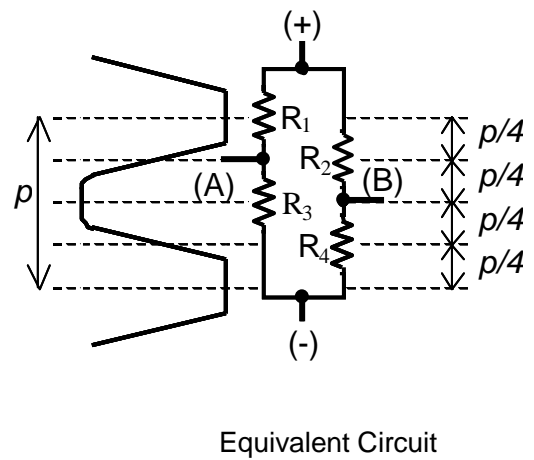
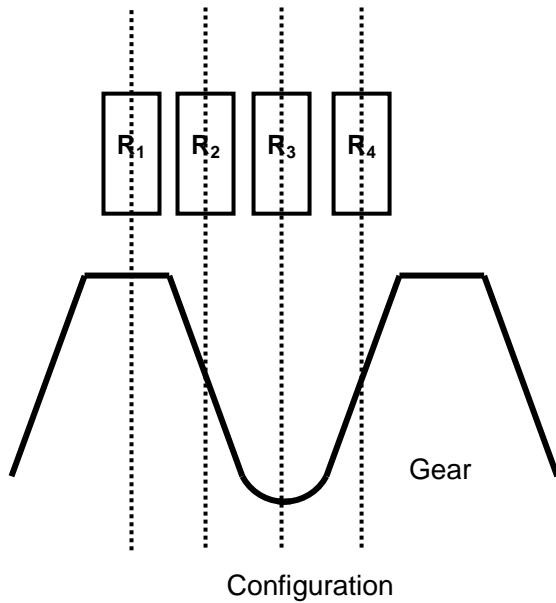


# MS-0050

## Semiconductor Magnetoresistive Element

### Semiconductor Magnetoresistive Element Composition

MS-0050 is used as rotation sensor for gear (module:  $m=0.5$ ), combining bias magnet.  
 MS-0050 generates A/B phase analog outputs when the gear rotates.



### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Junction Temperature	T <sub>j</sub>	-40	150	°C	
Storage Temperature	T <sub>stg</sub>	-40	150	°C	

WARNING: Operation at or beyond these limits may result in permanent damage to the device.  
 Normal operation is not guaranteed at these extremes.

### Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Temperature	T <sub>a</sub>	-40	-	125	°C	
Max. Input Power	PD	-	-	460	mW	T <sub>a</sub> =25°C

\* AKM assumes no responsibility for the usage beyond the conditions in this data sheet.

**Magnetic & Electrical Characteristics**

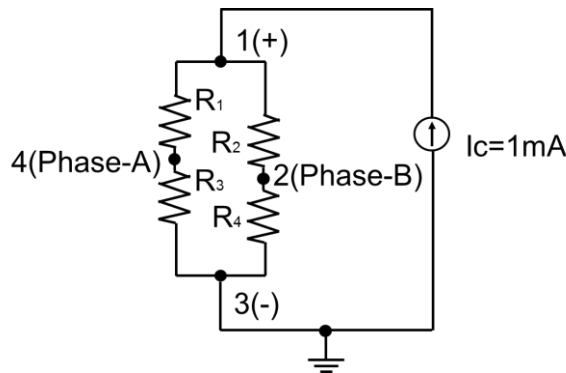
Condition: Ta =25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Input Resistance	Rin(0)	Ic=1mA B=0T	270	-	375	Ω	*1
Output Resistance	Rout(0)	Ic=1mA B=0T	270	-	375	Ω	*1
Input Resistance Change Ratio	$\Delta R_{in}/R_{in}$	Ic=1mA B=0/0.45T	130	-	-	%	*2
Output Resistance Change Ratio	$\Delta R_{out}/R_{out}$	Ic=1mA B=0/0.45T	130	-	-	%	*2
Phase-A Voltage	V <sub>A</sub> (0)	V <sub>c</sub> =5V, B=0T	2.46	-	2.54	V	*3
Phase-B Voltage	V <sub>B</sub> (0)	V <sub>c</sub> =5V, B=0T	2.46	-	2.54	V	*3
Phase-A Voltage	V <sub>A</sub> (B)	V <sub>c</sub> =5V, B=0.45T	2.46	-	2.54	V	*4
Phase-B Voltage	V <sub>B</sub> (B)	V <sub>c</sub> =5V, B=0.45T	2.46	-	2.54	V	*4

