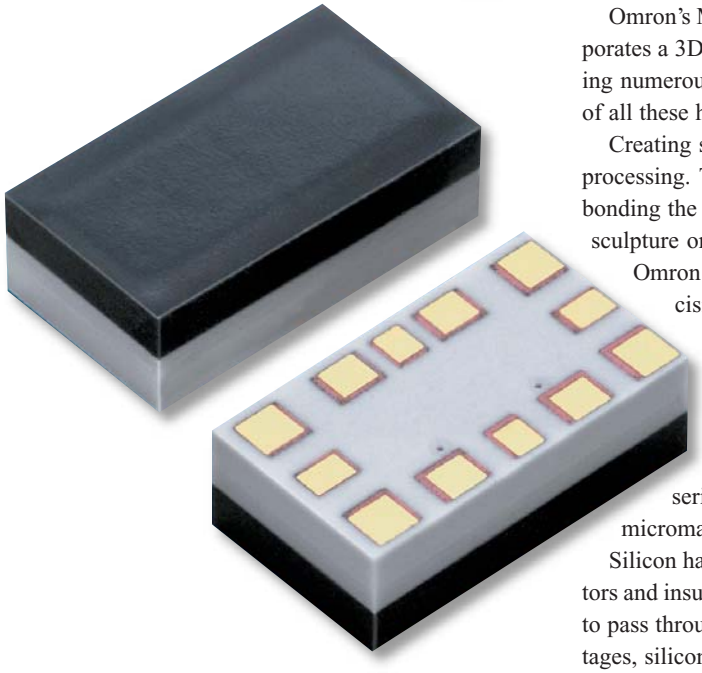
RF MEMS Switch Responds to the Call

TECHNOLOGY AWARD

Omron Electronic Components LLC is responding to the demand to incorporate an increasing number of advanced functions in mobile phones that are becoming more and more compact in design. In the future, the demand for more rapid transmission of large-volume data is expected to increase. MEMS is an essential element for making this happen.

To transmit and receive high-volume data such as video more quickly, switches capable of handling high-frequency requirements are necessary. RF (radio frequency) MEMS is now in the spotlight as a means of effectively responding to this need.

Omron's RF MEMS device is an RF switch that can handle frequencies 10 times higher than a semiconductor-based switch. To enable smooth On/Off switching with almost unlimited reliability while keeping dimensions to a minimum, Omron has created an "eagle" structure spring through etching. The spring is capable of extremely flexible movement, like an eagle's wings, hence the nickname "eagle."



Omron's MEMS chip is very small, measuring just a few square millimeters. But it incorporates a 3D solid structure that functions as a sensor as well as a complex system integrating numerous functions. The company's MEMS technology is what makes miniaturization of all these highly sophisticated components possible.

Creating such components requires super-high-precision micrometer or nanometer-level processing. The process of removing portions of a silicon material through etching, and bonding the silicon with a glass layer to form 3D structures is akin to creating an exquisite sculpture on the world's smallest scale. Because of its head start in MEMS development, Omron has alredy advanced its capabilities to a level that enables procesing with precision in the tens of nanometers. It can create a MEMS sensor that is extremely small with good functionality and reliability.

Semiconductor manufacturing borrows from photo development techniques. A silicon wafer is uniformly coated with light-sensitive resin solutions and exposed to a light pattern that imprints a corresponding circuit pattern. The unwanted layer is then removed from the wafer surface through etching. This series of semiconductor fabrication processes serves as the basis for MEMS micromachining.

Silicon has semi-conductive characteristics, which enables the formation of both conductors and insulators, each as small as 0.1 micrometer in width. The conductors allow electrons to pass through while insulators prevent the passage of electrons. With these unique advantages, silicon is used as a main component for all types of computing devices, from PCs to mobile phones to household appliances. As a substrate, MEMS uses a disc-shaped mono-crystal silicon wafer, on which silicon atoms and molecules are aligned. In addition to having the characteristics of semiconductors, mono-crystal silicon is very tough and withstands repeated exposure to vibration and pressure. Therefore, when used in sensors and actuators, this material enables reliable performance to be maintained for long periods of time.

Omron's goal with MEMS technology is to make devices so small as to be unnoticeable, enabling innovations such as "wearable" sensors. Technical data can be obtained by emailing components@omron.com or by visiting www.components.omron.com.