

ANASEM SEMICONDUCTORS

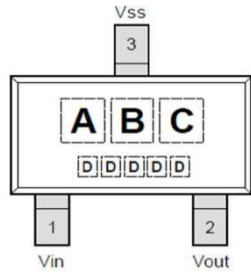
MR Sensor vs. Reed Switch



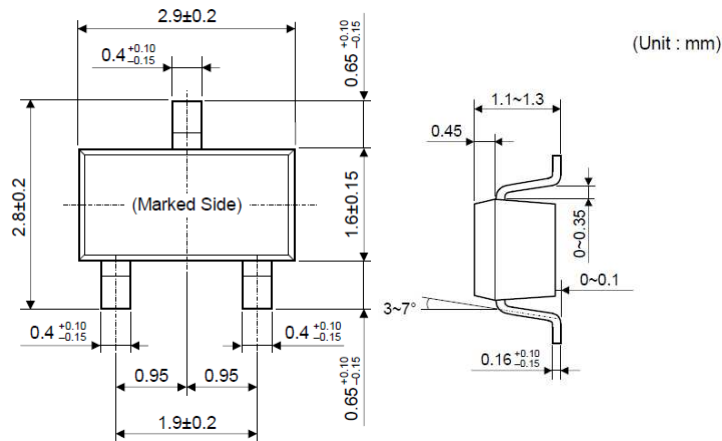


<p>Product Introduction:</p>	<p>MR Sensor IC (Magneto Resistive Sensor IC) is the latest innovation within the magnetic sensor device field. Bearing more advantages in terms of features and performances in comparison with the ordinary Reed Switch and Hall Effect Sensors, now a day many application designs are evolving to adapt and apply the use of MR Sensor IC.</p>
<p>Product Design Concept:</p>	<p>MR Sensor is a One-Chip based design component, a circuit which is composed of 4 parallel magneto resistors for the sensing function (hence the name “Magneto Resistive”), pairing with highly precise CMOS circuitry to deliver ever high sensitivity feature; this innovation design concept was developed when concerning and pin pointing the traditional Reed Switch’s bulky size and design space restriction, fragile to vibration and impacts, as well as function stability and sensitivity...etc.</p>
<p>Market Trend:</p>	<p>Currently MR Sensor IC has been gradually adopted by various application designs in the overseas and local market, such as electronic toys, smart electric, water and gas meters, industrial proximity sensing, speed reading, home appliances (i.e. refrigerators, air conditioners), security systems, as well as notebook PC and mobile phones where these applications had MR Sensor approved and used already. While the adaptation reason is similar: the market recognized the advantages of space saving and sensitivity comparing to ordinary solutions.</p>
<p>Background:</p>	<p>AnaSem MR Sensor products’ research and development wasn’t just an overnight innovation, but rather through our R&D team’s long term trial & error, yielding the best possible magnetic sensor solution with the latest CMOS trimming and production techniques, with actual trial and prototypes, with further improvements on specifications, thus providing this awesome device to be available in market.</p>

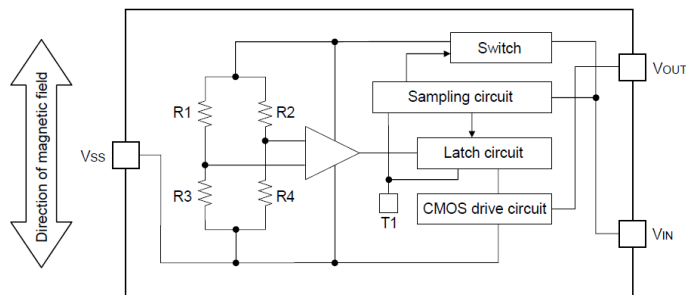
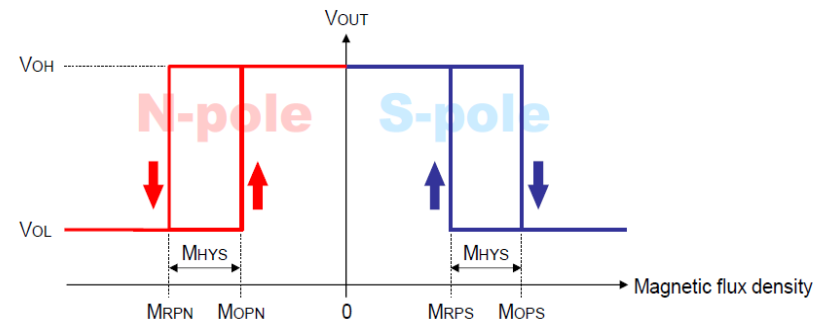
MR Sensor Features & Specifications:



