AnaSem

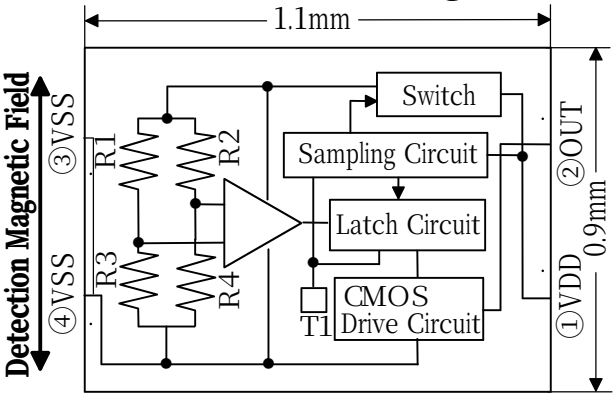
AnaSem Analog Semiconductor IC MRX1518HXA

CMOS MR MAGNETIC SENSOR SWITCH

Feature

- CMOS+MR Monolithic Structure
- Ultra small SMD package: 1.1×0.9×0.47mm
- Low current consumption: 1.6μA/1.8V
- High-Sensitivity MR sensor: 1.5mT/Typ
- Magnetic Direction: Both direction/CMOS inverter one output
- Detection Magnetic Field: Horizontal direction of package (electrode parallel both direction)
- Operating Temperature Range :−40~+85℃
- Operating Voltage Range :1.6~3.5V

PIN/Block Diagram



TOP VIEW

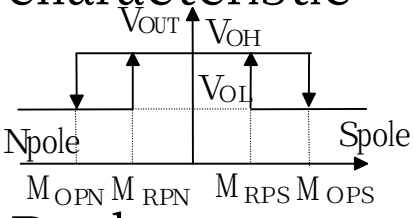
Outline

- MRX series is a monolithic IC with built-in MR magnet resistive element and CMOS switch.
- It becomes the switch of the noncontact of low current consumption, high sensitivity, and high reliability by combining with the magnet.
- A parallel to the electrode of the package horizontal magnetic field can be detected by an arbitrary polarity (N pole⇄S pole).
- Even 1.5mT~6mT can detect a wide magnetic field in the MRX series.
- There are two CMOS output and **opendrain** output types that can individually detect N and S pole in MR series.

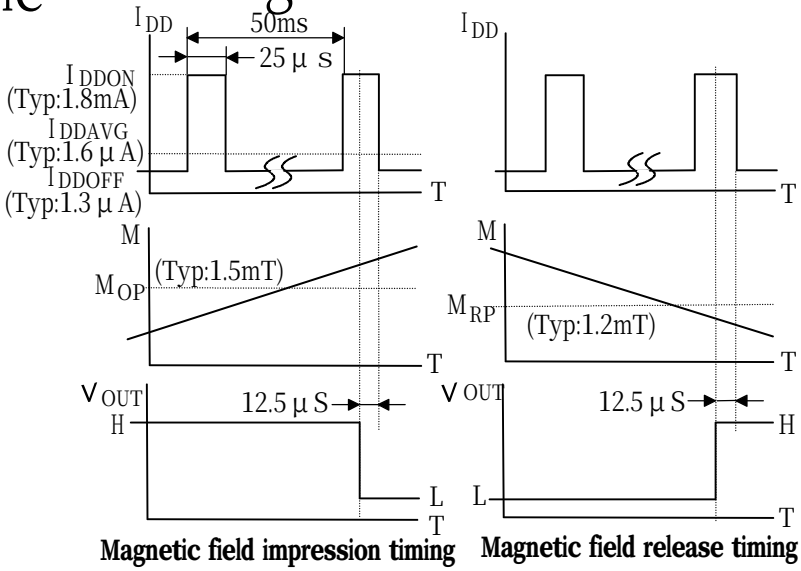
Type Name: MRX1518HXA/Product Number Rule/List

MRX	1518:Sensitivity /Voltage	H:Operation voltage/ Output cycle	X:Package	A:Version
Anasem Product Series Name	15:1.5mT(Typ)/ 18:1.8V(Typ)	H:1.6~3.5V/25μs:50ms	XXLP/1.1× 0.9×0.47mm/4L	A:CMOS/1out

