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Title:
MEMS Strip off their Packaging

Author:
Heikki Kuisma, Chief Scientist
VTI Technologies Oy

Presenter:
Rick Russell, Director, Sales & Marketing
VTI Technologies, Inc.

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Abstract:

VTI Technologies has developed a new manufacturing concept that offers better ways of combining MEMS and ASIC technology to create smaller, smarter and dramatically lower cost sensing devices suitable for large volume production. The ideal sensor could open the doors to a wide range of new sensing applications for handheld devices.

One of the challenges in sensing technology is to combine the very different requirements of MEMS with that of conventional electronic circuitry at the wafer level. In the first phase of its development work, VTI has been able to demonstrate one approach that uses currently available manufacturing techniques, to make smaller, lower cost devices. In the second phase, VTI is looking at new manufacturing technologies which will allow more complex sensing devices to be made using wafer-level integrations with the benefits of lower cost volume production and small size.

In its successful first phase, completed this year, VTI has demonstrated the potential of heterogeneous integration. Its approach has been to maintain the benefits of manufacturing the MEMS devices and ASICs on separate wafers to allow full testing of both types of before wafer level integration takes place. For this Chip-on-MEMS concept, thinned ASICs chips are flip-chipped onto the MEMS wafer in known good locations. Redistribution and isolation layers are applied to the MEMS wafer, solder points are provided for external connection before the ASICs are added and the MEMS and ASICs chips are then isolated using a passivation layer.

The concept has been proven in the successful construction and testing of a demonstration component having a foot print of only 4mm2 and a height of less than 1mm. This Chip-on-MEMS is a radical step away from conventional packaging as it is simply an extension of wafer-fab processes. Even the final testing and calibration are now wafer processes. The potential of these new integration concepts is that the size of MEMS devices could be cut to one third their current sizes.

VTI Technologies, Inc. . One Park Lane Blvd. . Suite 804 - East Tower . Dearborn, MI 48126
Tel. (313) 425-0850 . Fax (313) 425-0860 . E-mail: first.last@vtitechnologies.com . Internet: www.vti.fi