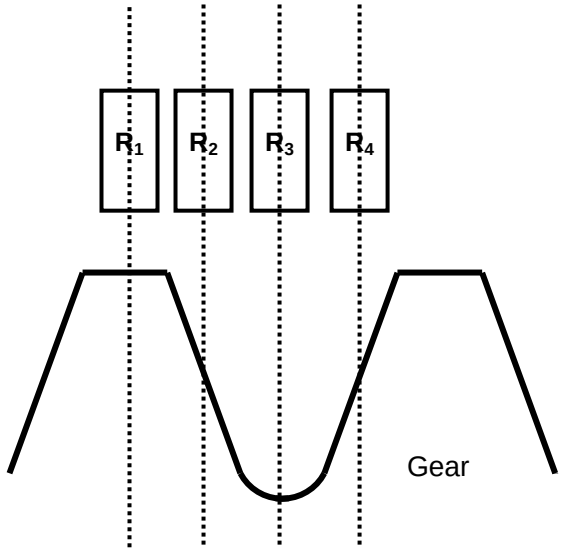
MS-0050

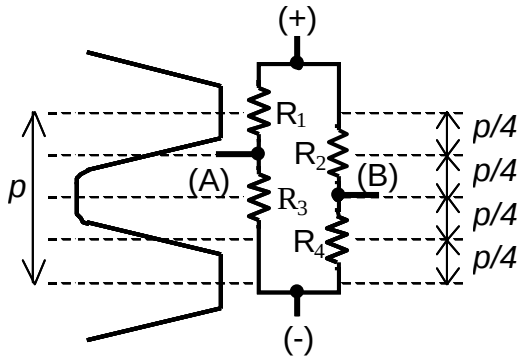
Semiconductor Magnetoresistive Element

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.



Configuration



Equivalent Circuit

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Junction Temperature	Tj	-40	150	°C	
Storage Temperature	Tstg	-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	Ta	-40	-	125	°C	
Max. Input Power	PD	-	-	460	mW	Ta=25°C

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

Magnetic & Electrical Characteristics

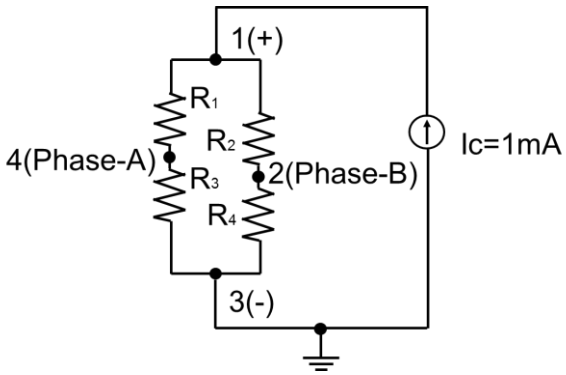
Condition: Ta =25°C

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	ΔRin /Rin	Ic=1mA B=0/0.45T	130	-	-	%	*2
Output Resistance Change Ratio	ΔRout /Rout	Ic=1mA B=0/0.45T	130	-	-	%	*2
Phase-A Voltage	$V_A(0)$	Vc=5V, B=0T	2.46	-	2.54	V	*3
Phase-B Voltage	$V_B(0)$	Vc=5V, B=0T	2.46	-	2.54	V	*3
Phase-A Voltage	$V_A(B)$	Vc=5V, B=0.45T	2.46	-	2.54	V	*4
Phase-B Voltage	$V_B(B)$	Vc=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

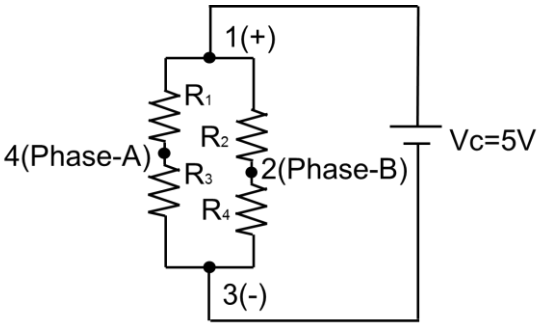
*2 ΔRin/Rin = (Rin(B)-Rin(0))/Rin(0) Rin(B)：B=0.45T
ΔRout/Rout = (Rout(B)-Rout(0))/Rout(0) Rout(B)：B=0.45T