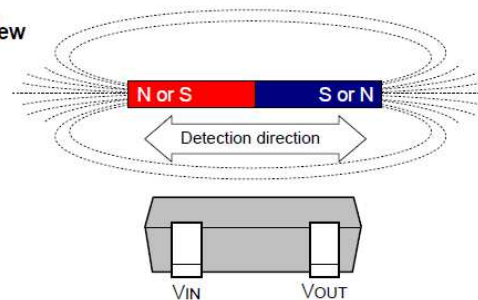
Appearance Feature:	<ul style="list-style-type: none"> • Our MR Sensor IC is single component, provided in SOT-23 type Packaging with 3 pins; • 3 pins are comprised of Input (Vin), Output (Vout) and Ground (Vss) • IC Package measured in 2.8mm (W) by 2.9mm (L) by 1.1mm (H)
Specifications:	<ul style="list-style-type: none"> • High Sensitivity: 1.5mT (15.0 Tesla) • Operating Voltage Range: 1.6V ~ 6.0V • Operating Temperature Range: -40°C ~ +85°C • When Triggered: Vout = "0" ; All other conditions : Vout = Vin



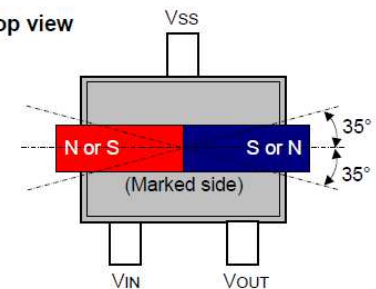
MAGNETIC-ELECTRIC CONVERSION CHARACTERISTIC



Front view











Top view



MR Sensor IC compares with Reed Switch:



Comparing Subjects	MR Sensor IC	Reed Switch
Size	2.8mm * 2.9mm * 1.1mm (smaller by typical of 25 times) 	Typically measured around 25mm * 3mm * 3mm
Connectivity	Input , Output, Ground (3 connections)	Input, Output (2 connections) 
Sensitivity	15 Tesla (more sensitive) 	>15 Tesla
Sensing Method	Magnetic Field (same) 	Magnetic Field
Quality / Risks	<ul style="list-style-type: none"> • Internal CMOS circuit with comparator • Circuit not affected by transportation nor assembly • Easy to mount SOT-23 type package by soldering • IC Package already sealed, external coating not necessary • CMOS IC can store for long time under appropriate condition • Moisture Sensitivity Level 1 • Stable operation under specific operating temperature • Compliant to RoHS / REACH / Halogen-Free / Antimony-Free / PFOS / PFOA standards 	<ul style="list-style-type: none"> • Comprised of 2x metallic plates for operation • Glass tube is fragile to transportation and assembly • Glass tube is easy to crack during the bending of pins • Requires additional sealing for protection from seepage • Stability depends on the inner gas which has shorter lifespan • Sensitive to moisture • Performance not as stable under different temperatures • Specific standards are met only by specific manufacturers
Mechanism	Occupies only a very small fraction of design space 	PCB or connection space needs to be wider / bigger
Produce Lead Time	Only 4~6 Weeks by utilizing latest CMOS technology 	Longer lead time due to involvement of mechanical assembly
Assembly Cost	<ul style="list-style-type: none"> • Lower cost in manufacturing due to matured CMOS trimming technology • More simple assembly process by surface mounting on PCB by soldering, very low defect yield in process 	<ul style="list-style-type: none"> • Also lower cost in manufacturing due to simple materials but with limited stability • More complicated assembly process due to requirement of bending of pins, as well as sealing and protections