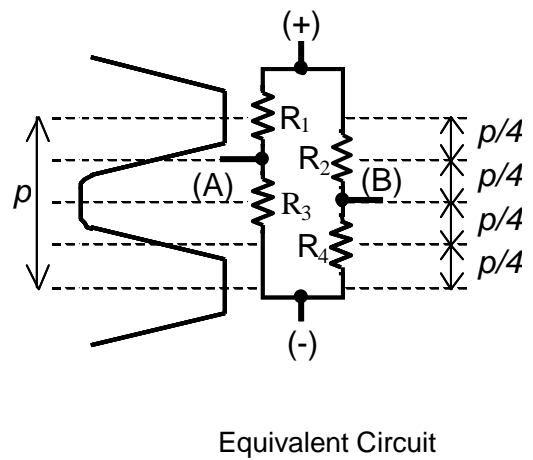
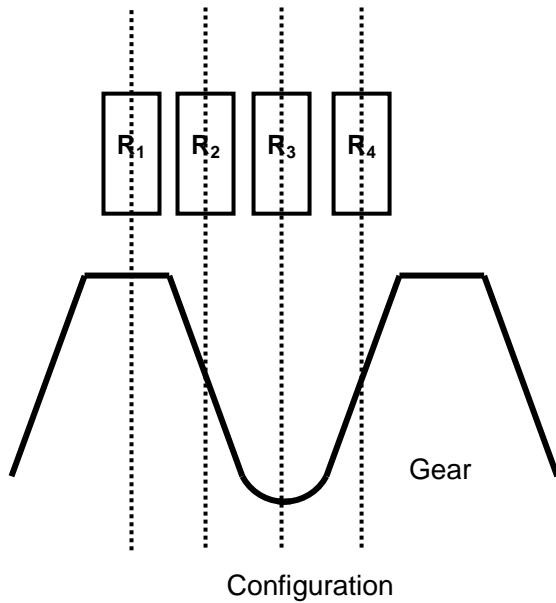


# MS-0050

## 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**

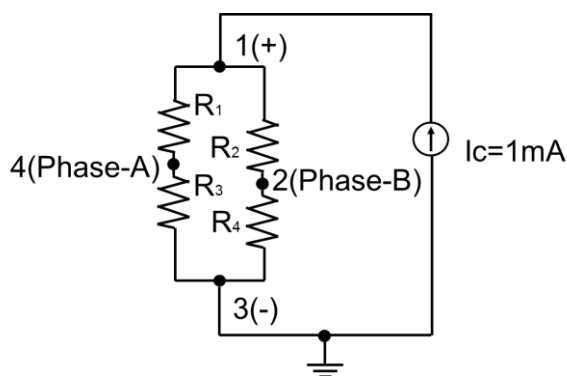
Condition: Ta =25°C

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)

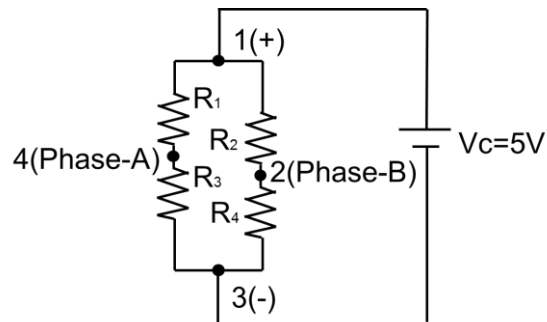
\*1 Rin(0): Resistance between 1pin(+) and 3pin(-) in B=0T  
 Rout(0): Resistance between 4pin(A) and 2pin(B) in B=0T

\*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



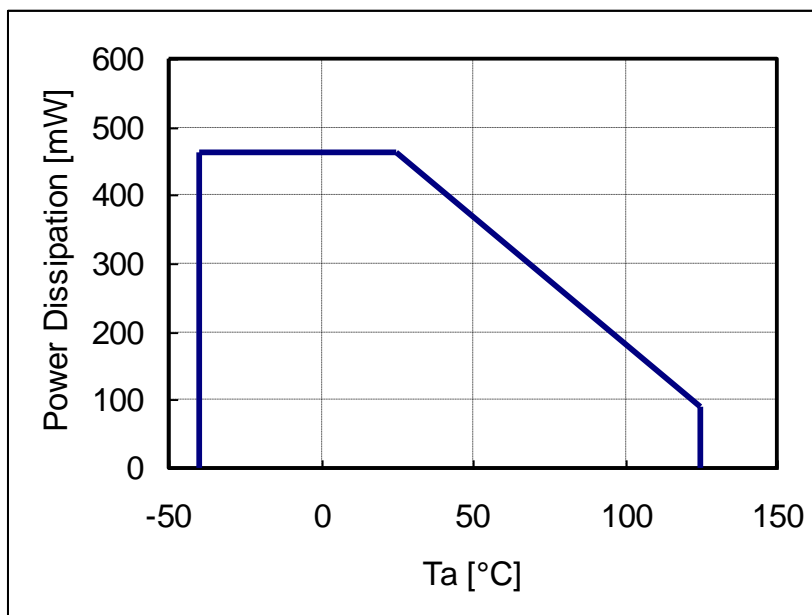
Measurement circuit of Rin(0)、Rout(0)、 $\Delta R_{in}/R_{in}$ 、 $\Delta R_{out}/R_{out}$