(1T=10kGauss)

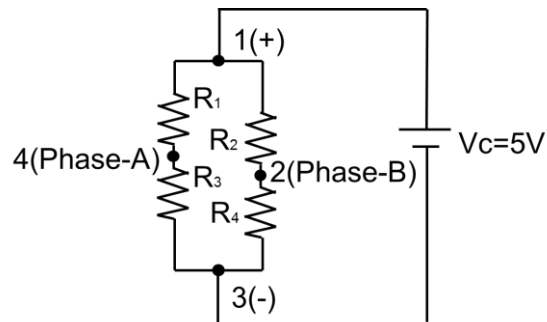
\*1 Rin(0): Resistance between 1pin(+) and 3pin(-) in B=0T  
 Rout(0): Resistance between 4pin(A) and 2pin(B) in B=0T

\*2  $\Delta R_{in}/R_{in} = (R_{in}(B)-R_{in}(0))/R_{in}(0)$  Rin(B): B=0.45T  
 $\Delta R_{out}/R_{out} = (R_{out}(B)-R_{out}(0))/R_{out}(0)$  Rout(B): B=0.45T



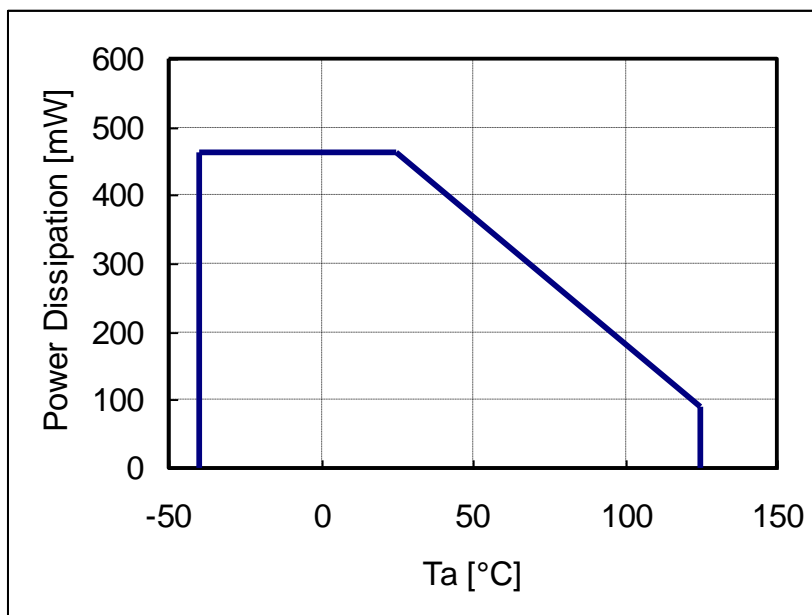
Measurement circuit of Rin(0)、Rout(0)、 $\Delta R_{in}/R_{in}$ 、 $\Delta R_{out}/R_{out}$

- \*3  $V_A(0)$ : The voltage at 4pin  
 $V_B(0)$ : The voltage at 2pin  
 <Measurement conditions>  
 1.  $V_C=5V$  between 1pin and 3pin  
 2.  $B=0T$
- \*4  $V_A(B)$ : The voltage at 4pin  
 $V_B(B)$ : The voltage at 2pin  
 <Measurement conditions>  
 1.  $V_C=5V$  between 1pin and 3pin  
 2.  $B=0.45T$



