Open-Silicon and GLOBALFOUNDRIES Demonstrate Custom 28nm SoC Using 2.5D Technology

November 21, 2013

Design features two 28nm ARM Cortex-A9 processors interfacing across a silicon interposer

Milpitas, Calif., November 21, 2013 -- Open-Silicon, Inc., and GLOBALFOUNDRIES today announced the industry's first demonstration of a functional system-on-chip (SoC) solution featuring two 28nm logic chips, with embedded ARM processors, connected across a 2.5D silicon interposer. The jointly developed design is a proof-of-concept vehicle to showcase the benefits of 2.5D technology for mobile and low-power server applications.

At the heart of the custom SoC are two ARM Cortex-A9 processors manufactured using GF's 28nm-SLP (Super Low Power) process technology. The processors are attached to a silicon interposer, which is built on a 65nm manufacturing flow with through-silicon-vias (TSVs) to enable high-bandwidth communication between the chips. This approach allows designers to choose the most appropriate process technology for each function of their SoC, while the interposer and TSVs allow for finer grain and lower power connectivity than traditional packaging solutions, leading to smaller form factors and reduced power budgets for next-generation electronic devices.

The companies recently demonstrated the functioning SoC at ARM TechCon in Santa Clara, CA, where they were awarded "Best in Show" in the Chip Design category.

"We are now much closer to building a system in package than before and Open-Silicon is extremely pleased to be at the forefront of making 2.5D a reality with our foundry and OSAT partners," said Dr. Shafy Eltoukhy, vice president of technology development at Open-Silicon. "Given the multitudes of advantages that this technology offers, we firmly believe that widespread adoption along with heterogeneous die-integration will ensue soon."

"As chip designers face growing complexity and cost at smaller geometries, the adoption of 2.5D technology is increasingly being viewed as an alternative to traditional scaling at the transistor level," said Srinivas Nori, director of SoC innovation at GF. "By collaborating closely with design partners like Open-Silicon and OSAT partners like Amkor, we will be able to accelerate the availability of this technology while minimizing cost, improving yield, maximizing re-use, and decreasing risk."

Open-Silicon and GF developed the custom SoC to help overcome some of the challenges associated with bringing 2.5D technology to market. The 2.5D system features the following characteristics:

- Logic die including dual-core ARM Cortex-A9 CPUs, as well as DDR3, USB and AXI bridge interfaces
- A special EDA reference flow designed to address the additional requirements of 2.5D design, including top-level interposer design creation and floor planning, as well as the increased complexity of using TSVs, front-side and back-side bumps, and redistribution layer (RDL) routing
- Support for additional verification steps brought on by 2.5D design rules
- Custom die-to-die IO for better area and power characteristics providing a maximum of 8GB/s full-duplex data-rate across the two die through the silicon interposer
- A development board with memory, boot-ROM, and basic peripherals to demonstrate the die-to-die interface functionality through software running on the CPUs embedded in the logic dies
- A test methodology consisting of Boundary Scan and Loopback modes
- Package-related design rules, back-side integration, copper pillar micro-bumping, and 2.5D product assembly by Amkor Technology, a leading supplier of outsourced semiconductor packaging and test services

About Open-Silicon

Open-Silicon, a leading supplier and developer of customer-specific products (CSPs), provides ASICs, platforms, concept-to-parts development, customized IP, low-effort derivative design, and state-of-the-art manufacturing solutions. With Open-Silicon, customer's benefit from global engineering including an ARMÂ® Technology Center of Excellence, advanced SerDes integration, 2.5D interposer-based package engineering, experienced architects, leading-edge physical design methodology, and embedded software development, all leveraging the industry's best technology from both Open-Silicon and the open market. For more information, visit Open-Silicon's website at www.open-silicon.com or call 408-240-5700 begin_of_the_skype_highlighting 408-240-5700 FREE end_of_the_skype_highlighting.

About GF

GF is the world's first full-service semiconductor foundry with a truly global footprint. Launched in March 2009, the company has quickly achieved scale as the second largest foundry in the world, providing a unique combination of advanced technology and manufacturing to more than 160 customers. With operations in Singapore, Germany and the United States, GF is the only foundry

that offers the flexibility and security of manufacturing centers spanning three continents. The company's three 300mm fabs and five 200mm fabs provide the full range of process technologies from mainstream to the leading edge. This global manufacturing footprint is supported by major facilities for research, development and design enablement located near hubs of semiconductor activity in the United States, Europe and Asia. GF is owned by the Advanced Technology Investment Company (ATIC). For more information, visit http://www.globalfoundries.com.