Magnetic-Electric conversion characteristic

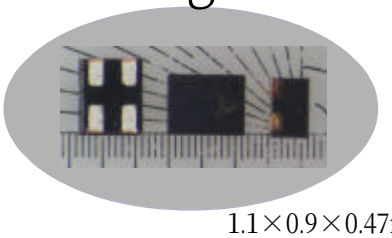


Timing Chart



Magnetic field impression timing　　Magnetic field release timing

Package



1.1×0.9×0.47mm

Electric Characteristics

(Ta= 25℃, V_{DD} = 1. 8V)

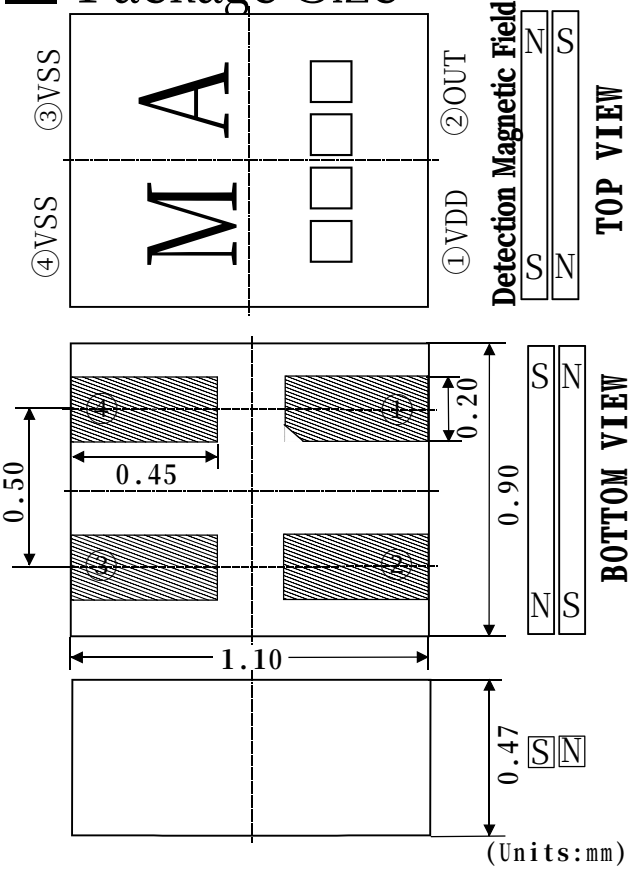
Item	Sign	Measurement condition	Min	Typ	Max	Unit
Operation Voltage	V_{DD}		1.6	1.8	3.5	V
Current consumption	I_{AVG}	Average Current V_{DD}=1.8V		1.6	3.0	μA
Output reversing magnetic induction (H→L)	M_{OPS}		(1.0)	1.5	2.2	mT
	M_{OPN}		-2.2	-1.5	(-1.0)	
Output reversing magnetic induction (L→H)	M_{RPS}		0.8	1.2	(1.9)	mT
	M_{RPN}		(-1.9)	-1.2	-0.8	
Width of reversing magnetic induction hysteresis	M_{HYS}		(0.1)	0.3	(0.8)	mT
Pulse drive cycle	t_S			50	90	ms
High-level output voltage	V_{OH}	I_{OUT}=+1.0mA	0.9V_{DD}			V
Low-level output voltage	V_{OL}	I_{OUT} =-1.0mA			0.1V_{DD}	V

★( )Design guarantee value

Absolute Maximum Rating

Operating temperature range	T_{OPR}		-40		+85	℃
Storage temperature range	T_{STG}		-50		+125	℃
Absolute maximum voltage range	V_{MAX}		V_{SS}-0.3		V_{SS}+6.0	V
Assembly temperature condition	T_{ASY}	t=max:5sec/Tmax		255	260	℃

