

Just Fit For Your Needs

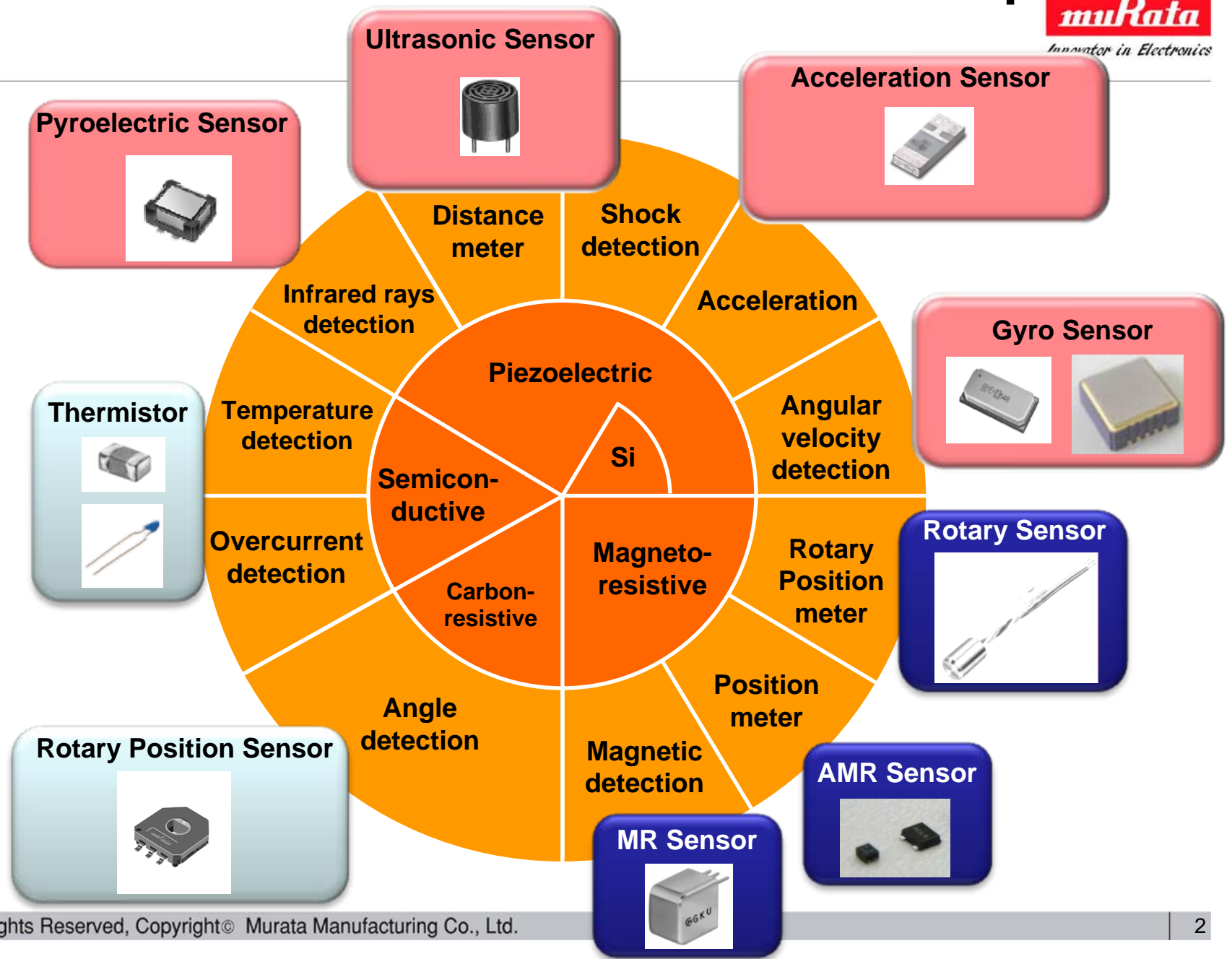
Magnetic switch (AMR sensor) AS series

Murata Manufacturing Co.,Ltd
Product engineering section II
Sensor products department
Sensor products division

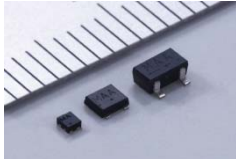
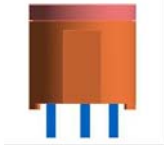




