HMX3033H Series

Low current consumption, 3.0mT High sensitivity CMOS Hall Magnetic Sensor Switch

(IMPORTANT: Please check the last page for Genuine Product Labeling)
Low current consumption, 3.0mT High sensitivity CMOS Hall Magnetic Sensor Switch

HMX3033H Series

GENERAL DESCRIPTIONS
HMX3033H series are monolithic ICs with built-in Hall magnet sensor element and CMOS switch. It becomes the non-contact switch with low current consumption, high sensitivity and reliability which is combined with magnet.
A vertical magnetic field to the electrode of the package can be detected by an arbitrary polarity. (N pole ⇔ S pole)

FEATURES
- CMOS + Hall monolithic structure
- Low current consumption: 5.0µA (VIN=3.3V, Ta=25°C)
- High-sensitivity: Typ. 3.0mT
- Operating temperature range: -40 ~ +85°C
- Operating voltage range: 1.6V ~ 6.0V
- Detection pulse driving cycle: Typ. 50msec with 50µsec width
- Magnetic direction: Omnipolar Hall Effect Switch
- Detection magnetic field: Vertical direction of marked side of package (Electrode vertical both direction)
- Small package: SOT-23 (2.9×2.8×1.1mm)

APPLICATIONS
- Detection of opening and closing: Mobile phone, Notebook PC, Microwave oven, Washing machine, Rice cooker, Refrigerator, Electronic dictionary, Digital camera, etc.
- Detection of position: Air cylinder, Antitheft window, Digital door lock, etc.
- Detection of water level: Water purifier, Humidifier, Bidet, etc.
- Detection of rotation: Water meter, Gas meter, Wattmeter, Speed meter, etc.
- Power supply switch: Cordless phone, Electric toothbrush, etc.
PRODUCTS NUMBERING GUIDE

HMX3033H

Design version
A : CMOS output

Package form
T : SOT-23 (2.9×2.8×1.1mm)

Detection pulse cycle
H : Typ. 50msec with 25μsec width

Operating voltage
33 : 1.6V ~ 6.0V

Detection sensitivity
30 : Typ. 3.0mT

PIN CONFIGURATION / MARKING SPECIFICATION

Pin Configuration

<table>
<thead>
<tr>
<th>No.</th>
<th>Symbol</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vin</td>
<td>Voltage input</td>
</tr>
<tr>
<td>2</td>
<td>VOUT</td>
<td>Output</td>
</tr>
<tr>
<td>3</td>
<td>VSS</td>
<td>Power ground</td>
</tr>
</tbody>
</table>

Marking Specification

<table>
<thead>
<tr>
<th>Code</th>
<th>Mark</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>H</td>
<td>Series name</td>
</tr>
<tr>
<td>BC</td>
<td>HA</td>
<td>Products specification &amp; version</td>
</tr>
<tr>
<td>D</td>
<td>Internal rule</td>
<td>Lot number</td>
</tr>
</tbody>
</table>
Low current consumption, 3.0mT High sensitivity CMOS Hall Magnetic Sensor Switch

HMX3033H Series

BLOCK DIAGRAM

ABSOLUTE MAXIMUM RATINGS

<table>
<thead>
<tr>
<th>Items</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Conditions</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>TOPR</td>
<td>-30</td>
<td>-</td>
<td>+85</td>
<td></td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>TSTG</td>
<td>-40</td>
<td>-</td>
<td>+125</td>
<td></td>
<td>°C</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>VMAX</td>
<td>VIN-0.3</td>
<td>-</td>
<td>VIN+7.0</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Assembly temp. condition</td>
<td>TASY</td>
<td>-</td>
<td>255</td>
<td>260</td>
<td>t=max:5sec/Tmax</td>
<td>°C</td>
</tr>
</tbody>
</table>

TEST CIRCUIT

Direction of magnetic field

S or N
N or S

15pF (including probe capacitance)

0.1 μF
Low current consumption, 3.0mT High sensitivity CMOS Hall Magnetic Sensor Switch

**ELECTRICAL CHARACTERISTICS**

(Unless otherwise specified, \( V_{DD} = 3.3V, T_a = 25^\circ C \))

