# AK8788

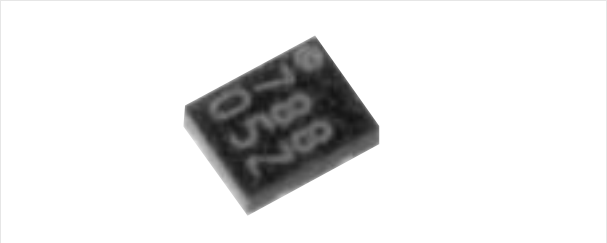
Shipped in packet-tape reel(5000pcs/Reel)

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

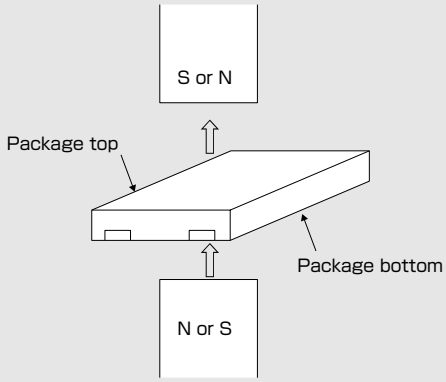
| | | | | | |
|---|---|---|---|---|---|
| Omnipolar Hall Effect Switch | Supply Voltage 1.6~5.5V | Hall Element Pulse Excitation | High Sensitivity Bop:3mT | Output CMOS | SON |

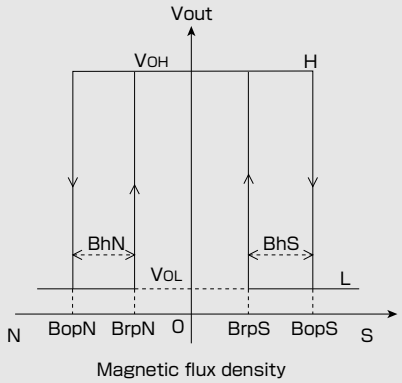
## ●Features

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

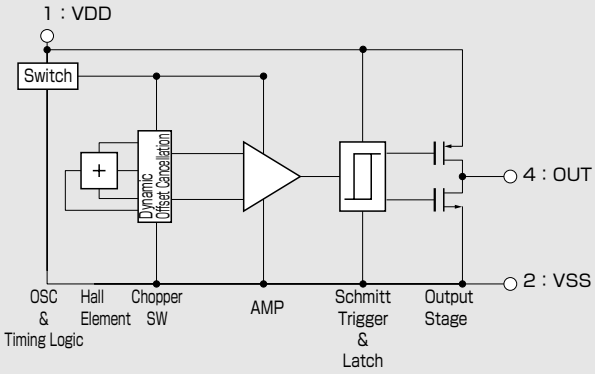


## ●Operational Characteristics




## ●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 | ℃ |

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 | ℃ |

## ●Electrical Characteristics① (Ta=25℃ VDD=1.85V Unless otherwise noted)

| Item | symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Current consumption | $I_{DD}$ | | 4.5 | 9 | μA | Average |
| | $I_{DD2}$ | | 7.5 | 12 | μA | Average, $V_{DD}$=5.5V |
| High level output voltage | $V_{OH}$ | $V_{DD}$−0.4 | | | V | $I_{out}$=−0.5mA |
| Low level output voltage | $V_{OL}$ | | | 0.4 | V | $I_{out}$=+0.5mA |
| Pulse drive period | $T_{PD1}$ | 25 | 50 | 100 | ms | |
| Pulse drive time | $T_{PD2}$ | 43 | 85.4 | 170 | μs | |

## ●Electrical Characteristics② (Ta=−30℃～85℃ VDD=1.6～5.5V)

| Item | symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Current consumption | $I_{DD}$ | | 4.5 | 15 | μA | |
| High level output voltage | $V_{OH}$ | $V_{DD}$−0.4 | | | V | $I_{out}$=−0.5mA |
| Low level output voltage | $V_{OL}$ | | | 0.4 | V | $I_{out}$=+0.5mA |
| Pulse drive period | $T_{PD1}$ | 25 | 50 | 100 | ms | |
| Pulse drive time | $T_{PD2}$ | 43 | 85.4 | 170 | μs | |