Feb. 2011

Murata's functional materials and sensor products

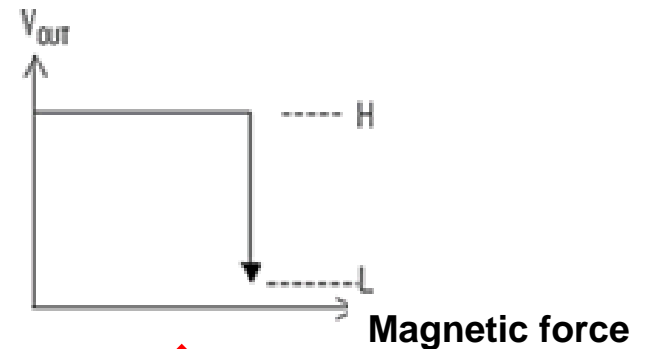
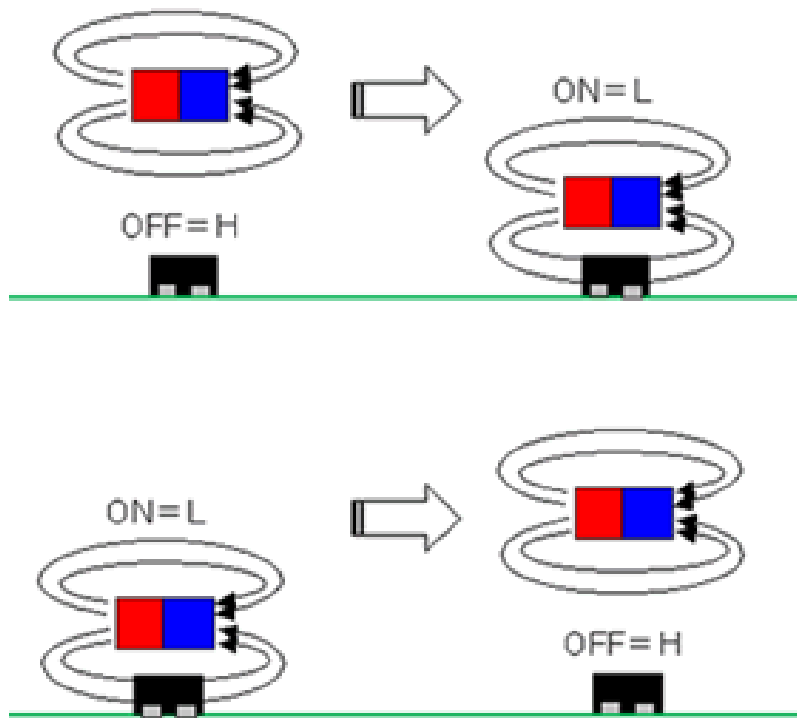


Murata Magnetic Sensor

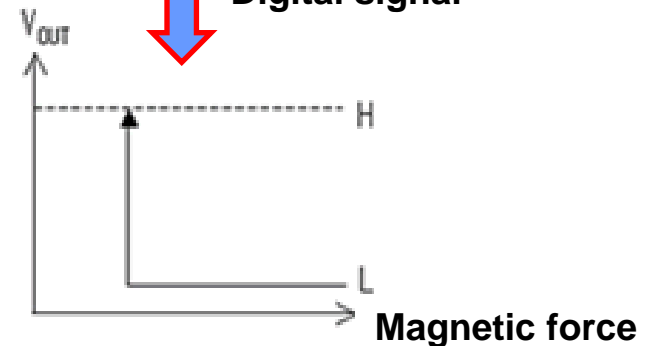
Sensor element	Product	Series	Application	Appearance
AMR	Magnetic switch	AS-M AS-V AS-R	Opening and closing of lids and doors	
	Tilt switch (Under development)	AS-D	Falling detection for white goods (Humidifier, etc.), security,	
MR	Magnetic Pattern Recognition Sensors	BS	ATM, Banking machine	
	Rotation sensor for gear	FR	Factory automation	

