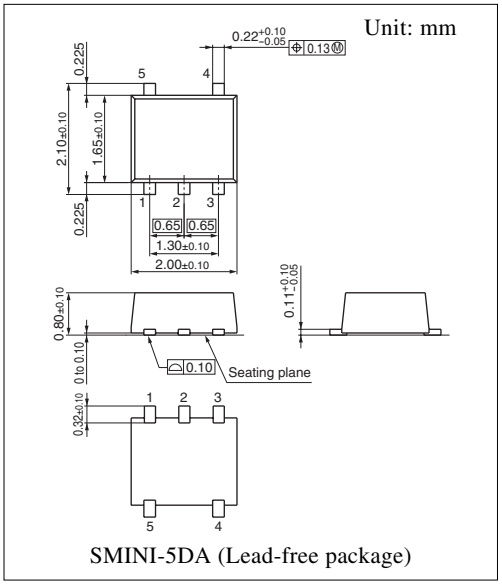
AN48810B

Low current consumption, high sensitivity CMOS Hall IC One-way magnetic field operation



SMINI-5DA (Lead-free package)

■ Overview

The AN48810B is a Hall IC (a magnetic sensor) which has 2 times or more sensitivity and a low current consumption of about one three-hundredth compared with our conventional one.

In this Hall IC, a Hall element, a offset cancel circuit, an amplifier circuit, a sample and hold circuit, a Schmidt circuit, and output stage FET are integrated on a single chip housed in a small package by IC technique.

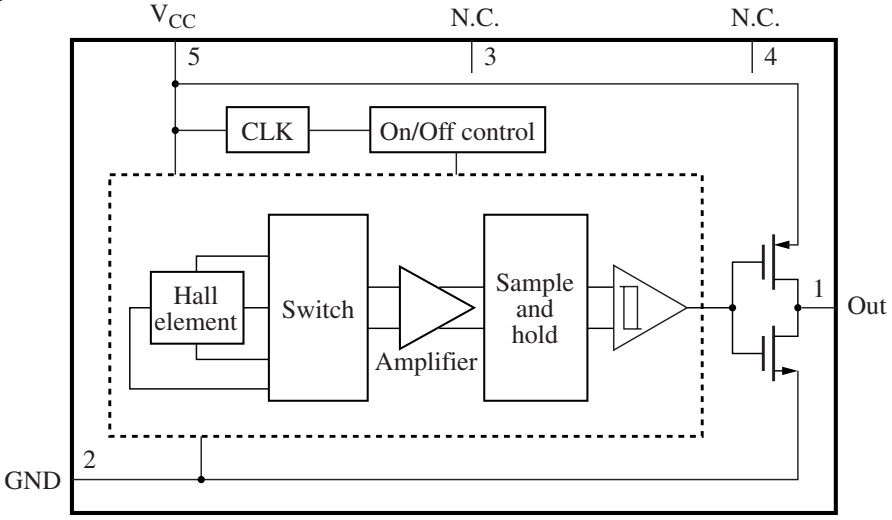
■ Features

- High sensitivity (6 mT max.) due to offset cancel circuit and a new sample and hold circuit
- Small current by using intermittent action
- Small package (SMD)
- CMOS inverter output

■ Applications

- Flip type cellular phone, digital video camera

■ Block Diagram



Note) The magnetism detection time should be longer than one intermittent action cycle (On = 200 µs and Off = 51 ms).

■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	Out	Output	4	N.C.	
2	GND	Ground	5	V_{CC}	Power supply
3	N.C.				

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	5	V
	V_{OUT}	5	V
Output current	I_O	15	mA
Power dissipation	P_D	60	mW
Operating ambient temperature	T_{opr}	−20 to +75	°C
Storage temperature	T_{stg}	−55 to +125	°C

Note) 1. Except for the operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.
2. The reverse insertion of this IC will cause its breakdown.
3. It will operate normally in several tens of ms after power on.
4. This IC is not suitable for car electrical equipment.

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V_{CC}	2.5 to 3.5	V

■ Electrical Characteristics at T_a = 25°C

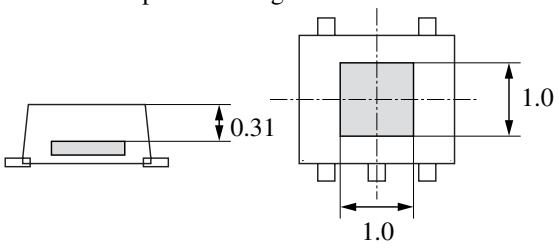
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating magnetic flux density 1	B_{H-L}	V_{CC} = 3 V	—	—	6	mT
Operating magnetic flux density 2	B_{L-H}	V_{CC} = 3 V	0.5	—	—	mT
Hysteresis width	BW	V_{CC} = 3 V	—	1.2	—	mT
Output voltage 1	V_{OL}	V_{CC} = 3 V, I_O = 2 mA, B = 6 mT	—	0.1	0.3	V
Output voltage 2	V_{OH}	V_{CC} = 3 V, I_O = −2 mA, B = 0.5 mT	2.7	2.9	—	V
Supply current 1	I_{CCON}	V_{CC} = 3 V, B = 0.5 mT	—	2	—	mA
Supply current 2	I_{CCOFF}	V_{CC} = 3 V, B = 0.5 mT	—	3	—	µA
Supply current 3	I_{CCAVE}	V_{CC} = 3 V, B = 0.5 mT	—	10	15	µA

