

# 3D Packaging Technology Study within the SmartSense Project

by

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# A Review of 3D Packaging

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# **1 Objectives and Motivation**

## **1.1 Objectives of this Review**

In recent years, 3D packaging has widely reached applications in the automotive, consumer electronics as well as aerospace and military sectors. Furthermore, research is undertaken on novel stacking technologies as well as heterogeneous integration of RF modules and MEMS. More than ever, these packages have to meet requirements of optimal miniaturization as well as minimal costs.

The results of literature and market research about the state of the art of 3D packages are presented in this study. We will give an overview on the different architectures, discuss the advantages of the 3D packaging technologies and describe the issues and challenges these technologies raise. Furthermore, an overview on the enabling technologies (assembly, interconnect and substrate technologies) is given. A stronger focus will lie on the state of the art of cost effective back-end assembly technologies that open possibilities for heterogeneous integration and mass production at the same time.

## **1.2 Applications for 3D Packaging**

At the beginning, 3D packaging technologies were only produced in small quantities mainly for military and aerospace use. Furthermore, the automotive industry and companies of medical devices have adopted 3D packaging in comparably small quantities, as the iNEMI roadmap shows. [1] Reports show that 3D packages have also been applied to micro cameras and camera modules.

Today, the main application for 3D packaging technologies is mobile phones and consumer electronics where 3D packages are mostly used in wireless devices. Furthermore, automotive electronics will emerge as another important market for 3D packages. [2] Although the technologies have been researched for a longer period of time, the introduction of the iPhone among others has pushed 3D packaging into the spotlight. For example, JEDEC has released drafts for package-on-package (PoP) standards, a specific 3D packaging configuration, which is becoming popular in the industry. In the future, it is to be expected that 3D packages will penetrate most major electronics market segments.