As for Magnetic switch

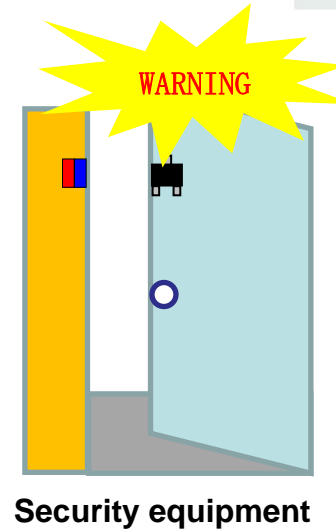
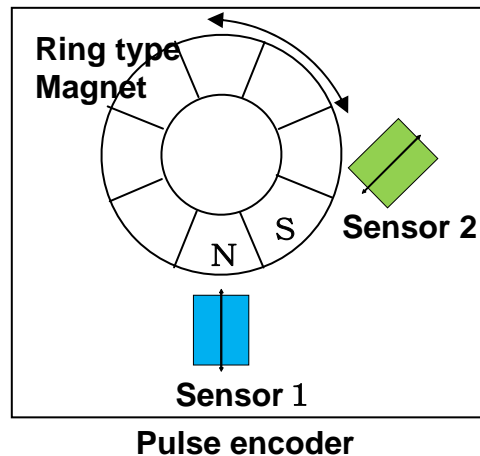
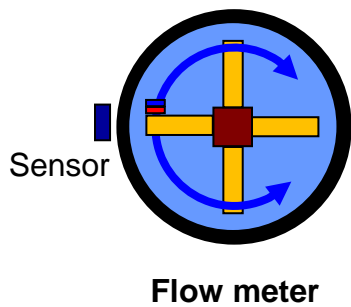
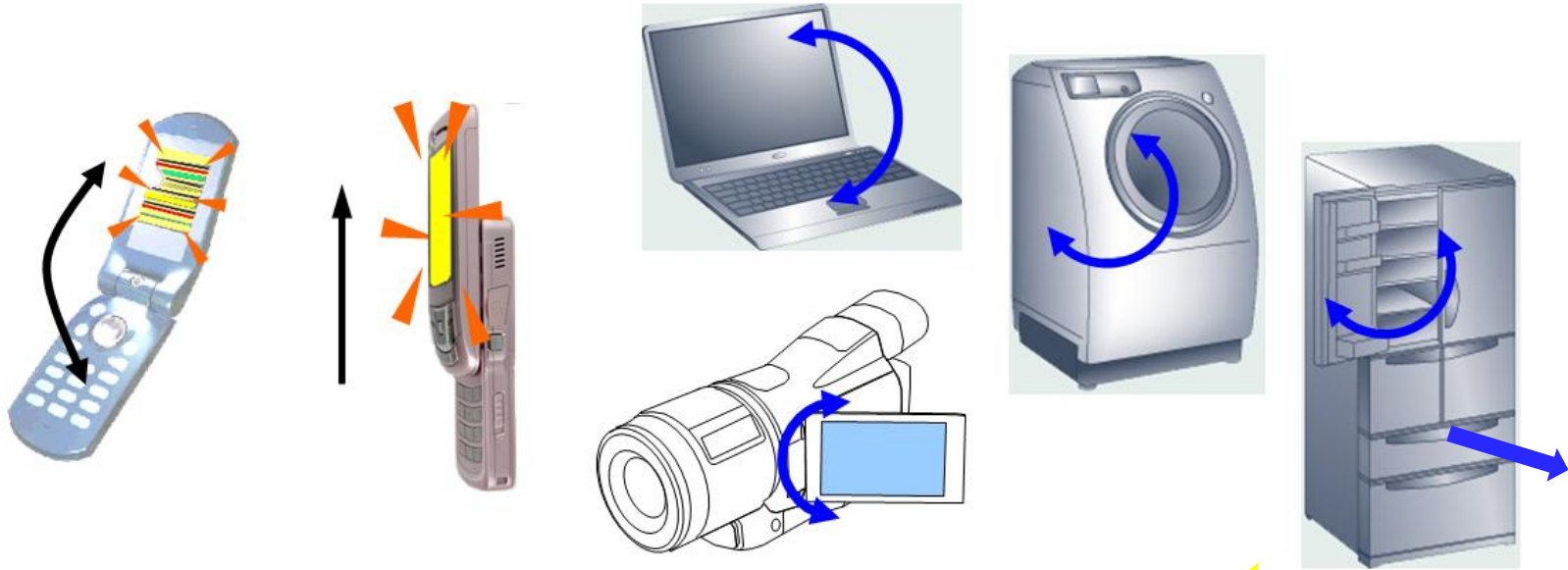
- When the magnet approaches to the sensor and the magnetic flux density exceeds M_{op} , V_{out} changes from H to L. When the magnet leaves and the magnetic flux density decreases below M_{rp} , V_{out} changes from L to H.
- Sensor incorporating both sensor element and IC.
- Open/close detection for mobile phones, note-size PCs and White goods



↕ Digital signal



Target Applications : Magnetic switch



AMR sensor AS series

Suitable for non-contact sensor in combination with a magnet

- Wide variation depending on applications

- Sensing direction of magnetic field

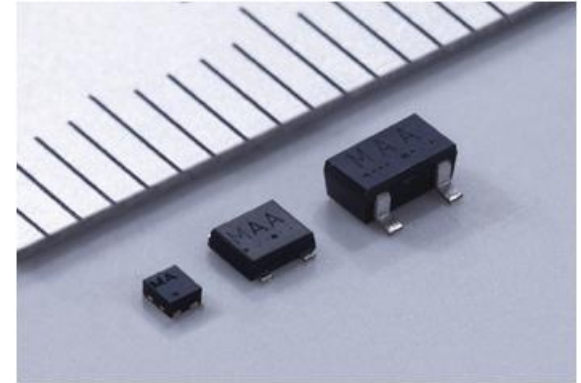
- Vertical direction : AS-V series**

New

- Horizontal direction : AS-M series

- Package type lineup

- High accuracy type



- Feature of AS-M series (compared to Hall IC*)

*Hall IC has become popular as magnetic switch. .

Available at more flexible for design (mount location)

- Our sensor has wide detection area.

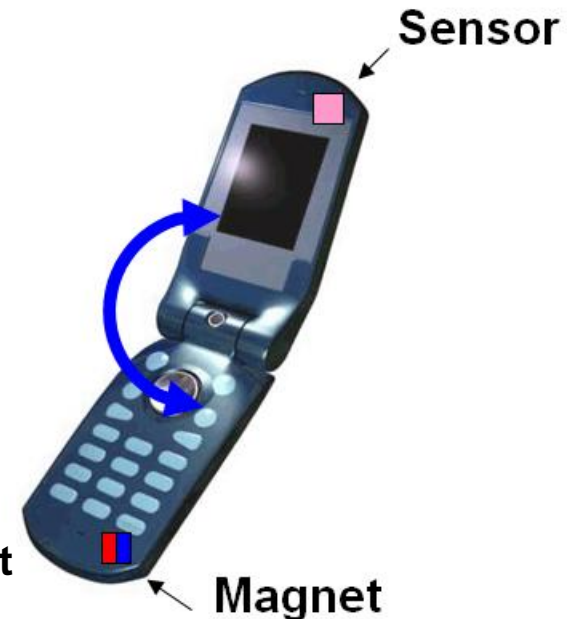
- Feature of AS-V series

Available at same magnet as a Hall IC

- Customers can switch easily.

