

Ultra-Thin Interposer Assemblies for Higher Integrated Circuit Bandwidth

Demand calls for more simple and inexpensive technologies for logic-memory bandwidth

The increasing number of applications in smart phones and mobile devices are driving the demand for logic-memory bandwidth to much higher levels without increasing power consumption at the system level. Two of the key factors influencing an integrated circuit's (IC) bandwidth are the number of logic-memory interconnections (i.e., I/O density) and the length of those connections. Current technology used is both expensive and complex.

New innovation uses high-density interconnections to increase bandwidth between communicating devices

Innovators at Georgia Tech utilized an ultra-small pitch structure that uses ultra-thin glass or silicon interposers, containing ultra-high density through-via interconnections to achieve bandwidth rates of at least ~10 gigabytes/second (GB/s). This innovative structure with its unprecedented density of interconnections — allowing 3D ICs to be stacked with or without TSVs — greatly increases bandwidth between the communicating devices.

This invention aims to achieve high bandwidth in telecommunication processes, via the use of new methods and structures. It is comprised of ultra-thin glass or silicon interposers, creating ultra-short interconnections, and ultra-fine pitch conductive through via structures, using novel process methods to fabricate such interposers.

Summary Bullets

- New ultra-thin interposer aims to achieve high bandwidth in telecommunication processes by using an ultra-small pitch structure and ultra-high density interconnections.
- The innovation allows for a great increase in bandwidth as well as a decrease in complexity and costs in comparison to current solutions.
- Novel invention provides advantages such as scalability, testability pre and post integration, and thermal flexibility for situations needing thermal isolation and conduction.

Solution Advantages

- **Scalable:** With connections above, below, and beside the interpose
- **Lower cost:** Less complex manufacturing through interposer-package integration
- **Testable:** Both before and after device integration
- **Thermally flexible:** With options for localized thermal isolation and conduction.

Potential Commercial Applications

This technology is ideal for applications requiring a variety of heterogeneous ICs — such as logic, memory, graphics, power, wireless, and sensors — that normally cannot be integrated into a single IC.

Inventors

- Dr. Rao Tummala
Distinguished and an Endowed Chair Professor - Georgia Tech Computer Engineering and Materials Science and Engineering

IP Status

<p>Patent application has been filed</p>:

Publications

[G. Kumar et al: Ultra-high I/O density glass/silicon interposers for high bandwidth smart mobile applications., IEEE Xplore - 2011](#)

Images

Visit the Technology here:

[Ultra-Thin Interposer Assemblies for Higher Integrated Circuit Bandwidth](#)

<https://s3.sandbox.research.gatech.edu//print/pdf/node/4263>