Measurement circuit of Rin(0)、Rout(0)、ΔRin/Rin、ΔRout/Rout

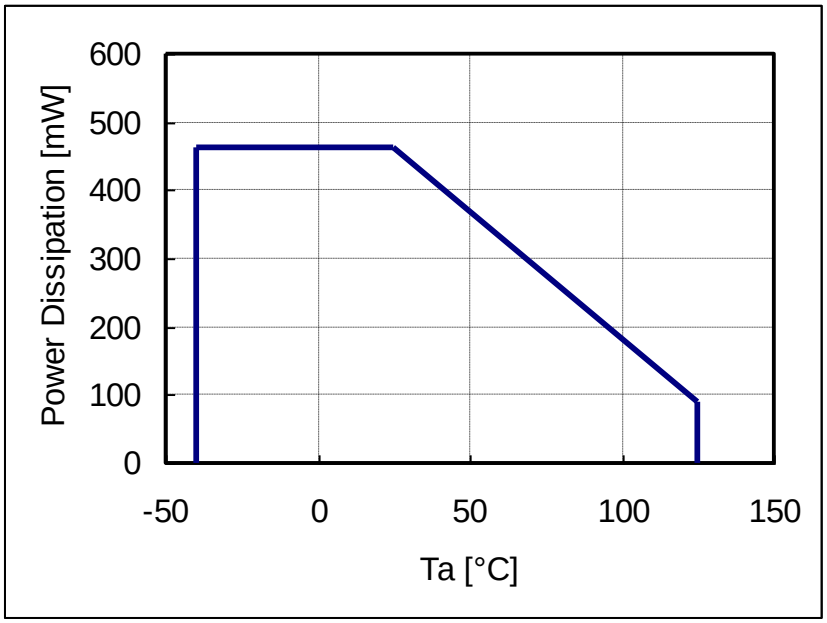
*3 $V_A(0)$: The voltage at 4pin
$V_B(0)$: The voltage at 2pin
<Measurement conditions>
1. Vc=5V between 1pin and 3pin
2. B=0T

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



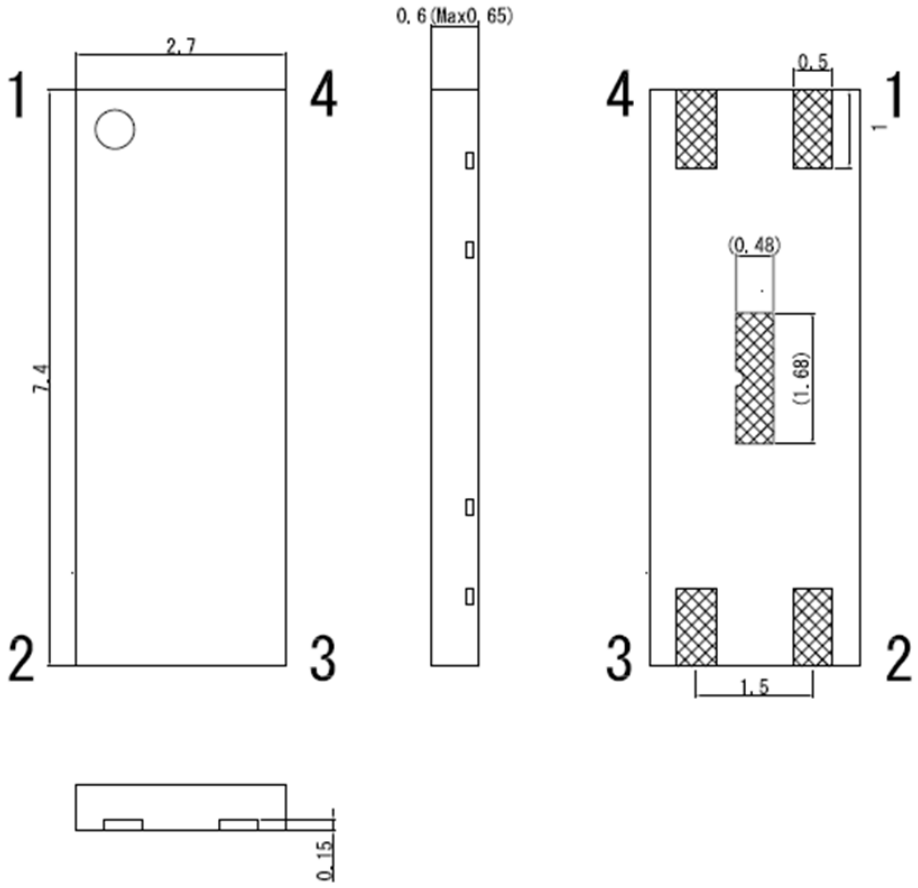
Measurement circuit of $V_A(0)$, $V_B(0)$, $V_A(B)$, $V_B(B)$

