Modernizing Security Systems with TMR

FOR HIGHER RELIABILITY, WIDER SENSING RANGE & LONG BATTERY LIFE

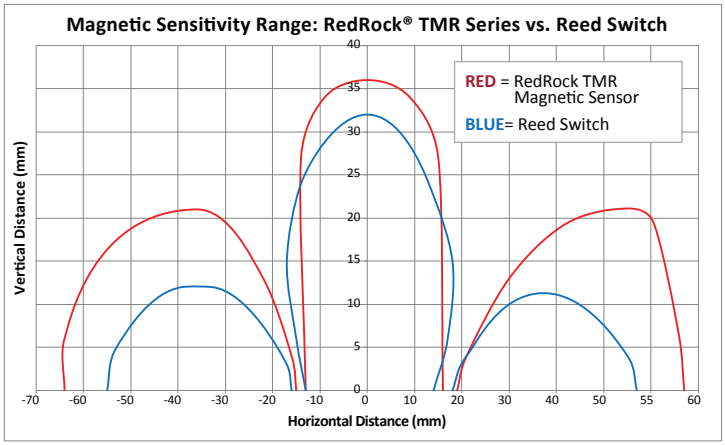
Because of their low power consumption, reed switches are still widely used in security sensing applications, particularly battery-powered remote systems. Typically, the reed switch in the sensor, mounted on a door jamb or window, is held closed by a permanent magnet mounted on the edge of the door. When the door is opened, the reed switch opens and the sensor unit transmits wirelessly to a central hub unit, triggering an alarm signal.

However, reed switches face drawbacks that impact their long term viability in these applications. They're electromechanical devices with limited switching cycles, prone to cracks in the hermetically-sealed glass causing premature switch failure, and are easily damaged by shock and vibration (including during manufacturing into the sensor units). The difficulty of their manufacturing also creates supply chain issues with very long leadtimes (>20 weeks).

Reed switches face drawbacks that impact their long term viability in security applications while TMR sensors offer high sensitivity, environmental ruggedness, and low power consumption.

That's why many design engineers are now looking for a solid state solution that doesn't prematurely drain the small coin-cell batteries used in these applications. The high current consumption of Hall Effect devices precludes their use, but Tunneling Magnetoresistance (TMR) sensors offer high sensitivity parts with low power consumption that won't negatively impact battery life. For instance, the RR123-1H02-612 draws only 20 nA on average, meaning that even a 150 mAh CR2032 lithium coin cell can supply it for multiple decades (note the battery only has a ten year shelf life, so the sensor is not the major concern here for power drain).

In practice, it's a relatively straightforward conversion to change from a legacy reed switch to a more robust TMR sensor. In many applications, the TMR sensor can be placed on the printed circuit board in the middle of the space previously occupied by the switch. Just as the reed switch typically has one lead going to ground while the other is "hot," the TMR sensor's ground pin connects to the ground pad while the V_{OUT} pin connects to the "hot" pad. Simply connect the V_{DD} pin on the TMR sensor to the V_{CC} pin of the microcontroller being used in order to tap the supply voltage.



This changeover not only converts the fragile and unreliable reed switch to a more robust solid state solution without sacrificing battery life, but the higher sensitivity of the TMR sensor also enables a wider sensing range (see Figure above). This is useful in window and door systems where the sensor and the activating magnet are not always able to be perfectly aligned during installation. That flexibility means easier installs, especially for those that are handled by the end user, resulting in greater customer satisfaction. It also provides a means for cost reduction, as the wider range allows a smaller, cheaper magnet to be substituted without sacrificing system performance. Additionally, The smaller TMR sensor takes up less PCB real estate when size is a critical factor and it's often available in under 8 weeks.

Security system manufacturers benefit from replacing fragile, large reed switches in favor of more robust, higher magnetic sensitivity, low power solid state solutions like Coto Technology's RedRock® TMR RR123 Series.

For more information, including how Coto Technology's applications support can help with your design efforts, please contact Coto Technology via **www.cototechnology.com**.

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