



NEXT-GEN MEDICAL DEVICES INCORPORATING **RedRock® TMR Magnetic Sensor Technology**



Whether enabling “wake-up” applications or monitoring liquid level, proximity or anti-tampering, next generation measurement and detection device requirements dictate sensors to be smaller, more sensitive, and to consume the lowest possible power.

RedRock® TMR sensors (offered by Coto Technology, Inc.) offer the lowest power, highest sensitivity, smallest packaged magnetic sensors on the market – addressing the many constraining requirements of next-generation medical devices. RedRock® TMR magnetic sensors are the #1 replacement for reed switches as well as a top consideration for those currently using Hall Effect as, in addition to its much sought-after inherent qualities, RedRock® TMR technology is robust, reliable, has short leadtimes and is extremely cost effective. All combined, TMR’s features allow for unprecedented flexibility to design engineers – giving them complete freedom to build their ideal systems.

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Medical applications benefitted by TMR technology include portable and battery-powered devices such as ingestibles,

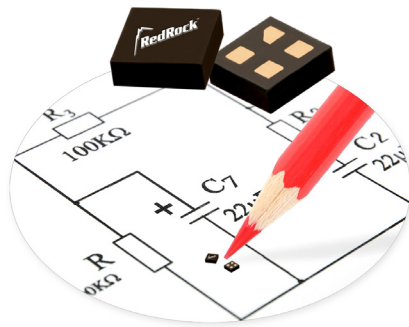
wearables and implantables that are hermetically sealed and, therefore, need a way to be triggered without compromising their protective encasement. Many of these devices need to be able to be stored in standby mode on a physician’s shelf for up to 18 months before being used; battery power conservation is critical to ensure there is sufficient charge left in the battery when it comes time to activate it. The small size of these devices and their hermetic seals necessitate a tiny, contactless means for “waking up” the device from the outside, (e.g., packaging the device with a magnet that triggers the magnetic sensor for as long as the device is in its package).

Examples of these hermetically-sealed medical devices include capsule endoscopes and Continuous Glucose Monitors (CGM). Capsule endoscopes, which are used to take pictures of a patient’s gastrointestinal tract, need to be small enough to be swallowed and hermetically sealed in order to protect its internal components from the body’s harsh environment. Conversely, CGM sensors are worn outside the body (typically on the upper arm or torso) to track a patient’s glucose levels throughout the day. CGM devices need to be hermetically sealed and can’t be too bulky as they need to be worn continuously, 24 hours a day.

In these applications the magnetic sensor can wake up the device in one of several ways. The sensor can provide a digital (HIGH/LOW) signal to a microcontroller that wakes up the full circuitry once the device is separated from the magnet that activates the sensor and keeps everything asleep. The sensor’s digital output can also be used to drive a transistor or load switch, that connects/disconnects the battery from the device’s circuitry. Alternatively, the sensor can power the device’s circuitry directly, provided the maximum current demanded by the device does not exceed the maximum current driving capability of the sensor.

When using a magnetic sensor to directly power a circuit, there’s always a risk that an external magnet may trigger the sensor and shut down the device again. Fortunately, Coto’s RR123-1H02-612 TMR sensor has a remarkable feature that allows it to lock its output so that it doesn’t respond to any

magnetic fields after the initial wake-up when the device is removed from its packaging. In addition to this, the RR123-1H02-612 offers the following specs:



- A Supply Voltage range of 1.0-3.6V, which allows it to be powered by both 1.5V and 3.0V batteries.
- A typical average current consumption of 13nA at 1.5V, and 20nA at 3.6V, which leads to a negligible drain on the battery while the device is in storage.
- A sampling frequency of 1Hz, which keeps current consumption low, and is ideal for one-time wake-up applications.
- A magnetic operate/release sensitivity of 7 Gauss/3 Gauss (respectively), allowing the use of a small, cost-effective magnet.
- A digital push-pull output, which has been designed for sourcing current with a minimal voltage drop between the battery and the output.
- A maximum sourcing current capability of 20mA, which can be used to directly power the type of circuits used in these applications without the need for a load switch or other components.
- A 1.45mm x 1.45mm x 0.436mm LGA-4 package, taking up minimal space inside small devices with limited board space.

Coto Technology can also supply critical Application Support to design engineers looking to incorporate this technology into their devices. For more information and a free demo, please contact us www.cototechnology.com.