- \*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.  $B=0.45T$



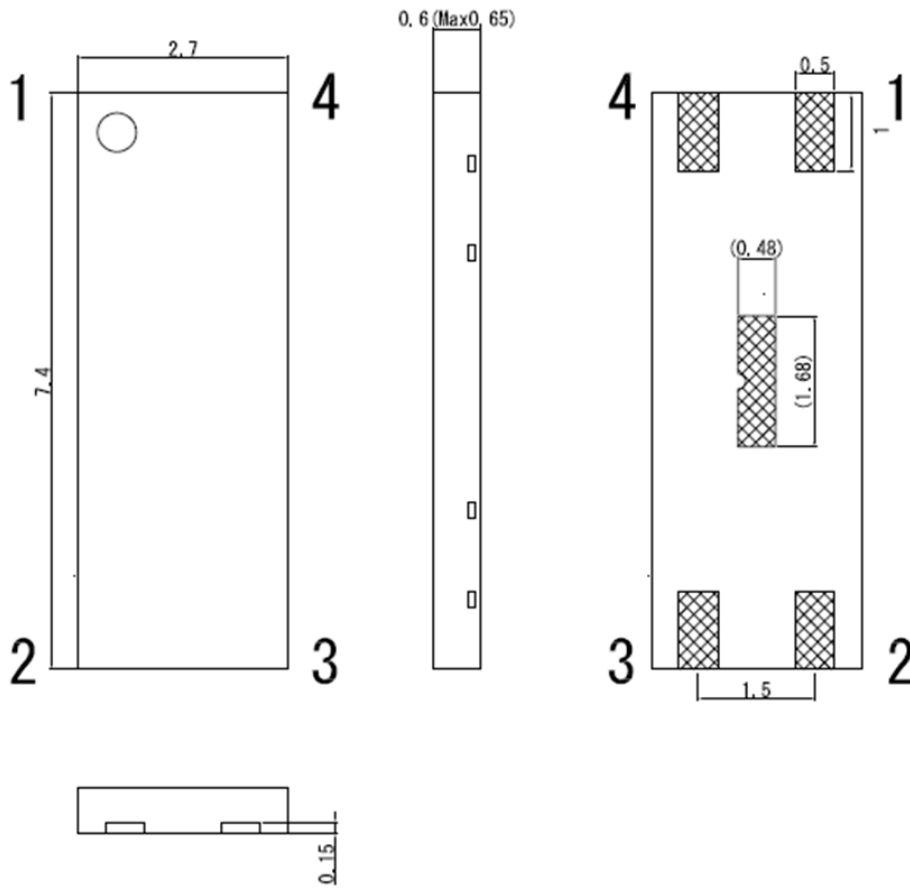
Measurement circuit of  $V_A(0)$ ,  $V_B(0)$ ,  $V_A(B)$ ,  $V_B(B)$

## Power Dissipation



**Package Information**

Dimensional Outline Drawing



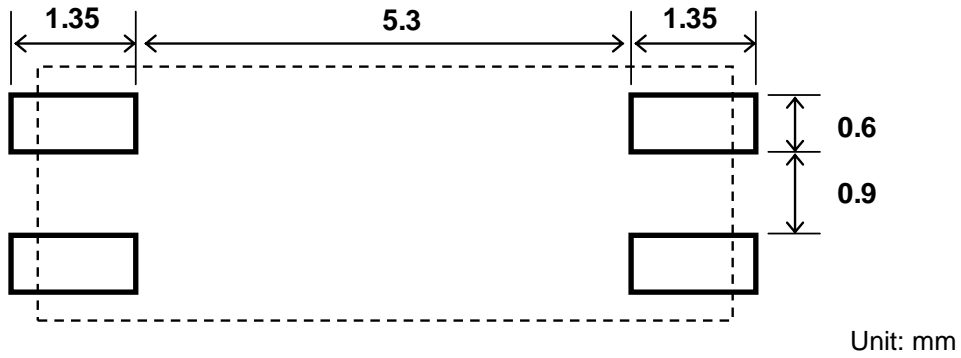
Unit: mm

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.

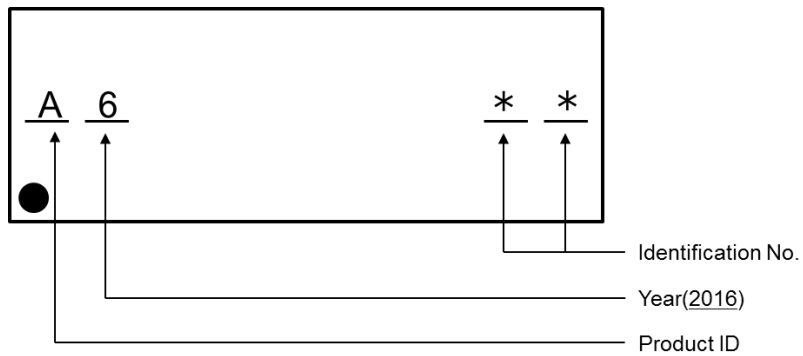
**Recommended Land Pattern (reference)**



**Marking**

Marking is performed by laser.

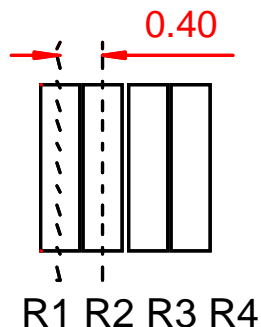
Ex.)



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		

<b>Sensor Arrangement (reference)</b>
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Unit: mm



<b>RoHS Compliance</b>
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MS-0050 is compliant with RoHS Directive 2002/95/EC.

<b>Reliability Test</b>
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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.

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