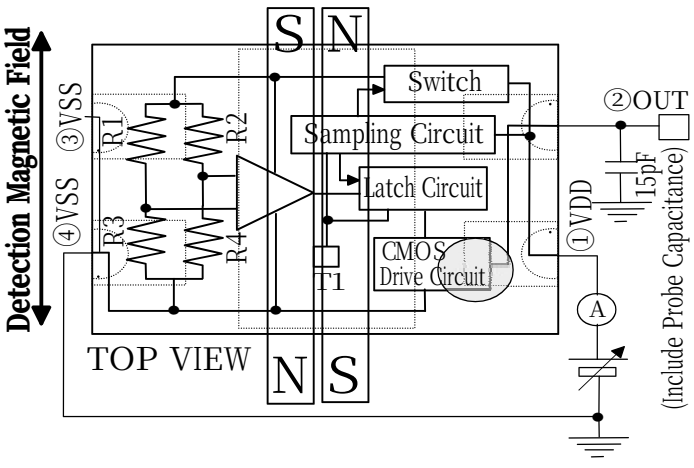
Package Size



Magnetic Strength and Output Voltage

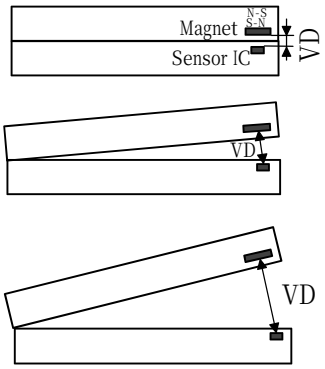
Magnet & Power	Magnet Condition	Output Voltage
Magnet=OFF Power=ON	M=0mT	High-Level
Magnet =ON Power=ON	M≧2.2mT	Low-Level
Magnet=OFF Power=ON	M≦0.5mT	High-Level

Test Circuit



■ Use Example (Cellular Phone)

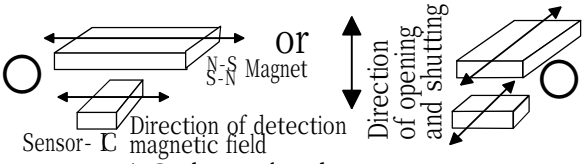
1) Opening and shutting type detection



Position A
Output= L/Level
Magnetic Flux
Dencity≧2.2mT

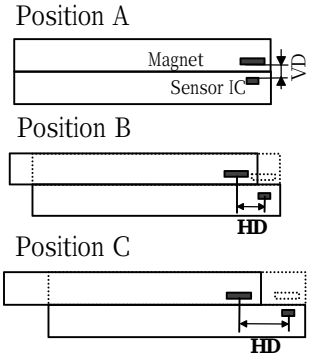
Position B
Output= L→H/Level
Magnetic Flux
Dencity≧1.5mT

Position C
Output= H/Level
Magnetic Flux
Dencity≦0.5mT



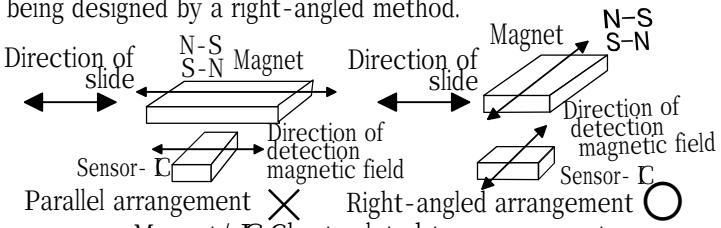
Magnet/ IC Chart related to arrangement

2) Slide type detection



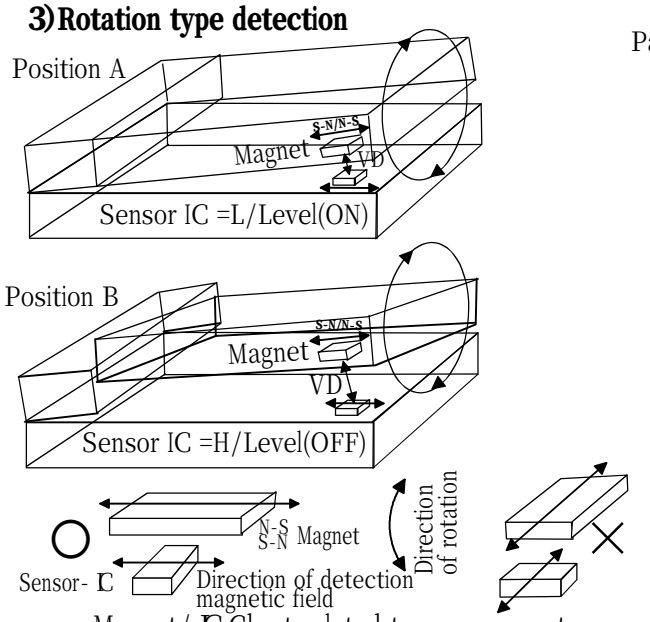
There is right-angled or parallel arrangement in the relation between the direction of the magnetic field and the direction of the slide in the slide type cellular phone.
Both become switches ON in Position A, too. It is likely to become turning off in parallel arrangement in Position B It becomes switch ON again by a reverse-magnetic field if swerving in the direction of Position C in parallel arrangement, and when the distance parts enough, it becomes switch OFF.