Power Dissipation



Package Information

Dimensional Outline Drawing



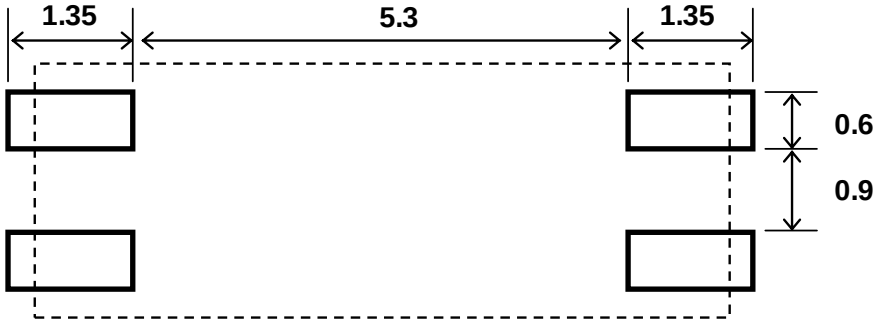
Unit: mm

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

*The tolerance of dimensions with no mention is ±0.1mm.

Note) The metal portions on the package side (support lead) and the center metal area (1.68mm×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)

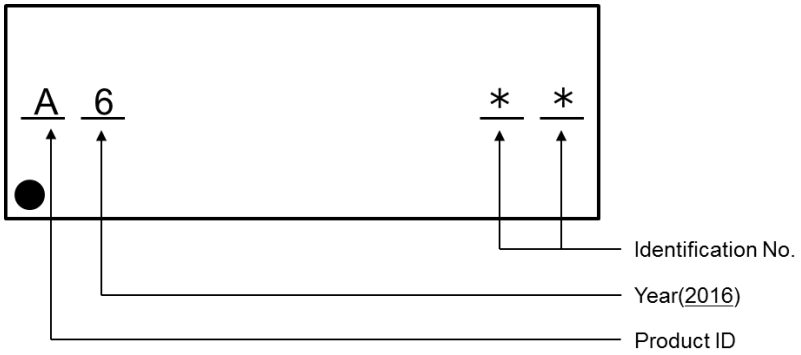


Unit: mm

Marking

Marking is performed by laser.

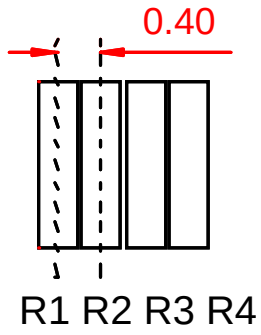
Ex.)



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. $V_A(0)$,$V_B(0)$,$V_A(B)$ and $V_B(B)$ 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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