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

## ●Magnetic Characteristics① (Ta=25℃ VDD=1.85V)

| Item | symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Operating points | $B_{op}S$ | *1.4 | 3.0 | 4.0 | mT |
| | $B_{op}N$ | −4.0 | −3.0 | *−1.4 | mT |
| Releasing points | $B_{rp}S$ | 1.1 | 2.2 | *3.7 | mT |
| | $B_{rp}N$ | *−3.7 | −2.2 | −1.1 | mT |
| Hysteresis | BhS,BhN | *0.3 | 0.8 | *1.5 | mT |

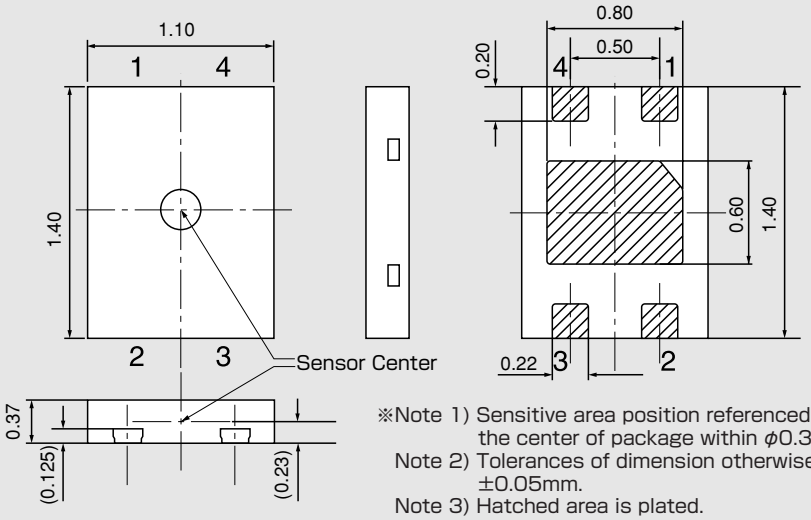
Note) The characteristics with * mark are design targets.

## ●Magnetic Characteristics② (Ta=−30℃～85℃ VDD=1.6～5.5V)

| Item | symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Operating points | $B_{op}S$ | 1.2 | 3.0 | 4.4 | mT |
| | $B_{op}N$ | −4.4 | −3.0 | −1.2 | mT |
| Releasing points | $B_{rp}S$ | 0.9 | 2.2 | 4.1 | mT |
| | $B_{rp}N$ | −4.1 | −2.2 | −0.9 | mT |
| Hysteresis | BhS,BhN | 0.1 | 0.8 | 1.7 | mT |

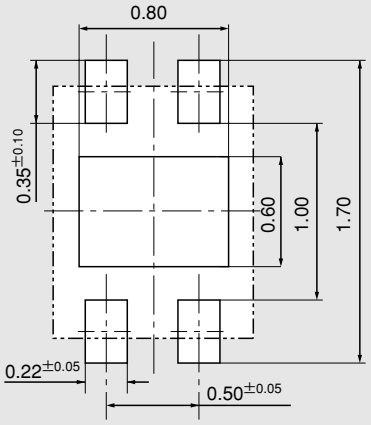
Note) The specifications in Magnetic Characteristics ② are design targets.

## ●Package (Unit:mm)



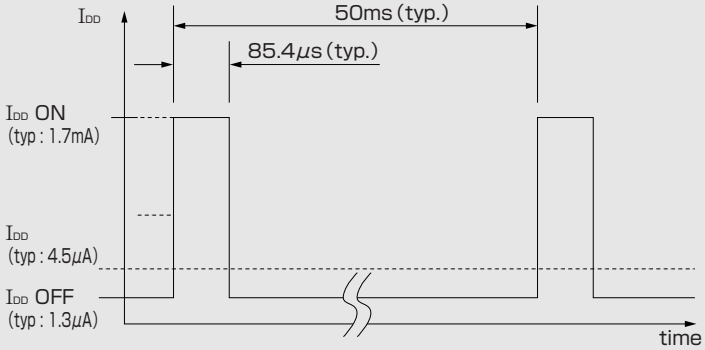

※Note 1) Sensitive area position referenced to the center of package within $\phi$0.3mm circle.
Note 2) Tolerances of dimension otherwise noted is ±0.05mm.
Note 3) Hatched area is plated.
Note 4) Center pad area (TAB) should be tied to the VSS or floating

