

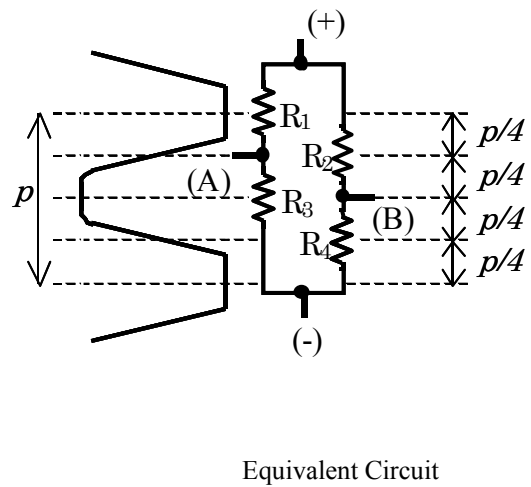
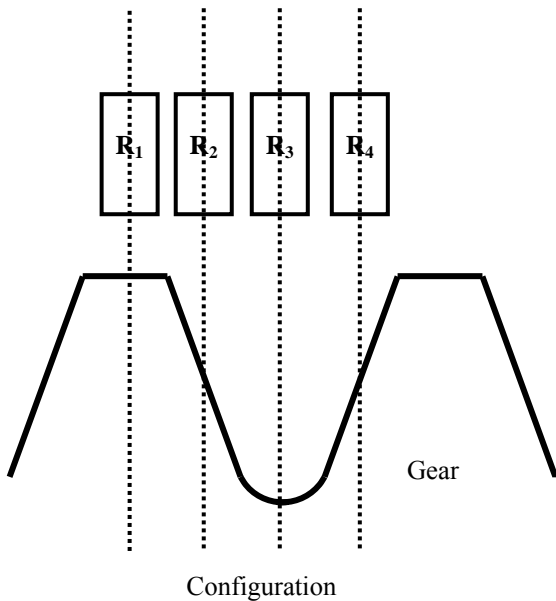
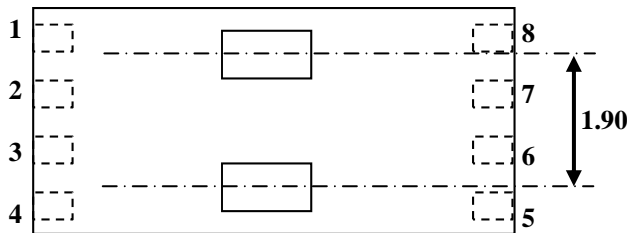


# MS-0042

## Semiconductor Magnetoresistive Element

### Semiconductor Magnetoresistive Element Composition

MS-0042 is used as rotation sensor for gear (module: M=0.4), combining bias magnet.  
 MS-0042 generates A/B phase and Za/Zb phase analog outputs, rotating the gear. (MS-0042 includes 2 sensor chips in 1 package for A/B phase and Za/Zb phase.)  
 The pitch between one sensor and the other is 1.90mm.



### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Junction Temperature	Tj	-40	150	°C	
Storage Temperature	Tstg	-40	150	°C	

Note) Stresses beyond these listed values may cause permanent damage to the device.

## Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Max. Input Power	PD			490	mW	Ta=25°C
Operating Temperature	Topr	-40		125	°C	

Note) Stresses beyond these listed values may cause permanent damage to the device.

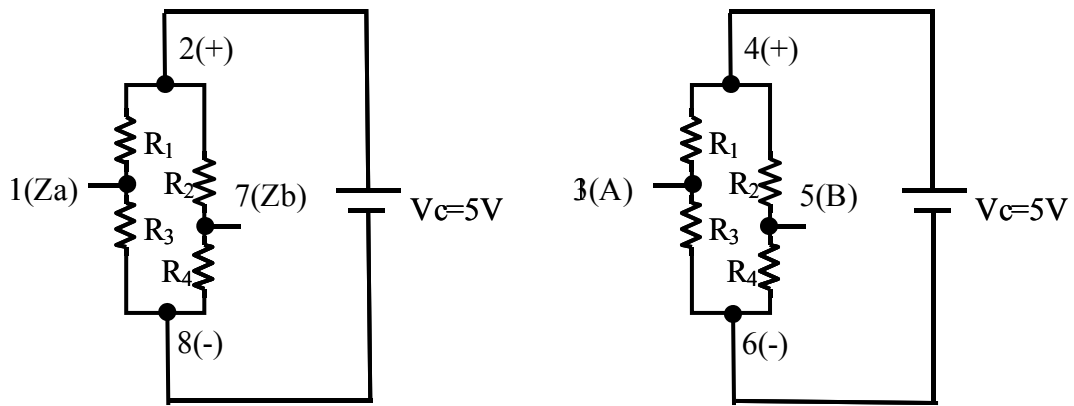
## Magnetic & Electrical Characteristics