It doesn't become OFF by Position B in right-angled arrangement but it becomes OFF by Position C to which the distance parts enough.The meaning that prevents the malfunction recommends being designed by a right-angled method.



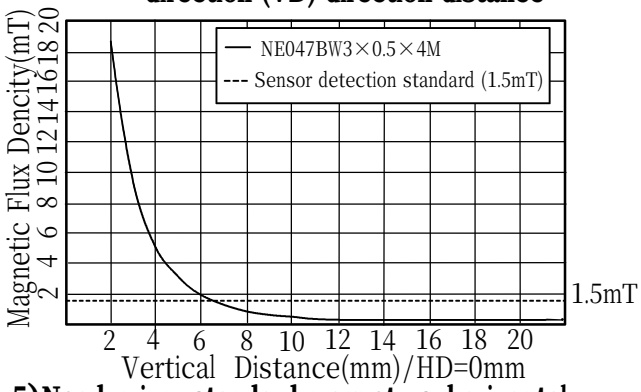
Magnet/ IC Chart related to arrangement

3) Rotation type detection

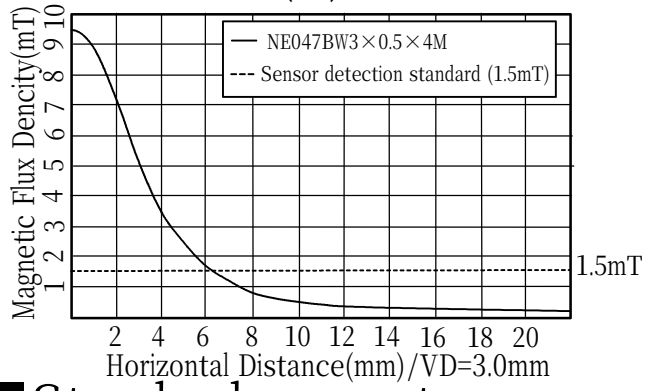


Magnet/ IC Chart related to arrangement

4) Neodymium standard magnet vs. vertical direction (VD) direction distance

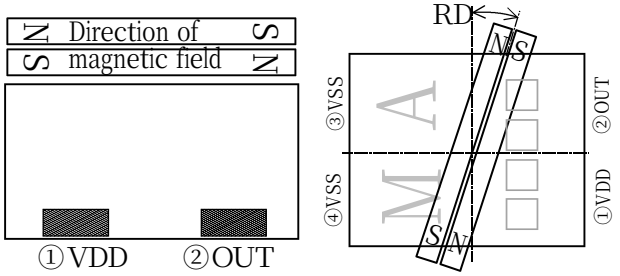


5) Neodymium standard magnet vs. horizontal direction (HD) direction distance



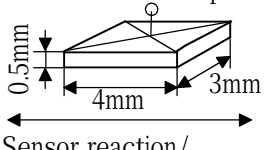
■ Magnetic field detection

When an enough magnetic induction is added in parallel to the sensor side in the direction of marking, the output is ON(Low). Magnetic field strength of each 50msec for 25 μsec is detected. The direction of the magnetic field is detected regardless of N pole S pole.
A reverse-magnetic field doesn't influence it for the detection of horizontal direction.
Because the marking side and the vertical direction are perceived according to the size of the magnetic induction, it is possible to apply also to the slide type in a parallel direction and the fold type in the vertical direction.



■ Standard magnet specification

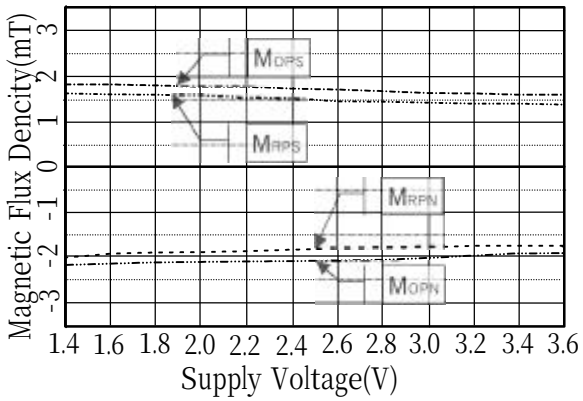
P point: Magnetic induction measurement position



