SiP Technologies: Perspectives and Challenges

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Philippe Cauvet is a senior principal engineer at Philips Semiconductors Caen, France. He received his MS in physics-instrumentation from the "Conservatoire National des Arts et Métiers" in 1989. After several years in the automotive industry, he joined Philips Semiconductors in 1994 as a test engineer for high-speed data converters. He developed advanced test techniques, focusing on solutions for jitter and noise issues, presented in several international conferences. In 2004, he moved to a new group of Philips Semiconductors, where he is in charge of the development of advanced techniques for System-in-Package technologies. Regular lecturer in engineering schools and of internal courses, he is a member of the Die Product Consortium, and the chairman of the "Mixed-Signal Test Methods" and of the "SiP Test" internal working groups.

Abstract:

The SiP (System-in-Package) technologies are becoming an important part of the semiconductors, and will likely continue to grow in the future, following the market demand in portable applications, such as mobile phones or laptop computers, where the size and the power consumption represent the two major factors for a successful implementation.

This talk will start with a brief introduction to the market trends, followed by a description of the various technologies involved: silicon-based, laminate-based substrates, stacked-die, package-on-package, flip-chip, etc.

The manufacturing flow will shortly explained in the next part, showing the economical importance of the yield at every process step.

An emphasis will be first made on the wafer test issues, by introducing the "known-good-die" approach. Although this strategy has been used for many years in industries like avionics or aerospace, it represents a big challenge for the mass production of consumer products, where the cost is the key factor. Some emerging solutions will be shown, thanks to either hardware enhancements or alternative test techniques.

Packaging issues will be then addressed, showing some examples of application with different configurations and their characteristics. The trends in packaging technologies will demonstrate the needs for permanent innovation in this field.

The final test will be also discussed, posing the major problems, and describing some of their related solutions, before drawing the conclusions.

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