Note) 1. Symbol B_{H-L} stands for the operating magnetic flux density where its output level varies from high to low.
2. Symbol B_{L-H} stands for the operating magnetic flux density where its output level varies from low to high.
3. I_{CCON} is a consumption current when the magnetism detection system is on, and I_{CCOFF} is that when the magnetism detection system is off. One magnetism detection cycle is On = 200 µs and Off = 51 ms. I_{CCAVE} is an average consumption current.

■ Technical Data

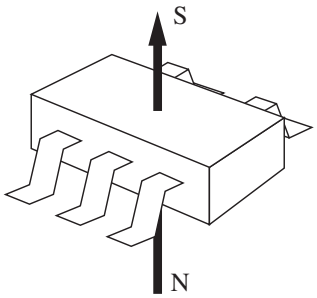
• Position of a Hall element (unit in mm)

Distance from a package surface to sensor part: 0.31 mm (reference value)
A Hall element is placed on the shaded part in the figure.

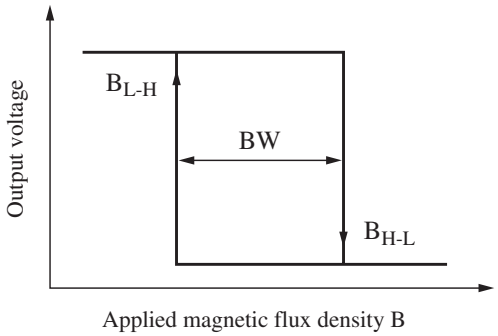


■ Technical Data (continued)

• Magneto-electro conversion characteristics

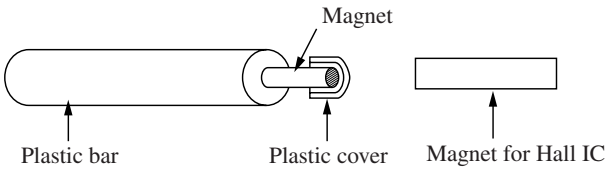


Direction of applied magnetic field



Operating magnetic flux density

• Simple polarity distinction method of mounting magnet to product incorporating Hall IC

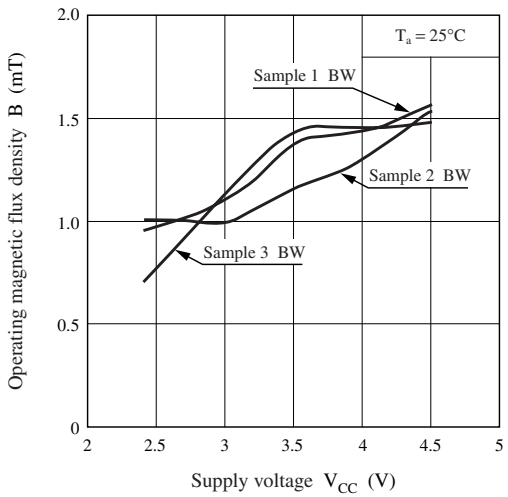


A magnet, which is used in pair with a Hall IC, can be mounted to a product incorporating a built-in Hall IC (e.g., a cellular phone) smoothly and correctly with a simple tool. The polarity of the magnet (hereafter referred to as Hall IC magnet) will be automatically discriminated.

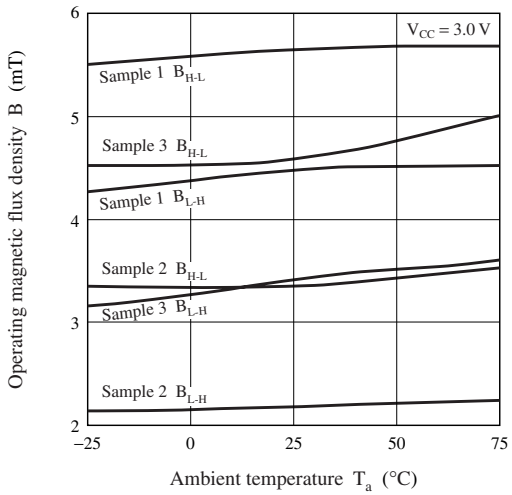
This tool is a plastic bar, one end of which is attached with a small magnet (hereafter referred to as plastic bar magnet), as shown in the above illustration. The plastic bar magnet, the polarity of which is known, is secured on the bar with a plastic cover. When the plastic bar magnet is located close to the Hall IC magnet, the Hall IC magnet will be attracted to the plastic bar magnet. The contact side of the Hall IC magnet is different in polarity from that of the plastic bar magnet. As a matter of course, the polarity of the Hall IC magnet will be known then. The Hall IC magnet can be mounted to the appliance in this state. The attraction force of the plastic bar magnet is rather weak due to the plastic cover on it. Therefore, the plastic bar can be separated from the Hall IC magnet with ease after the Hall IC magnet is mounted properly.

