Packaging for RF MEMS

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RELENTLESS demand for more functionality, smaller size, and lower cost has been a driving force in the electronics industry for decades. Impressive advances in semiconductor fabrication technology can in large part be credited with enabling much of the progress, as feature sizes have been reduced and wafer sizes have grown.

While the silicon (Si) area (and cost) for a particular function has decreased by more than an order of magnitude in the last decade, advances in packaging have proceeded at a more modest pace until recently. Packaging is now emerging as a major consideration in the quest to further erode price and cost barriers. In fact, not only is the package the major size contributor for leaded surface-mount-technology (SMT) devices, it is sometimes more costly than the Si inside.

Portable electronic products are at the leading edge in the battle against size and cost. The development of these products has led to great interest in chip-scale-packaging (CSP) and near-CSP technologies. Cellular phones and handheld computing devices are among the most prominent portable products today. The latest phones incorporate multiband operation and sophisticated features such as voice recognition, calendars, voice recorders, as well as Internet browsers. Mainstream packages, with a standard pitch of 0.050-in. (1.27-mm), such as quad flat pack (QFP), small-outline package (SOP), thin QFP (TQFP), and plastic-leaded chip carrier (PLCC), struggle to support the new breed of miniature products. Smaller 0.025-in. (0.65-mm) pitch packages such as QSOP and higher-pin-density, ball-grid-array (BGA) packages have become popular, especially for microprocessors. Standard BGAs use a 0.050-in. (0.127-cm) pitch, but in a grid array. Shortened electrical path from die to printed-circuit board (PCB) in BGAs provides better electrical performance than for leaded packages, which is important at higher clock speeds and for RF applications.

PHS MEMS will present recent development which are the key for the future generation of RF product such as IPD (Integrated Passive Devices) and WLP (Wafer Level Packaging)