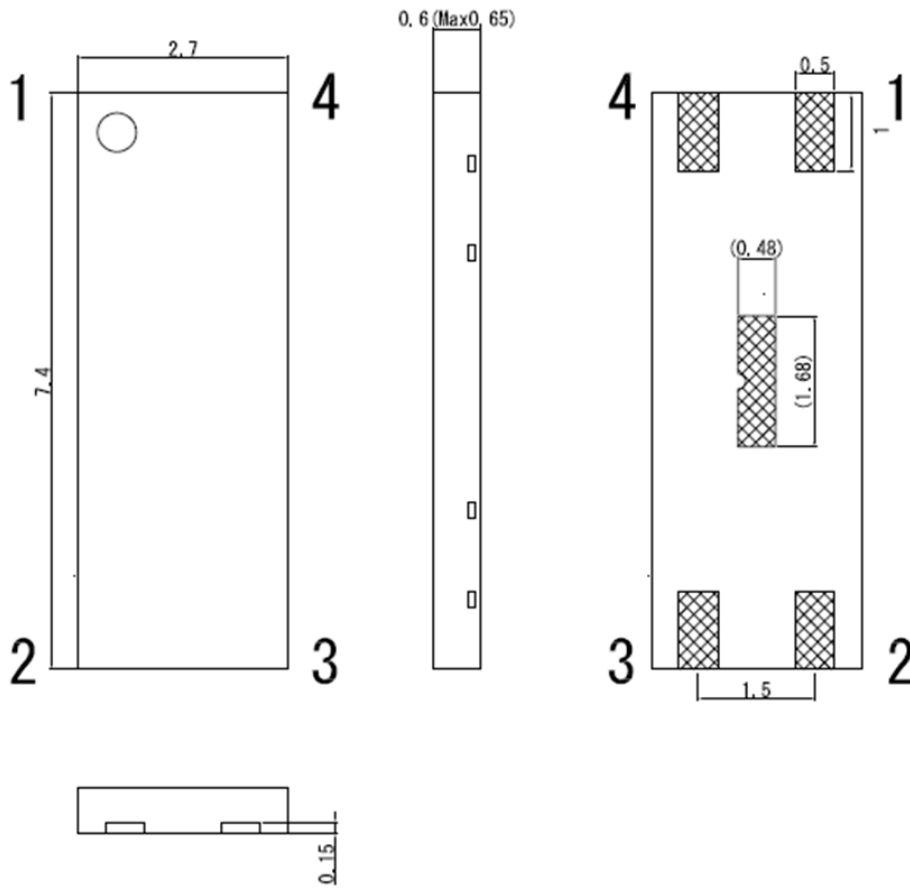
Measurement circuit of  $V_A(0)$ ,  $V_B(0)$ ,  $V_A(B)$ ,  $V_B(B)$

## Power Dissipation



**Package Information**

Dimensional Outline Drawing



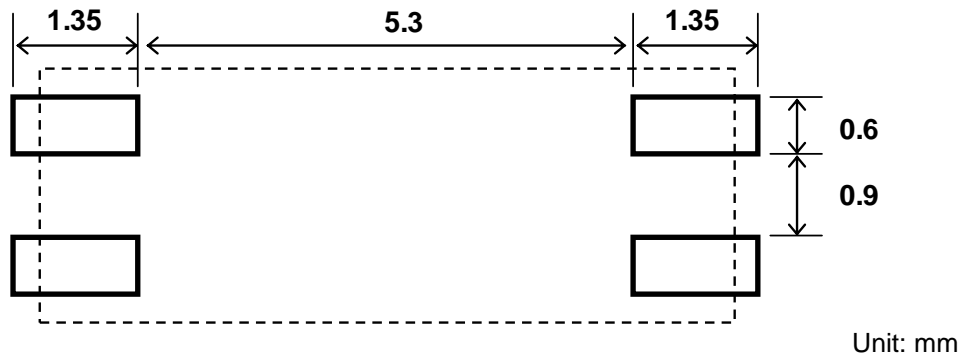
Unit: mm

Material of terminals: Copper alloy  
 Material of plating: Sn 100%  
 \*Halogen free

\*The tolerance of dimensions with no mention is  $\pm 0.1$ mm.

Note) The metal portions on the package side (support lead) and the center metal area (1.68mm $\times$ 0.48mm) behind the package are connected to the internal circuits. The support lead and the metal area should be isolated from the external circuit and the other support lead.