• Main characterisitcs

Operating magnetic flux density — Supply voltage



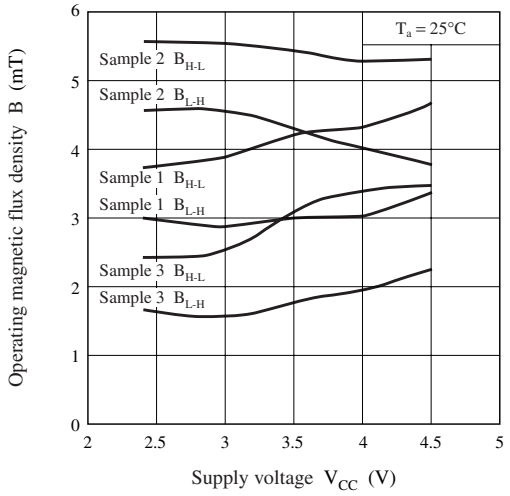
Operating magnetic flux density — Ambient temperature



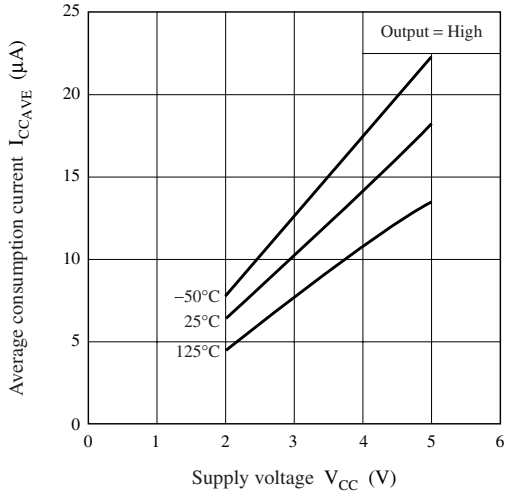
■ Technical Data (continued)

• Main characterisitcs

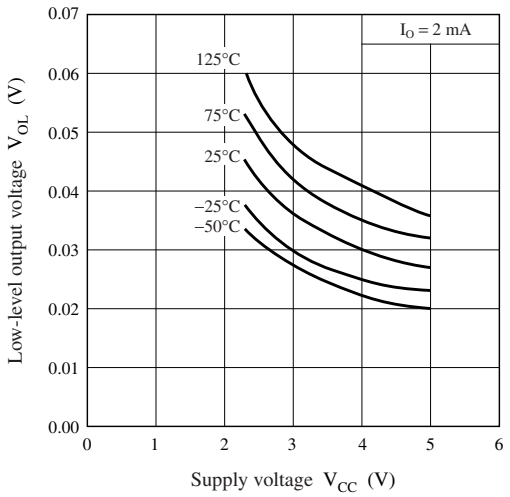
Operating magnetic flux density — Supply voltage



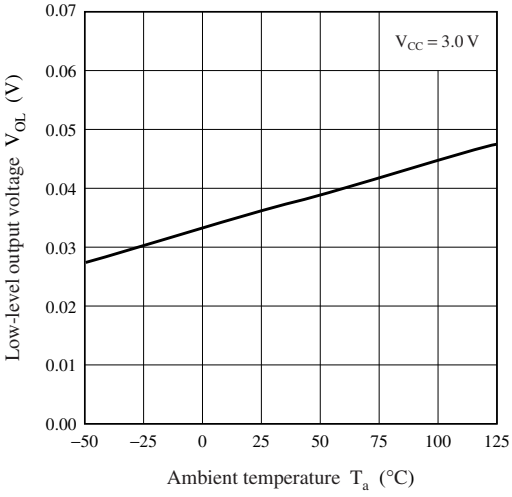
Average consumption current — Supply voltage



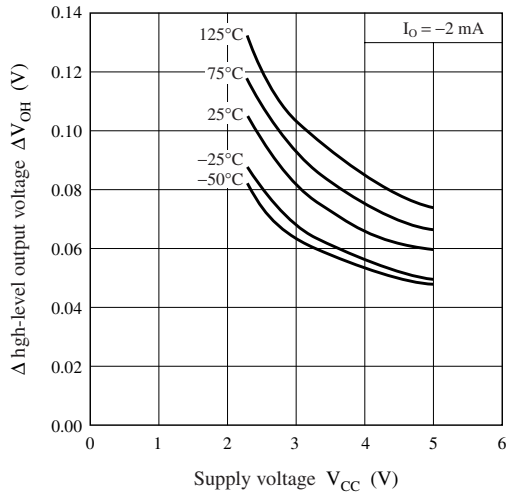
Low-level output voltage — Supply voltage



Low-level output voltage — Ambient temperature



Δ high-level output voltage — Supply voltage



Δ high-level output voltage — Ambient temperature