## ●Footprint (for reference)

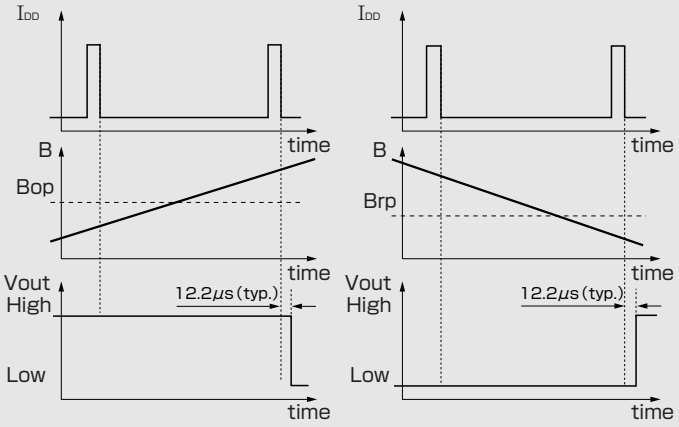



| Pin No. | Pin name | Function | Note |
|---|---|---|---|
| 1 | VDD | Power supply pin | |
| 2 | VSS | Ground pin | |
| 3 | N.C. | (No internal connection) | Connect to VSS externally |
| 4 | OUT | Output pin | CMOS output |

## ●IDD Timing Chart

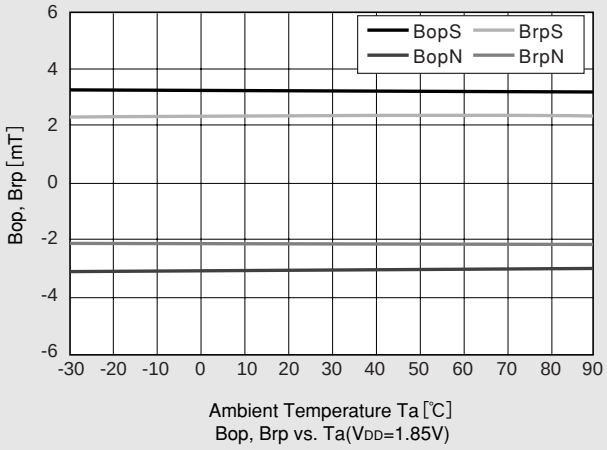



## ●Functional Timing Chart

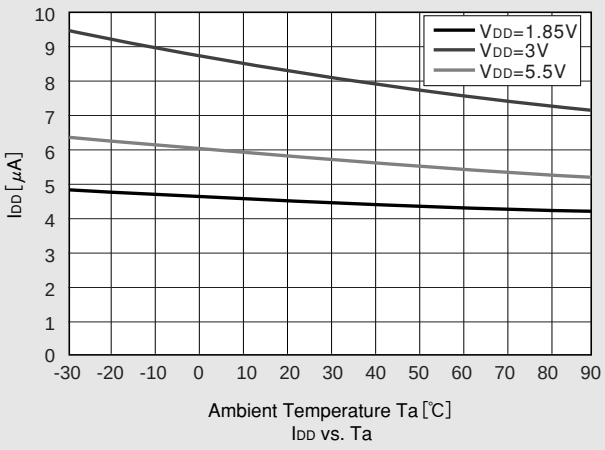



Note: Hall IC's output is held as internal data just before the internal circuit turns off. And after 12.2$\mu$s (typ.)the output changes.

## ●Typical Characteristics Data (for reference)

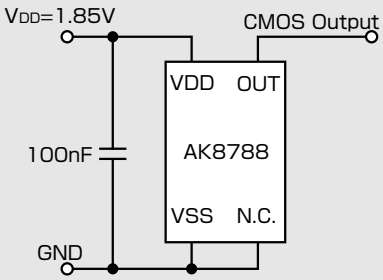



Temperature dependence of sensitivity




Temperature dependence of current consumption (Average)

## ●Application Circuit



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April 4, 2012