APECS

Forschungsfabrik Mikroelektronik Deutschland

## About QMI

# Quasi-Monolithic Integration (QMI) – The Most Highly Integrated Chiplet Technology

**In today's world, where technological advances are happening at an incredible pace, it is essential that the integration of different technologies is also at the highest level. This is where Quasi-Monolithic Integration (QMI) comes into play – a ground-breaking method that breaks down the boundaries between back-end and front-end in microelectronics.**

## What is quasi-monolithic integration (QMI)?

Quasi-monolithic integration (QMI) refers to a technology in which various functional chiplets are integrated into a virtually monolithic system. With this technology, these integrated chiplets are then contacted within the back end of line, allowing the highest contact densities to be achieved.

Chiplets are modularized, reusable hardware IPs that serve as building blocks for the implementation of complex systems. By using chiplets, manufactures can combine different manufacturing technologies on the same wafer to take advantage of the best features of each component, resulting in improved performance and efficiency.

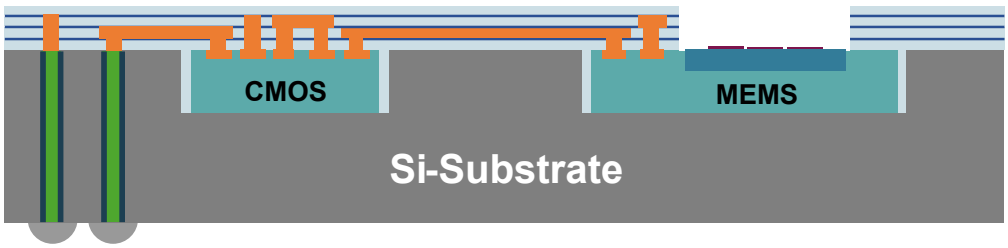
## Why is QMI so revolutionary?

The key strength of QMI lies in its ability to combine different materials and technologies in a highly integrated way to create an extremely efficient and reliable end product. In contrast to fully monolithic systems, QMI allows for greater flexibility and adaptability.

- The tight integration of various elements significantly increases the **performance** of the system. Signal losses and delays are minimized, resulting in **faster and more efficient data processing**.
- QMI systems are characterized by **increased reliability** and a **longer service life**, as the back end of line connections of the component reduces mechanical failures.
- QMI **alows extremely compact systems**, as the elements are integrated almost monolithically.
- The QMI combination of chiplets enables **cost-efficient maximum integration** with fast innovation cycles

## Into the future with QMI

Quasi-monolithic integration is at the forefront of technical innovation and its ability to combine the advantages of monolithic systems with the flexibility of modular approaches makes it a key technology for the future.




*Example of quasi-monolithic integration (QMI) with common ILD and interconnect technology (multilayer; thermal coupling; seamless PDK/ADK, ...)*