

MEMS Special Report

Magnetic Sensors Headed for the Big Time

By Richard Dixon, Senior Analyst

Forecast

Frequency, Time Period

- 7-year annual forecast from 2006 to 2013

Measures

- Revenue
- Shipments
- ASPs
- Trends

Market Share

- Overall
- By technology
- For key applications: ABS braking systems, industrial motors, mobile phones, etc.

Applications/Products Covered

- Automotive
- Industrial
- Medical
- White goods
- Consumer electronics and mobile phones

Technologies Covered

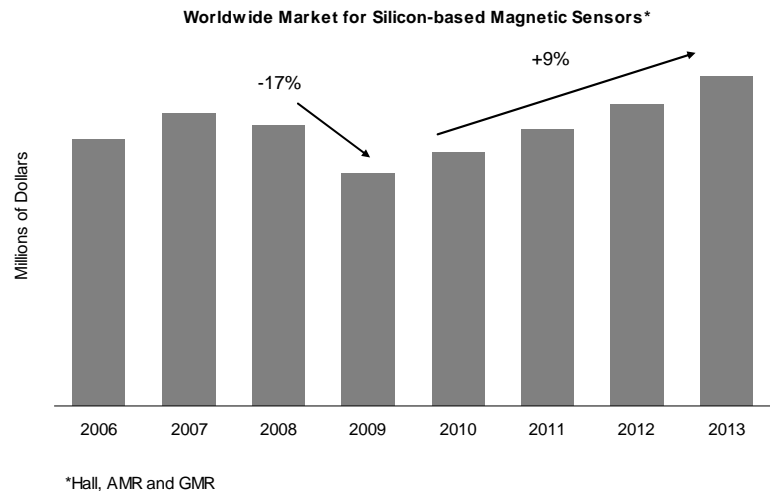
- Detailed semiconductor magnetic sensors
 - Hall
 - AMR
 - GMR
- Summary of competing magnetic sensors
 - REED
 - Inductive
 - Variable reluctance
 - MEMS

Magnetic sensors represent one of the most pervasive of sensor categories. Many kinds of precision measurements—speed, angle, position, etc.—are needed in modern cars and industrial encoders, while switching is a key functionality in endoscopes and pacemakers, or to indicate when a clap-phone, laptop or digital camera viewfinder is open, or to adjust motors that help the camera user take sharp, wobble-free pictures.

After a disastrous year felt in nearly every economic corner, the suppliers of silicon-based magnetic sensors will again feel a fresh wind starting in 2010 with revenue growth of 9% up to 2013.

There are many flavors of magnetic sensors—as many as five different types compete for applications like steering wheel angle measurement, for example. Silicon Hall effect sensors lead the way, pervading the territory of established technologies like inductive and optical sensors, Reed and mechanical switches. This technology combines contact-less sensing to mitigate mechanical wear, without requirement for sensing of external magnet or ferrous objects, with good performance with silicon batch manufacturing cost structure. Hall effect faces its own challenges, particularly from larger air-gap magnetoresistive sensors offering superior performance and simplifying engineering.

This report addresses key opportunities, disruptive forces, technology battlegrounds, supply chain and market information for the various silicon magnetic sensors.



Critical Questions Answered

- What is driving the shift from linear to angle sensors?
- Why do magnetic linear sensors replace potentiometers?
- What is the significance of 3D Hall approaches?
- What are the chances for current sensors?
- Will GMR become significant?
- What drives the use of sensors in industrial motors?
- What are the new applications for cell phones and consumer electronics?

Who Should Read This?

- Component Manufacturers
 - Marketing, Executives
- ODM: tier 1, 2 and 3 suppliers to auto industry
- Manufacturers of consumer products, medical and industrial sector
 - Procurement, R&D and sensor integration
- Foundries
 - Marketing
- Equipment for ASIC and semiconductor manufacturers, Packaging and Testing
 - Sales, Marketing

Lead Analyst**Dr. Richard Dixon, Senior Analyst**

Richard Dixon is senior analyst for MEMS and the author of over 50 MEMS related consulting and market research studies.

Richard graduated from North Kent University with a degree in Materials Science and earned a doctorate from Surrey University on semiconductor characterization.

He served as a technology transfer engineer for RTI International for 5 years before serving as an analyst for WTC for consumer and automotive MEMS for clients as varied as Qualcomm, EPCOS, University of Munich and Robert Bosch.

Richard speaks English and German.

Applications/Products Covered

- Automotive powertrain sensors
 - Crank and camshaft
 - Engine speed
 - Transmission
 - Throttle position (throttle-by-wire)
 - EGR position
 - Oil, brake, fluid level...
- Automotive Safety
 - Chassis height
 - Strut and suspension position
 - Wheel-to-chassis height
 - Wheel speed (ABS)
 - Steering wheel angle, electronic assisted power steering
 - Passenger occupation, acceleration pedal position
 - Seat belt presence detection...
- Automotive Body
 - DC brushless motors
 - Steering column control
 - Seat position, coolant level
 - Door latches
- Infotainment
 - Navigation compass
- Digital Still Cameras & Camcorders
 - Display open / close
 - Image stabilization controllers
 - Motor commutation
- Personal Navigation Devices
 - Navigation compass
- Mobile phone
 - Open / close, compass
- Personal computer & laptop
 - HDD heads, DVD spindle motors
 - PC fans
- White goods
 - Washing machines
 - Microwave ovens
 - Cooker hood
 - Rice cooker heater control
 - Instant water heaters, power showers...
- Office products
 - Fax machines (door close)
- Industrial encoders
 - Motor encoders
 - Floor detection in lifts
 - End position for hoists
 - Water tank control
 - Deep bore liquid detection
- Marine industry
 - Anchor, rudder, hatch position
 - Wind speed and direction
- Medical
 - Magneto-cardiography
 - Pacemakers
 - Hearing aids
 - Smart pills

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 Major applications for sensor ICs include on/off switching of the cell phone main display (a) folding (b) rotary (c) sliding
 Types of Hall-effect switches for mobile phones

Hall sensors support motors drivers with integrated Hall commutation and speed control, linear Hall-effect sensors for autofocus and zoom, and Hall switches
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