- Independent of magnetic pole (One output for S or N pole)

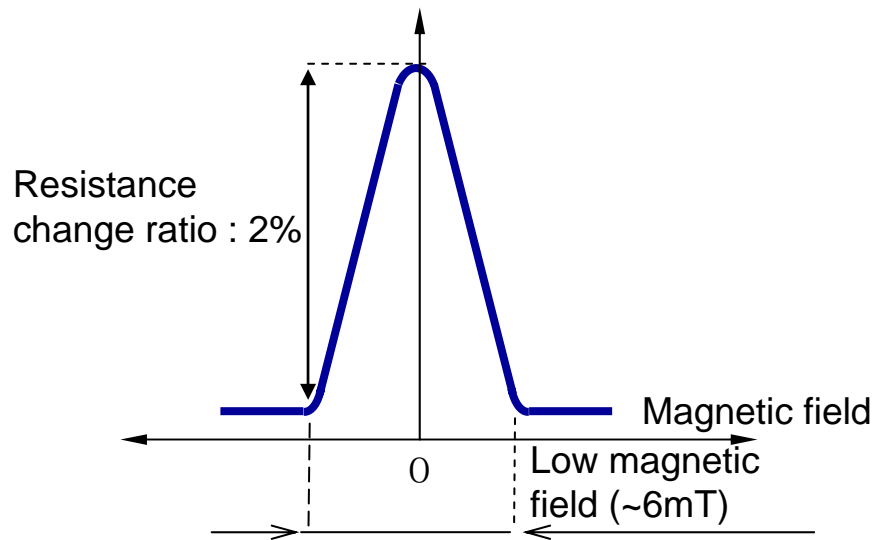
- Available sample magnet and board for initial measurement



Magnetic Sensor Using AMR effect

AMR is a magnetic sensor of high sensitivity in a low magnetic field.

AMR = Anisotropic-Magneto-Resistance



Magnetic field strength
and a resistance rate of change

- ✓ AMR is made of a perm alloy (Fe, Ni) thin film resistor.
- ✓ When a magnetic field applied to AMR, the resistance changes. Resistance change depend on magnetic field strength. (AMR effect)
- ✓ Resistance change is about 2% form initial value in low magnetic field and saturated in the certain level.
- ✓ Resistance change in the magnetic field will cause a change in output voltage.

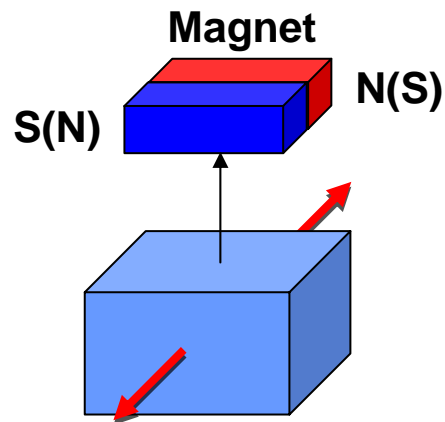
New product

Feature of AS-V series

- Available at same type magnet as a Hall IC by our original process
- Two kinds of packages

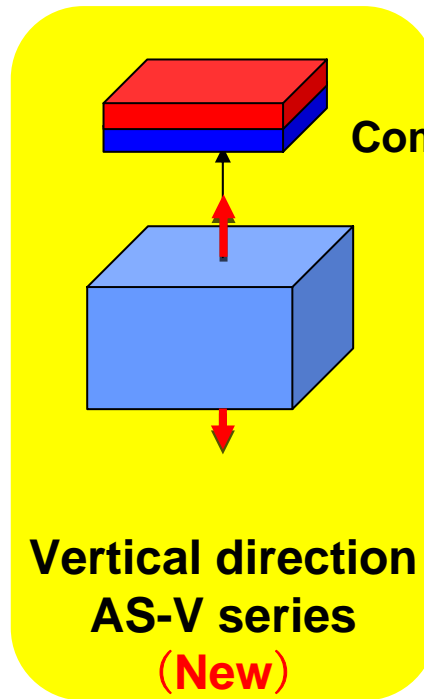
AS-V20TA-R → Land compatibility as SOT23 package

AS-V20NA-R → Land compatibility as SON4 package



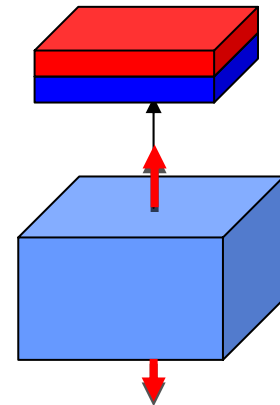
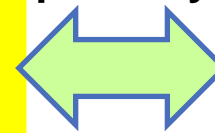
Sensing direction of magnetic field

Horizontal direction
AS-M series



Vertical direction
AS-V series
(New)