Ta=25°C

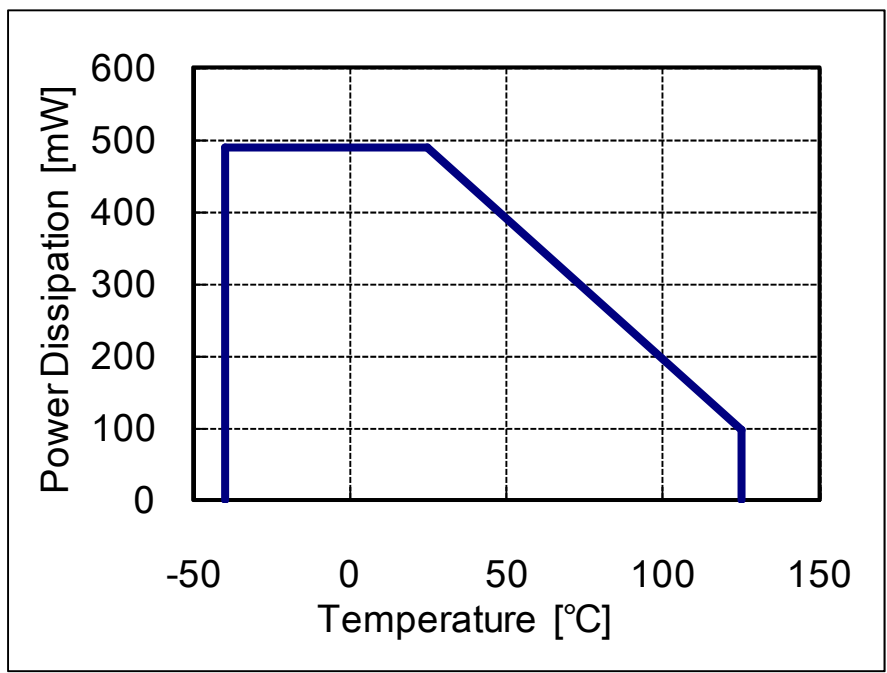
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Input Resistance	Rin(0)	Ic=1mA B=0T	290		420	Ω	*1
Output Resistance	Rout(0)	Ic=1mA B=0T	290		420	Ω	*1
Input Resistance Change Ratio	$\Delta R_{in}/R_{in}$	Ic=1mA B=0/0.45T	130			%	*2
Output Resistance Change Ratio	$\Delta R_{out}/R_{out}$	Ic=1mA B=0/0.45T	130				
Phase-A Voltage	V <sub>A</sub> (0)	Vc=5V, B=0T	2.46	2.50	2.54	V	*3
Phase-B Voltage	V <sub>B</sub> (0)	Vc=5V, B=0T	2.46	2.50	2.54	V	*3
Phase-A Voltage	V <sub>A</sub> (B)	Vc=5V, B=0T	2.46	2.50	2.54	V	*4
Phase-B Voltage	V <sub>B</sub> (B)	Vc=5V, B=0T	2.46	2.50	2.54	V	*4

(1T=10kGauss)

- \*1 Rin(0): Resistance between 2pin(+) and 8pin(-) in B=0T and  
Resistance between 4pin(+) and 6pin(-) in B=0T  
Rout(0): Resistance between 1pin(Za) and 7pin(Zb) in B=0T and  
Resistance between 3pin(A) and 5pin(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
- \*3 V<sub>A</sub>(0): Output Voltage of 1pin(Za) with Vc=5V and B=0T and  
Output Voltage of 3pin(A) with Vc=5V and B=0T  
V<sub>B</sub>(0): Output Voltage of 7pin(Zb) with Vc=5V and B=0T and  
Output Voltage of 5pin(B) with Vc=5V and B=0T
- \*4 V<sub>A</sub>(B): Output Voltage of 1pin(Za) with Vc=5V and B=0.45T and  
Output Voltage of 3pin(A) with Vc=5V and B=0.45T  
V<sub>B</sub>(B): Output Voltage of 7pin(Zb) with Vc=5V and B=0.45T and  
Output Voltage of 5pin(B) with Vc=5V and B=0.45T