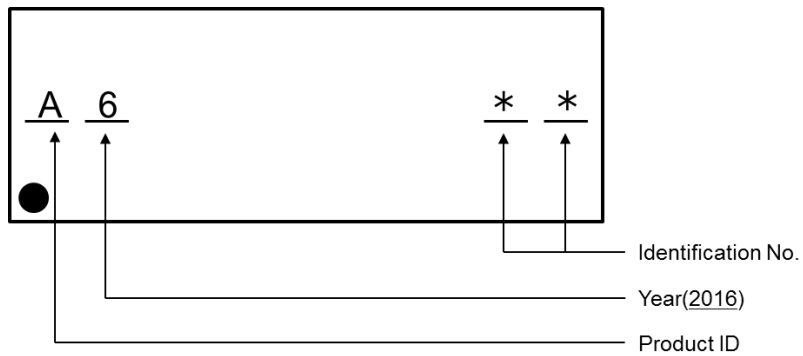
**Recommended Land Pattern (reference)**



**Marking**

Marking is performed by laser.

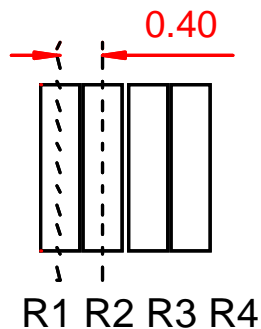
Ex.)



Mark	Product ID	Mark	Corresponding Year
1		0	2020
2		1	2021
3		2	2022
4		3	2023
5		4	2024
6		5	2025
7		6	2016
8		7	2017
9		8	2018
0		9	2019
A	MS-0050		

**Sensor Arrangement (reference)**

Unit: mm



**RoHS Compliance**

MS-0050 is compliant with RoHS Directive 2002/95/EC.

**Reliability Test**

No.	Parameter	Test Condition	n	Time	Criteria (Ta=25°C)
1	Temperature Humidity Storage	Ta=85°C Relative Humidity=85%	22	1000hr	1. Rin(0) and Rout(0) are within +/-20% of initial value. 2. VA(0),VB(0),VA(B) and VB(B) are 2.50V +/-0.06V. 3. ΔR/R is over 130%
2	Operating Life Test	Ta=125°C, Vc=4.4V	22	1000hr	Same as the above
3	High Temperature Storage	Ta=150°C	22	1000hr	Same as the above
4	Heat Cycle	-65°C →150°C 30min.← 30min.	22	100Cycle	Same as the above

**Revision History**

Date (Y/M/D)	Revision	Reason	Page	Contents
17/Feb./23	00	First Edition		
17/Jun./21	01	Second Edition	5	Marking production month and lot number changed to private.

**IMPORTANT NOTICE**

0. Asahi Kasei Microdevices Corporation (“AKM”) reserves the right to make changes to the information contained in this document without notice. When you consider any use or application of AKM product stipulated in this document (“Product”), please make inquiries the sales office of AKM or authorized distributors as to current status of the Products.
1. All information included in this document are provided only to illustrate the operation and application examples of AKM Products. AKM neither makes warranties or representations with respect to the accuracy or completeness of the information contained in this document nor grants any license to any intellectual property rights or any other rights of AKM or any third party with respect to the information in this document. You are fully responsible for use of such information contained in this document in your product design or applications. **AKM ASSUMES NO LIABILITY FOR ANY LOSSES INCURRED BY YOU OR THIRD PARTIES ARISING FROM THE USE OF SUCH INFORMATION IN YOUR PRODUCT DESIGN OR APPLICATIONS.**
2. The Product is neither intended nor warranted for use in equipment or systems that require extraordinarily high levels of quality and/or reliability and/or a malfunction or failure of which may cause loss of human life, bodily injury, serious property damage or serious public impact, including but not limited to, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, devices related to electric power, and equipment used in finance-related fields. Do not use Product for the above use unless specifically agreed by AKM in writing.
3. Though AKM works continually to improve the Product’s quality and reliability, you are responsible for complying with safety standards and for providing adequate designs and safeguards for your hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of the Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption.
4. Do not use or otherwise make available the Product or related technology or any information contained in this document for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). When exporting the Products or related technology or any information contained in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. The Products and related technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
5. Please contact AKM sales representative for details as to environmental matters such as the RoHS compatibility of the Product. Please use the Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. AKM assumes no liability for damages or losses occurring as a result of noncompliance with applicable laws and regulations.
6. Resale of the Product with provisions different from the statement and/or technical features set forth in this document shall immediately void any warranty granted by AKM for the Product and shall not create or extend in any manner whatsoever, any liability of AKM.
7. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of AKM.