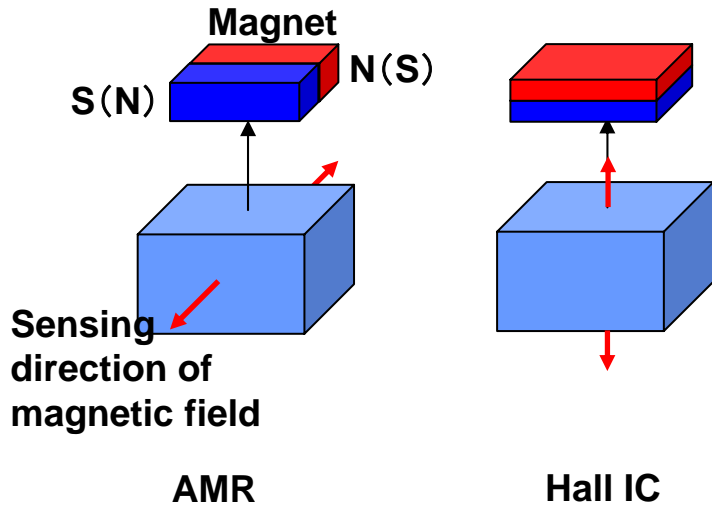
Compatibility *1)



Hall IC

***1) Make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.**

Feature of AS-M series (Compared to Hall IC)

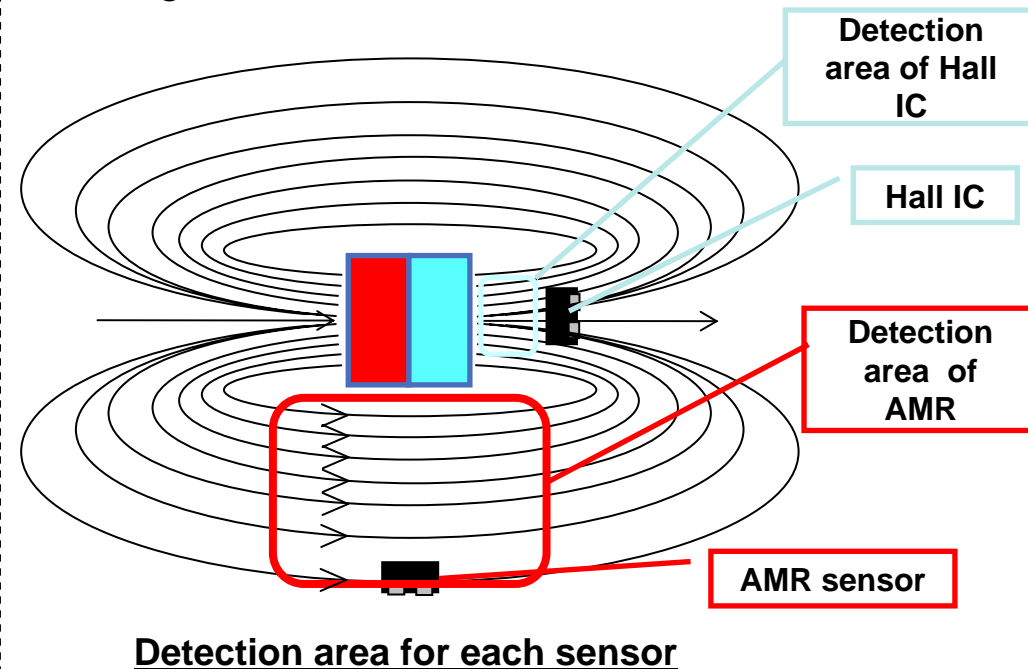


	Hall IC	AMR sensor
Detection direction	Hall effect	Magnetic resistance effect
Sensor Material	Si type InSb type	Ni and Fe
Detection Magnet Field	Vertical	Horizontal
Detection area	Narrow	Wide

<Advantage>

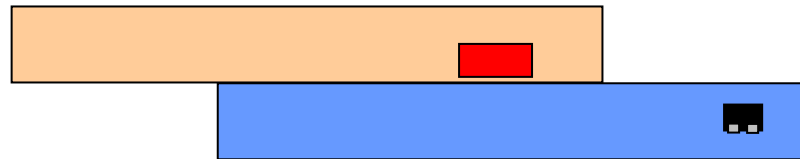
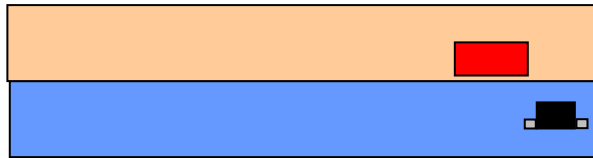
More flexible for design (Mount location)

- AMR sensor has wide detection area because AMR sensor can use wide magnetic field.