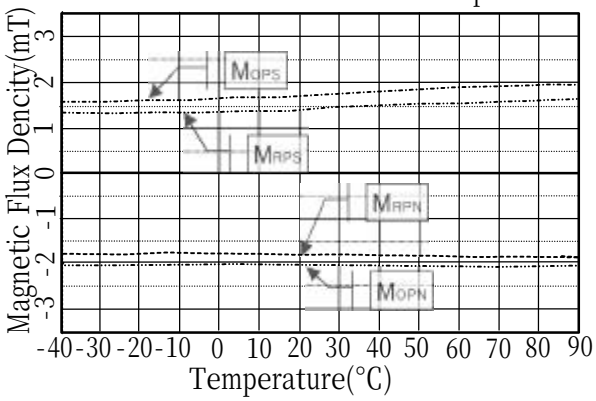
- Magnet maker: TDK Corp
- Neodymium magnet
- Product number: NE047B W3× 0. 5× 4M
- Size: 4×3×0.5mm

Electric Characteristics Data

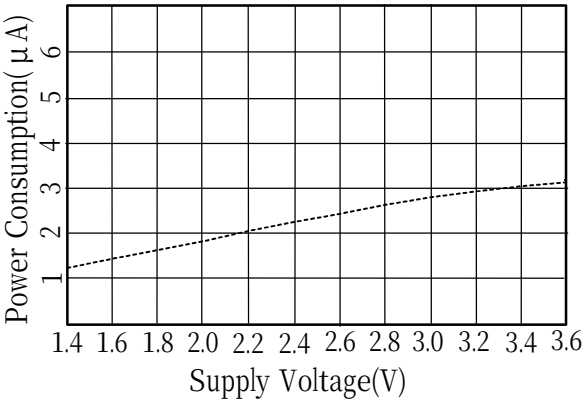
1) Operation magnetic induction vs. power-supply voltage



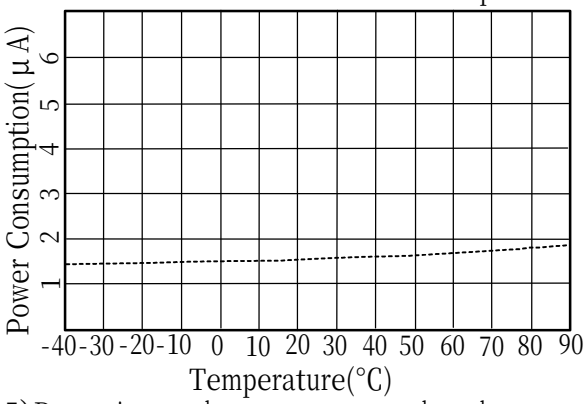
2) Operation magnetic induction vs. ambient temperature



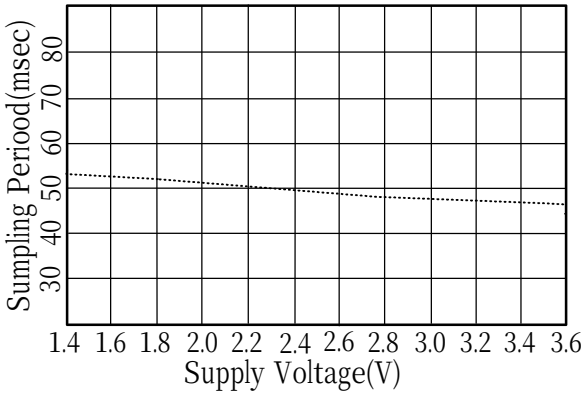
3) Current consumption vs. power-supply voltage



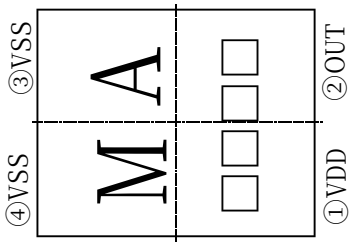
4) Current consumption (average current) vs. ambient temperature

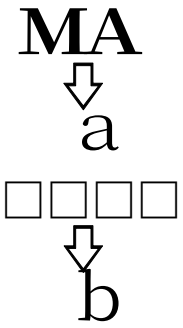


5) Detection cycle vs. power-supply voltage (Temp=25°C)



Marking





a	**Products Name:MA/MRX1518HXA**
b	**Production Lot:Company Rule**

6) Detection cycle vs. ambient temperature (VDD=1.8V)