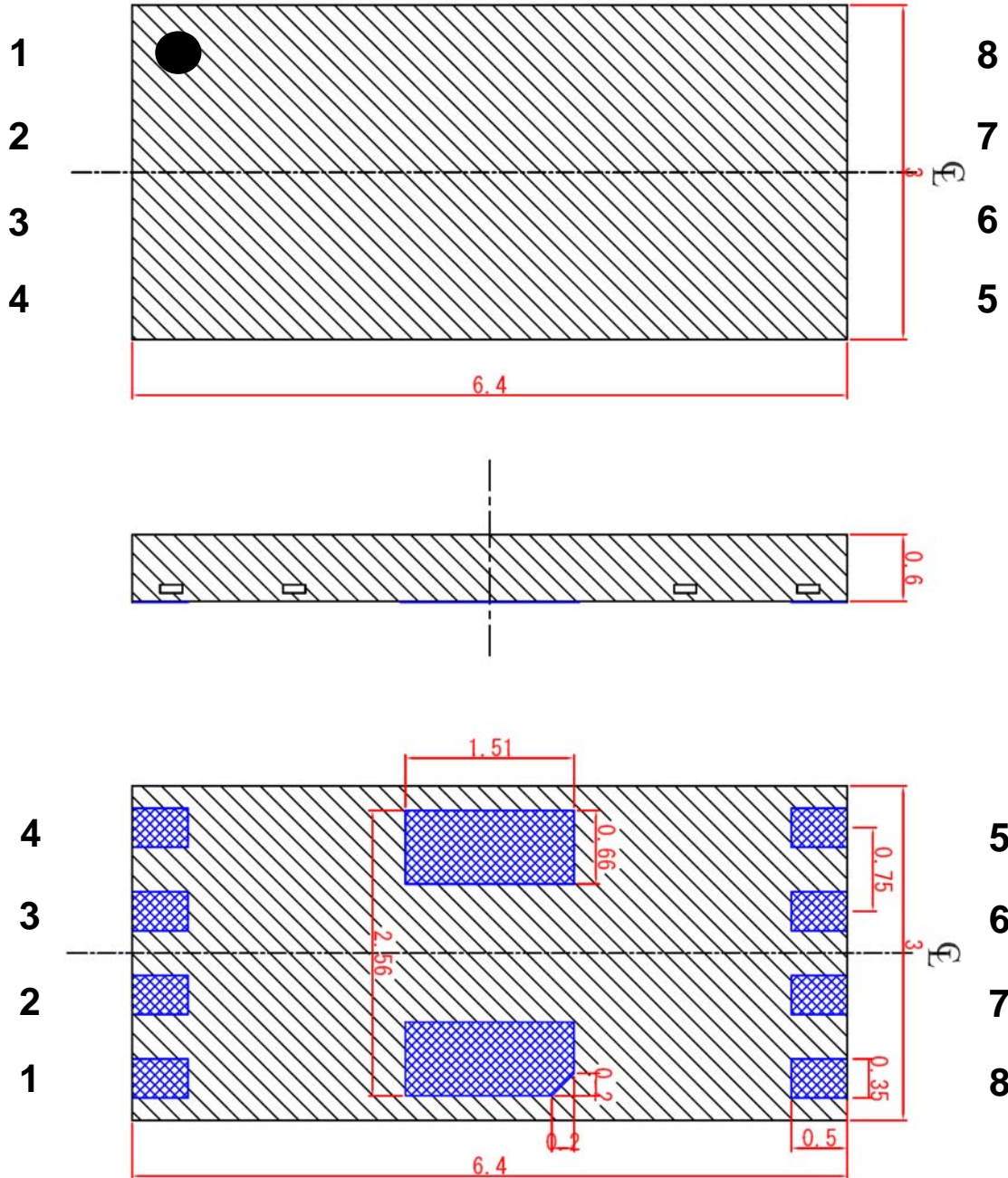
**Power Dissipation**



Power dissipation shows the power dissipation of 2 SMRE chips.

**Package Information**

□ Dimensional Outline Drawing (Unit:mm)



\*The tolerances of dimensions with no mentions is  $\pm 0.1$ mm

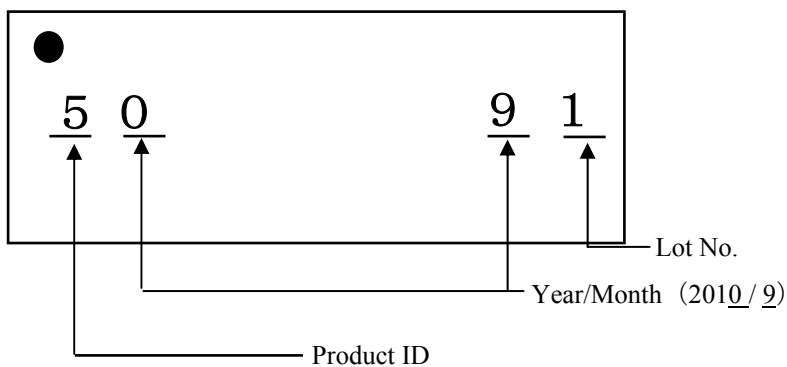
<b>Reliability Test</b>
-------------------------

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. ΔRin/Rin and ΔRout/Rout are over 130%
2	Operating Life Test	Ta=125°C (Vc:3.2V...Tj=150°C )	22	1000hr	Same as the Above
3	High Temperature Storage	Ta=150°C	22	1000hr	Same as the Above
4	Heat Cycle	-55°C → 25°C → 150°C 30min.← 5min.← 30min.	22	100Cycle	Same as the Above

**Marking**

Marking is performed by laser.