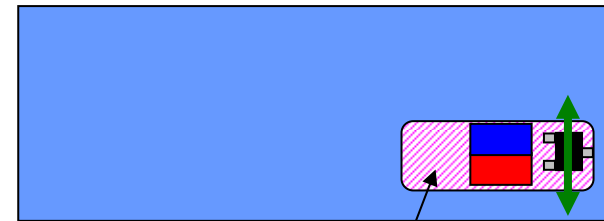


Feature of AS-M series (Wide detection area)

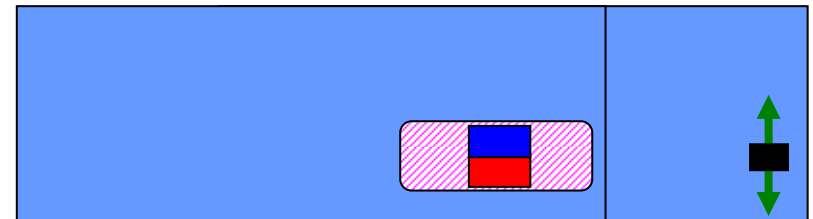
- More flexible for design (Mount location)
 - Our sensor has wide detection area



(Side view)



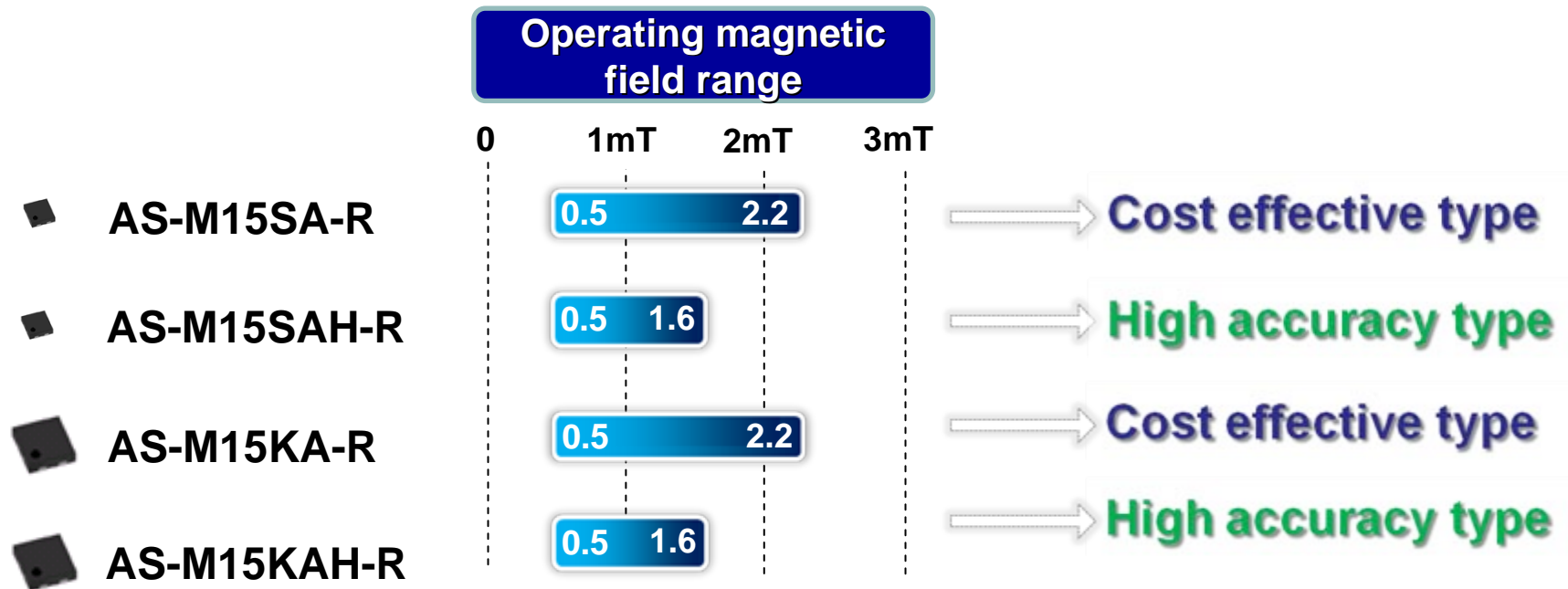
Detection area of AMR



(Top view)

Feature of AS-M series (High accuracy type)