<table>
<thead>
<tr>
<th>Items</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Conditions</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>( V_{IN} )</td>
<td>1.6</td>
<td>3.3</td>
<td>6.0</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Current consumption</td>
<td>( I_{AVG} )</td>
<td>-</td>
<td>5.0</td>
<td>-</td>
<td>Avg. current at ( V_{IN} = 3.3V )</td>
<td>( \mu A )</td>
</tr>
<tr>
<td>Detection pulse driving cycle</td>
<td>( P_c )</td>
<td>-</td>
<td>50</td>
<td>90</td>
<td>Pulse width : 1/1000</td>
<td>( \text{msec} )</td>
</tr>
<tr>
<td>&quot;H&quot;-level output voltage</td>
<td>( V_{OH} )</td>
<td>( V_{IN} - 0.4 )</td>
<td>-</td>
<td>-</td>
<td>( I_{OH} = -0.5mA )</td>
<td>V</td>
</tr>
<tr>
<td>&quot;L&quot;-level output voltage</td>
<td>( V_{OL} )</td>
<td>-</td>
<td>-</td>
<td>0.4</td>
<td>( I_{OL} = +0.5mA )</td>
<td>V</td>
</tr>
</tbody>
</table>

**MAGNETIC CHARACTERISTICS**

(Unless otherwise specified, \( V_{DD} = 3.3V, T_a = 25^\circ C \))

<table>
<thead>
<tr>
<th>Items</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic flux density at operating point (H→L)</td>
<td>( M_{BOPS} )</td>
<td>1.5(^*)</td>
<td>3.0</td>
<td>5.0</td>
<td>mT</td>
</tr>
<tr>
<td></td>
<td>( M_{BOPN} )</td>
<td>-5.0(^*)</td>
<td>-3.0</td>
<td>-1.5(^*)</td>
<td>mT</td>
</tr>
<tr>
<td>Magnetic flux density at release point (L→H)</td>
<td>( M_{BRPS} )</td>
<td>1.2(^*)</td>
<td>2.5</td>
<td>4.7(^*)</td>
<td>mT</td>
</tr>
<tr>
<td></td>
<td>( M_{BRPN} )</td>
<td>-4.7(^*)</td>
<td>-2.5</td>
<td>-1.2</td>
<td>mT</td>
</tr>
<tr>
<td>Width of hysteresis</td>
<td>( M_{BHYS} )</td>
<td>0.3(^*)</td>
<td>0.5</td>
<td>1.2(^*)</td>
<td>mT</td>
</tr>
</tbody>
</table>

Note: The values with [*] marks are guaranteed by design, not tested in production.

**MAGNETIC-ELECTRIC CONVERSION CHARACTERISTIC**
### MAGNETIC FLUX DENSITY AND OUTPUT VOLTAGE LEVEL

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Magnet flux density</th>
<th>Output level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnet = OFF / Power = ON</td>
<td>M = 0mT</td>
<td>High-level</td>
</tr>
<tr>
<td>Magnet = ON / Power = ON</td>
<td>M $\geq 5.0mT$</td>
<td>Low-level</td>
</tr>
<tr>
<td>Magnet = OFF / Power = ON</td>
<td>M $\leq 1.2mT$</td>
<td>High-level</td>
</tr>
</tbody>
</table>

### DETECTION PULSE DRIVING CYCLE (SAMPLING CYCLE)

![Diagram showing detection pulse driving cycle](image)

### OUTPUT SWITCHING TIMING CHART

![Diagram showing output switching timing chart](image)

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TYPICAL ELECTRIC CHARACTERISTICS

- Magnetic flux density vs. Input voltage
  
  ![Graph of Magnetic flux density vs. Input voltage](image)

- Magnetic flux density vs. Ambient temp.
  
  ![Graph of Magnetic flux density vs. Ambient temp.](image)

- Current consumption vs. Input voltage
  
  ![Graph of Current consumption vs. Input voltage](image)

- Current consumption vs. Ambient temp.
  
  ![Graph of Current consumption vs. Ambient temp.](image)

- Sampling period vs. Input voltage
  
  ![Graph of Sampling period vs. Input voltage](image)

- Sampling period vs. Ambient temp.
  
  ![Graph of Sampling period vs. Ambient temp.](image)
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Rev. E13-01

HMX3033H Series

PACKAGE DIMENSIONS (SOT-23)

(Unit : mm)

Recommended land pattern

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TAPING AND LOADING SPECIFICATIONS (SOT-23)

(Unit: mm)

REEL DIMENSIONS (SOT-23)

(Unit: mm)
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AnaSem Logo and Brand Name (Black color Logo)

Other specific customized Labels

Our internal Outgoing Check Code 3

Our Internal QR Check Code 2

Our Internal Product Check Code 1

Genuine labels MUST include our correct contact information as shown