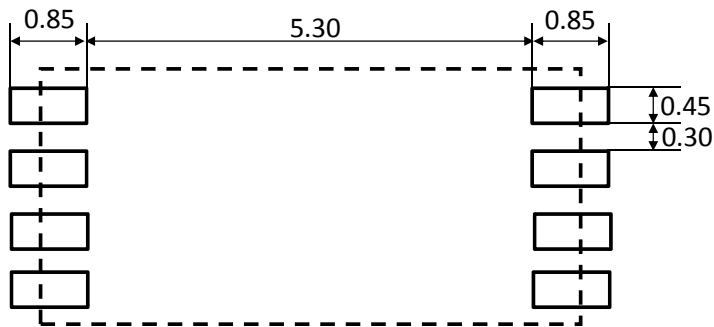
Ex.)



Product Distinction No		Year		Month	
Mark	Product ID	Mark	Corresponding YR.	Mark	Corresponding Mo.
1		0~9	The end figure of the Christian era	1	January
2				2	February
3				3	March
4				4	April
5	MS-0042			5	May
6				6	June
7				7	July
8				8	August
9				9	September
0				0	October
				A	November
				B	December

**Land Pattern (reference)**

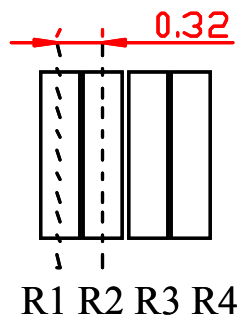
Unit: mm



\*The center island is not be connected.

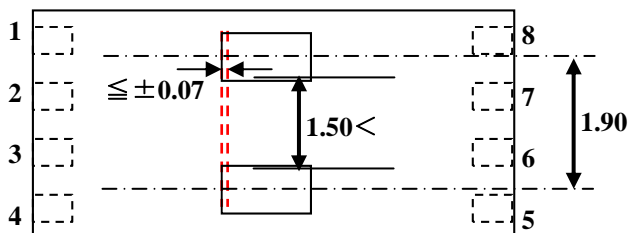
**Sensor Arrangement (reference)**

Unit: mm



**Sensor Configuration (reference)**

Unit: mm



The distance between one sensor and the other is over 1.5mm.  
(This item is not assured, and not tested.)

The relative position error of 2 sensor chips in rotating direction is under 0.07mm.  
(This item is not assured, and not tested.)

## Important Notice

- Descriptions of external circuits, application circuits, software and other related information contained in this document are provided only to illustrate the operation and application examples of the semiconductor products. You are fully responsible for the incorporation of these external circuits, application circuits, software and other related information in the design of your equipments. Asahi Kasei Microdevices Corporation (AKM) assumes no responsibility for any losses incurred by you or third parties arising from the use of these information herein. AKM assumes no liability for infringement of any patent, intellectual property, or other rights in the application or use of such information contained herein.
- Any export of these products, or devices or systems containing them, may require an export license or other official approval under the law and regulations of the country of export pertaining to customs and tariffs, currency exchange, or strategic materials.
- AKM products are neither intended nor authorized for use as critical components<sup>Note1)</sup> in any safety, life support, or other hazard related device or system<sup>Note2)</sup>, and AKM assumes no responsibility for such use, except for the use approved with the express written consent by Representative Director of AKM. As used here:
  - Note1) A critical component is one whose failure to function or perform may reasonably be expected to result, whether directly or indirectly, in the loss of the safety or effectiveness of the device or system containing it, and which must therefore meet very high standards of performance and reliability.
  - Note2) A hazard related device or system is one designed or intended for life support or maintenance of safety or for applications in medicine, aerospace, nuclear energy, or other fields, in which its failure to function or perform may reasonably be expected to result in loss of life or in significant injury or damage to person or property.
- It is the responsibility of the buyer or distributor of AKM products, who distributes, disposes of, or otherwise places the product with a third party, to notify such third party in advance of the above content and conditions, and the buyer or distributor agrees to assume any and all responsibility and liability for and hold AKM harmless from any and all claims arising from the use of said product in the absence of such notification.