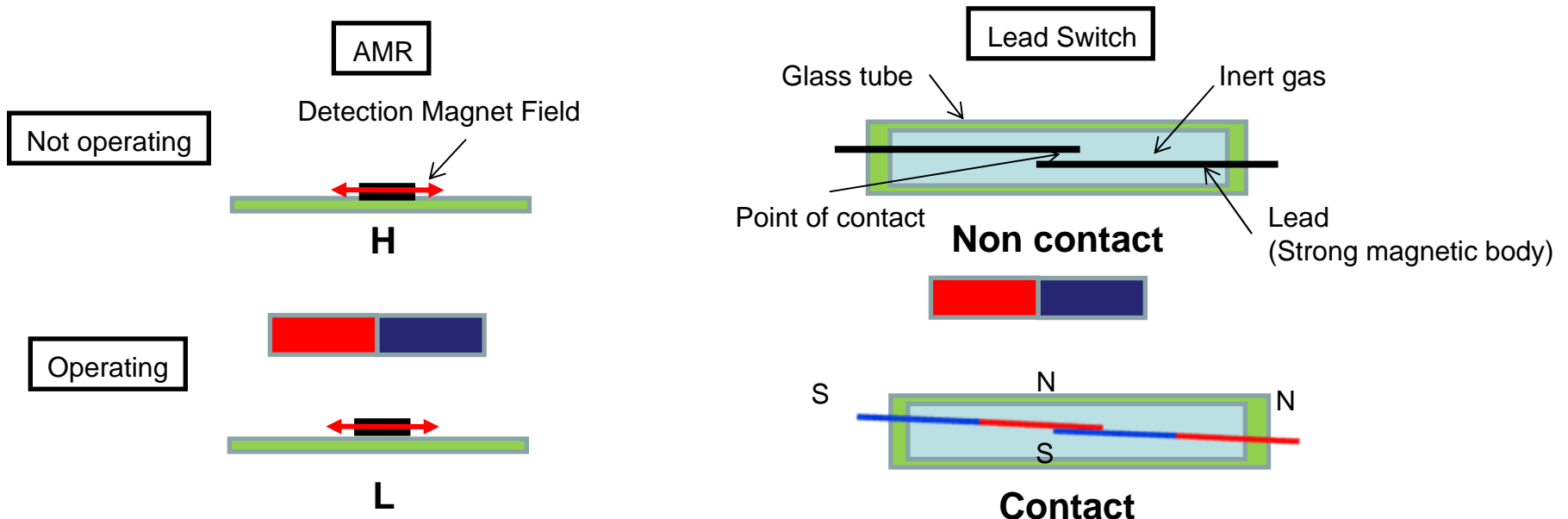
- AS-M15SAH and AS-M15KAH are narrow sensitivity type as shown the below.
- For require precise control of the detection range or area.



Feature of AS-M series (Compared to Reed switch)

Possible for Cost effective and High Robust !

	AMR Sensor	Reed Switch
Price	○	×
Size	Small and Thin	Large
Sensing direction	Horizontal direction	Horizontal direction
Robust (Resistance to mounting)	◎	×
Supply voltage	Available for low supply voltage	Not Available for supply voltage





LINE-UP

Product Line up

Vertical Sensing Direction Type

New



P/N	Sensitivity (mT)	Supply Voltage (V)	Feature	Size (mm)	Product Lifecycle	Recommended Mark	Appearance
AS-V20TA-R	0.8 to 4.0	2.5 to 3.5	Land compatibility as SOT23	2.8×2.9×1.1	in Production	Preferred	
AS-V20NA-R	0.8 to 4.0	2.5 to 5.5	Land compatibility as SON4	2.1×2.0×1.0	in Production	Preferred	

***Product Lifecycle Stage**

in Production: This product is in production or current type.

Phase-Out: This product will phase out in future, then not recommended for new design.

Obsolete: This product is obsolete. Orders are not accepted.

***Recommended Rank**

Preferred: Preferred product.





Semi-Preferred: We have the other preferred products. Contact us for details.

Non-Preferred: Contact us for details.

Subject to change without notice

Product Line up

Horizontal Sensing Direction Type

P/N	Sensitivity (mT)	Supply Voltage (V)	Feature	Size (mm)	Product Lifecycle	Recommended Mark	Appearance
AS-M15SA-R	1.5mT	1.5 to 6.0	Small, Low High	1.2×1.2×0.37	in Production	Preferred	
AS-M15SAH-R	1.5mT	1.5 to 6.0	High accuracy Small, Low High	1.2×1.2×0.37	in Production	Preferred	
AS-M15LA-R	1.5mT	1.5 to 6.0	Small, Low High	1.4×1.4×0.37	in Production	Preferred	
AS-M15LAF-R	1.5mT	1.5 to 6.0	Sampling : 1.3msec For Low speed rotation detection	1.4×1.4×0.37	CS sample	Preferred	
AS-M15KA-R	1.5mT	1.5 to 6.0	Alternative for AS-M15NA-R	2.0×2.0×0.37	in Production	Preferred	
AS-R15KA-R	1.5mT	1.5 to 6.0	No sampling For High speed rotation detection	2.0×2.0×0.37	Under contemplation	Preferred	
AS-M15KAF-R	1.5mT	1.5 to 6.0	Sampling : 1.3msec For Low speed rotation detection	2.0×2.0×0.37	CS sample	Preferred	
AS-M15TAN-R	0.5 to 2.2	1.6 to 5.5	SOT23, Available at flowsoldering	2.8×2.9×1.1	in Production	Preferred	

Subject to change without notice

Part Numbering : AS series

P/N : AS - M 15 T A -R
 1 2 3 4 5 6 7 8

1 ●●● Product ID

2 ●●● Type

M : Magnetic switch (Horizontal Sensing Direction Type)

V : Magnetic switch (Vertical Sensing Direction Type)

R : Rotation switch (All-time drive type)

