ( $T_a=-30^\circ\text{C}\sim 85^\circ\text{C}$ $V_{DD}=1.6\sim 5.5\text{V}$ )

| Item             | symbol       | Min. | Typ. | Max. | Unit |
|------------------|--------------|------|------|------|------|
| Operating points | $B_{opS}$    | 1.2  | 3.0  | 4.4  | mT   |
|                  | $B_{opN}$    | -4.4 | -3.0 | -1.2 | mT   |
| Releasing points | $B_{rpS}$    | 0.9  | 2.2  | 4.1  | mT   |
|                  | $B_{rpN}$    | -4.1 | -2.2 | -0.9 | mT   |
| Hysteresis       | $B_hS, B_hN$ | 0.1  | 0.8  | 1.7  | mT   |

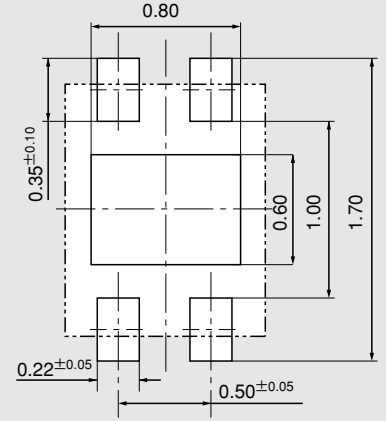
Note) The specifications in Magnetic Characteristics ② are design targets.

●Package (Unit:mm)



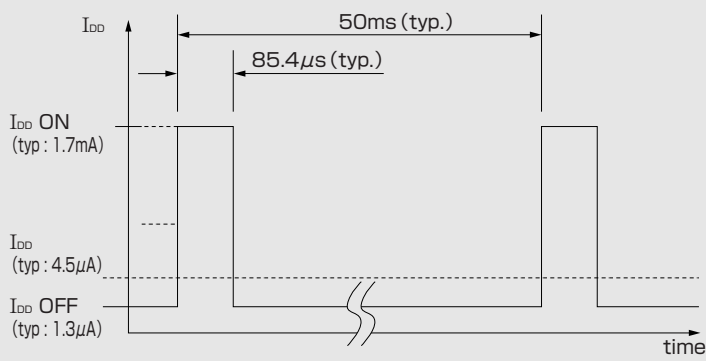
- ※Note 1) Sensitive area position referenced to the center of package within  $\phi 0.3\text{mm}$  circle.
- Note 2) Tolerances of dimension otherwise noted is  $\pm 0.05\text{mm}$ .
- Note 3) Hatched area is plated.
- Note 4) Center pad area (TAB) should be tied to the VSS or floating

●Footprint (for reference)

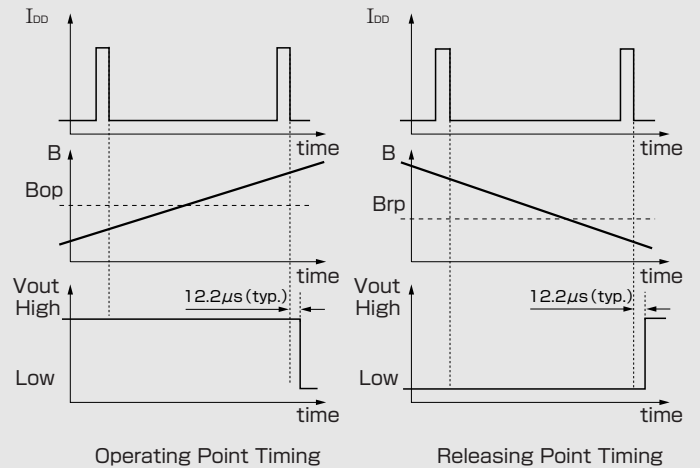


| Pin No. | Pin name | Function                 | Note                      |
|---------|----------|--------------------------|---------------------------|
| 1       | VDD      | Power supply pin         |                           |
| 2       | VSS      | Ground pin               |                           |
| 3       | N.C.     | (No internal connection) | Connect to VSS externally |
| 4       | OUT      | Output pin               | CMOS output               |

●IDD Timing Chart

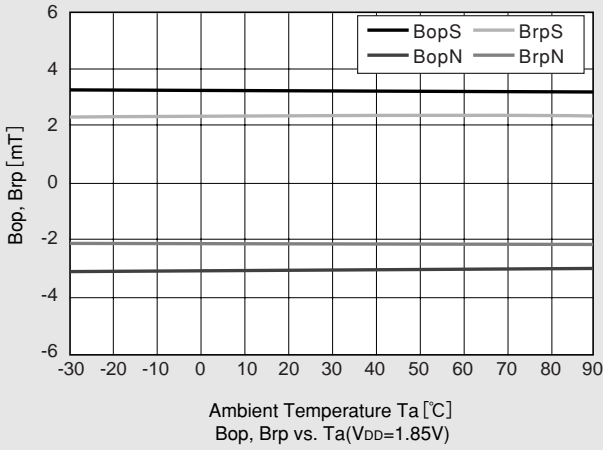


●Functional Timing Chart

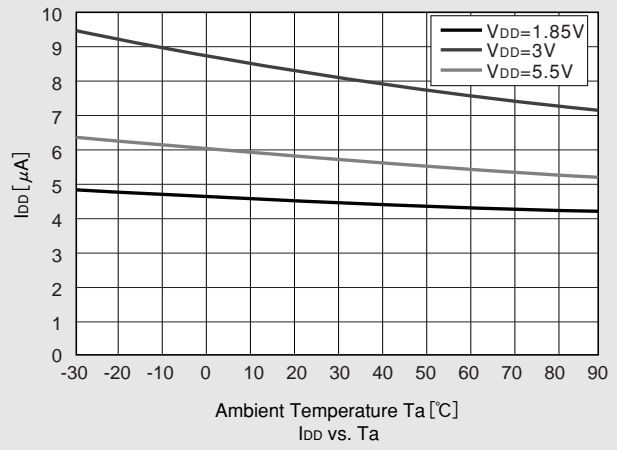


Note: Hall IC's output is held as internal data just before the internal circuit turns off. And after 12.2µs (typ.) the output changes.

● Typical Characteristics Data (for reference)

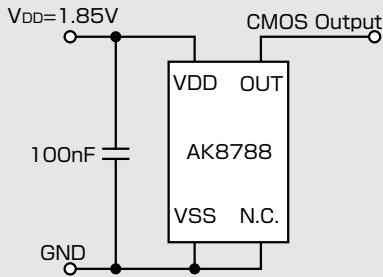


Temperature dependence of sensitivity



Temperature dependence of current consumption (Average)

● Application Circuit



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