



NEWS RELEASE

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Comparative Analysis Provides Helpful Tool for Design Engineers

Analysis compares features and benefits of magnetic switch technologies

15 April 2006, Chickasha, OK (USA) – Hermetic Switch, Inc., along with technology consulting firm, TekMark Growth Partners, recently completed an analysis of four magnetic switch technologies. The analysis identifies and compares data of many performance criteria for both electro-mechanical (Reed and MEMS) and solid-state (Hall and GMR) magnetic switch products.

The analysis provides a succinct and helpful tool for design engineers who may not be aware of the various advantages and disadvantages of each switch technology. The comparative analysis also helps to address misconceptions that exist in the public domain.

The analysis reviews the strengths, limitations and merits of each of the above technologies across various performance criteria in the areas of reliability, proven design, operating environment, power consumption as well as size, magnetic sensitivity and design flexibility. Various manufacturers and numerous product data sheets were accessed for this analysis.

Results of the analysis confirm that, although one technology may provide an advantage over others in a specific area, in general, all of the technologies offer a wide array of capabilities and it is to the design engineers' benefit to evaluate each of the technologies based on application-specific design requirements. A summary of each switch's strengths and limitations is provided below. A more in depth report entitled, "Guide to Magnetic Switch Technologies", is available, upon request, from Hermetic Switch.

Magnetic Switch Technologies - Summary of Comparative Analysis

Reed (electromechanical) switches have several strengths. They do not consume power when in the "off" mode. As such, they are ideally suited for applications where conserving battery power is critical as in pacemakers, defibrillators and hearing aids. These switches have hermetically sealed contacts, which makes them ideal for use in dirty, hostile environment applications. The reed switch family is highly resistant to Electrostatic Discharge (ESD), making them well suited for ESD-sensitive applications. Reed switches provide both switching AND sensing functions in one package. Since the reed switch can perform both functions without additional components, this saves on overall cost and labor. Reed switches utilize an established technology (*dating back to 1936 when Dr. W.B. Elwood invented it at Bell Telephone Laboratories*) and have a long and proven history of reliability.

There are some limitations to the reed switch. Reed switches may cost more per unit than other magnetic switches, but the quality, performance and reliability reduce the overall cost. Reed switches have historically been larger in size than other magnetic switches, but advances are being made. For example, the recent introduction of Hermetic's HSR-0025 reed switch reduces glass length to .160 inches (4.06mm) and provides a magnetic sensitivity as low as 2.0 mT.

MEMS (electromechanical) switches have numerous strengths including a small footprint; MEMS devices are as small as .110 inches long (2.8mm). The MEMS switches are also magnetically sensitive; they are available with sensitivity as low as 1.7 mT. They are also highly shock resistant and can withstand physical shock of up to 15,000 Gs. MEMS switches are relatively inexpensive making them a good choice for high volume, low cost commercial applications.

MEMS switches also have limitations. They are ESD sensitive so MEMS-based devices can be easily damaged in the presence of ESD. In addition, MEMS switch contacts are not hermetically sealed so electrical contacts can become contaminated, thereby causing sticking or other malfunctions. Lastly, MEMS switches generally have higher contact resistance than other magnetic switch technologies.

Hall Effect (solid state) switches have recognized strengths. They are inexpensive and are well suited for high volume, low cost commercial applications. Hall effect switches have very long life expectancy. When operated within their electrical specifications, hall switches can operate for billions of cycles. These switches also have no contact bounce. For applications where bounce is a factor, Hall devices offer excellent performance. They are also durable and resistant to shock and vibration.

Hall Effect switches also have limitations. These switches require constant power. Power is consumed even when in the 'off' mode, thereby reducing the life of battery powered devices. Hall effect switches cannot switch loads directly therefore loads must be switched using additional components, adding cost and labor. These switches also have a low signal output, usually requiring amplification circuitry. Hall effect switches are also very ESD sensitive. They should not be used in applications exposed to ESD since they could be easily damaged.

GMR (solid state) switches have noted strengths. These switches are true solid-state devices and as such, the GMRs have no moving parts. GMR switches have a small footprint; some footprints are as small as .04 inches (1.0 mm) square. These switches are very magnetically sensitive. Some GMRs have a magnetic sensitivity as low as 1.0 mT and can maintain a very tight operating point. This switch family also operates in a wide temperature range, from -40°C up to +150°C.

GMR switches also have limitations. GMR switches require constant power. Power is consumed even when in the 'off' mode, thus reducing the life of battery powered devices. GMR switches are ESD sensitive; ESD-induced damage can easily occur to a GMR-based device. These switches are based on a relatively new technology and thereby entail some degree of risk, as the technology continues to evolve.

In conclusion, knowing that no single magnetic switch technology is best suited for all applications, one must analyze the switching requirements of a specific application along with the strengths and limitations of the switches available in the market, and then make an informed decision. The intent of this analysis is to encapsulate basic information about these technologies and to inform the designer of available options.

About Hermetic Switch

Hermetic Switch (est. 1968), www.hermeticswitch.com, is a privately held, ISO 9001 registered company that designs, develops and manufactures reed switches, proximity sensors and other switch technologies that respond to customer needs. The company provides switching and sensing solutions to many industries including medical, aerospace, telecommunications, military, fluid processing, computer/electronic, construction, security, agricultural and lawn/garden/turf. Specific applications where Hermetic products are used include pacemakers, defibrillators, vagus nerve stimulators,

hearing aids, space station/space shuttle functions, commercial and military jet engines, wireless devices, valve-position monitoring devices, test, measurement and diagnostic equipment, burglar alarms, commercial lawn mowers, among many others. Customers include numerous Fortune 500 companies as well as other key players in the global marketplace.

About TekMark Growth Partners

TekMark Growth Partners Ltd., www.tekmarkgp.com, is a leading technology sales, marketing and strategic management-consulting firm. TekMark helps technology and engineered product based companies grow through a variety of proven processes and programs focused on new business development, new product development, technology commercialization, channel management, technical research and overall strategy development. Clients include firms from a variety of industries including the semiconductor, electronics, test & measurement, sensor, optical components & systems, aerospace, energy, and general industrial markets.

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Magnetic Switches – Relative Size Comparison