3 ●●● Typical Sensitivity

15 : 1.5mT

20 : 2.0mT

4 ●●● Package

T : SOT23

N : SON4

S : 1.2 × 1.2 × 0.37

L : 1.4 × 1.4 × 0.37

K : 2.0 × 2.0 × 0.37

5,6,7 ●●● Individual Specification Code

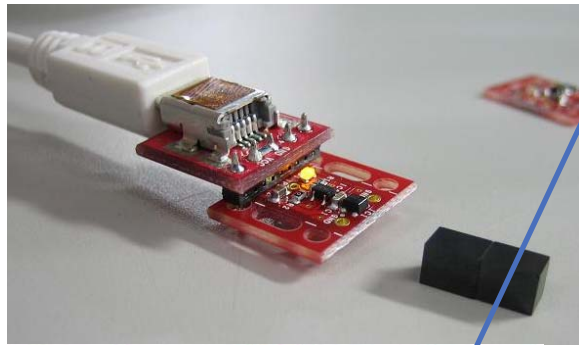
8 ●●● Plastic taping

∅180mm

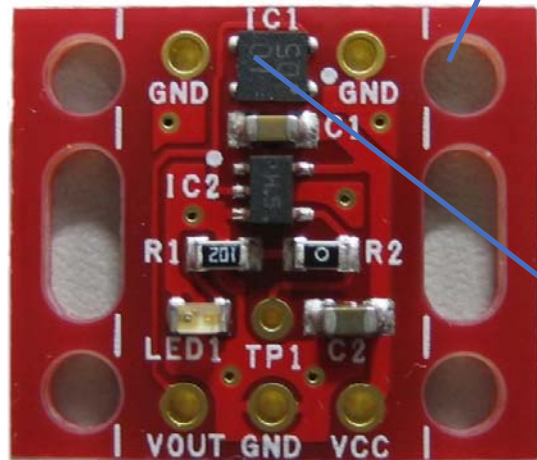
Selection Guide example

Application	Feature	Part number	Mounting method	
			Reflow	Flow
Cell-phone	Small and Thin	AS-M15SA-R	○	×
	Small and Thin and High accuracy	AS-M15SAH-R	○	×
Detection of rotation like Pulse encoder, Flowmeter	High speed detection (High speed sampling :1.3msec)	AS-M15KAF-R	○	×
		AS-M15LAF-R	○	×
	Full time detection	AS-R15KA-R	○	×
White goods Industrial goods Security goods	Land compatibility as SON4	AS-M15KA-R	○	×
	Available at flowsoldering	AS-M15TAN-R	○	○
	Replacement for Hall IC Land compatibility as SOT23	AS-V20TA-R	○	○
	Replacement for Hall IC Land compatibility as SON4	AS-V20NA-R	○	○

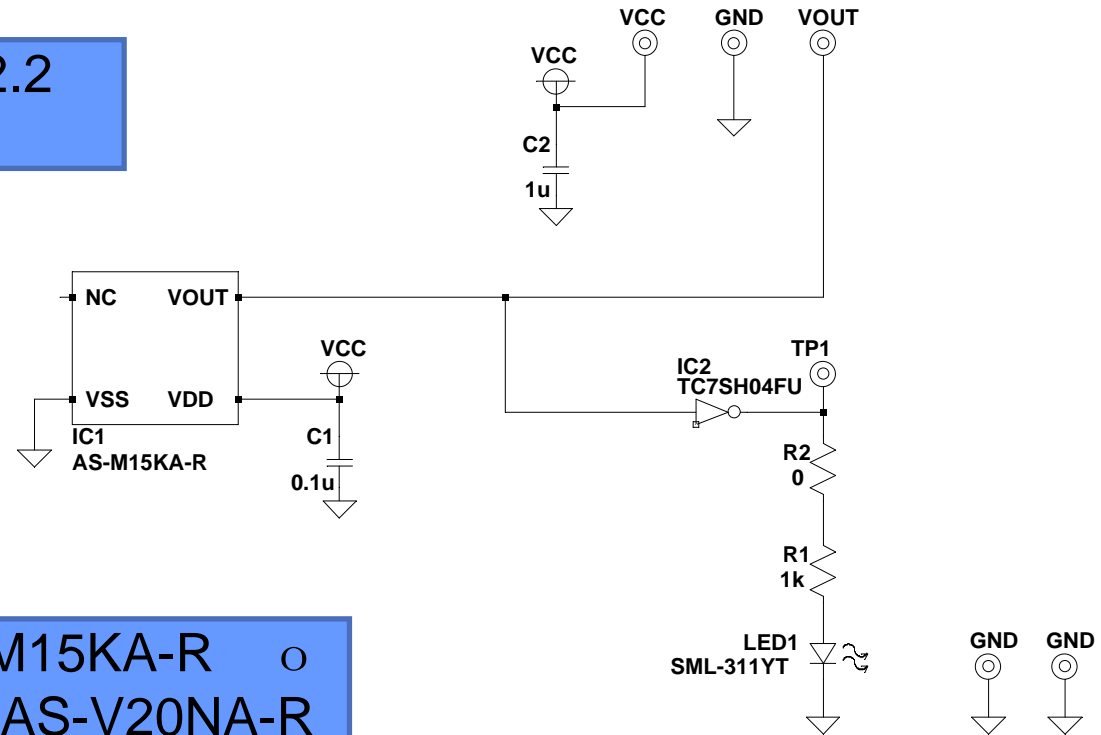
Evaluation board for AMR sensor



$\Phi 2.2$
mm



AS-M15KA-R
AS-V20NA-R



Feature

- Available at the power supply via USB or other power supply
- LED light up when Magnet close to the sensor.
- There are threaded holes with this evaluation board.



END
Thank You!