GLOBALFOUNDRIES and Cyclos Semiconductor Partner to Develop High-Performance, Low-Power ARM Cortex-A15 Processors Using Resonant Clock Mesh Technology

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Partnership Will Enable GLOBALFOUNDRIES Customers to Realize SoCs with Class-Leading Performance and Power-Efficiency in 28nm through Cyclos Resonant Clock Mesh Technology

Santa Clara, Calif., February 5, 2013 —At today's Common Platform Technology Forum, GF and Cyclos Semiconductor, the inventor and only supplier of resonant clock mesh (RCM) technology for commercial IC designs, announced plans to implement Cyclos' low-power semiconductor intellectual property in ARM® CortexTM-A15 processors using 28nm High-K Metal Gate (HKMG) process technology from GF.

The partnership will enable GF's customers to design next-generation SoCs with class-leading performance and power efficiency. It also reflects Cyclos' commitment to ensure the broadest possible availability of its RCM IP technology for reducing power consumption.

Cyclos RCM IP is a unique and differentiating technology that reduces the power consumed in clock meshes, the clock distribution networks that have been used in high-performance processors for years. Cyclos employs on-chip inductors to create an electric pendulum, or "tank circuit," formed by the large capacitance of the clock mesh and the Cyclos inductors. The Cyclos inductors and clock control circuits "recycle" clock power instead of dissipating it on every clock cycle like in a conventional clock network implementation, which results in a reduction in total IC power consumption.

Implementing inductors on-chip to resonate a clock mesh is a simple idea with complex implementation requirements. Cyclos has commercialized over 10 years of research to produce resonant clock mesh design solutions that meet all the testability, reliability, dynamic frequency scaling, and quality assurance requirements of today's ICs.

GF and Cyclos are now partnering to make RCM technology available for the first time ever to the ARM ecosystem. The low clock-skew, power-saving clock distribution technology from Cyclos will be deployed to achieve uniquely differentiating power, performance and area (PPA) metrics on ARM Cortex-A15 processors based on GF 28nm-SLP and 28nm-HPP process technologies to serve both the high-end mobility and low-power micro-server segments.

"Cyclos' advanced clock mesh technology has already been used to demonstrate reduced power consumption while maintaining high clock speeds with our HKMG process," said Srinivas Nori, director of SoC innovation at GF. "Now the powerful combination of our 28nm HKMG process and Cyclos' RCM technology will be available to a broader customer base, thereby enabling them to push the envelope of PPA efficiency for ARM processor-based SoC designs at the leading edge."

"Our customers demand continuous improvements in the performance of their ARM processor-based SoCs, while maintaining leadership in energy efficiency," said Dr. Krisztiaì?n Flautner, vice president of research and development at ARM. "We are excited that GF is developing future power and performance scaling options for leading-edge applications."

"This partnership represents a major milestone for Cyclos Semiconductor," said Marios Papaefthymiou, founder and President of Cyclos Semiconductor. "We believe that RCM design will be a key enabler for GHz+ embedded processor IP blocks in next-generation SoCs that also require ultra-low power consumption. We are looking forward to making this technology available to GF's customers through the development of RCM-based ARM Cortex-A15 cores. We are also eager to expand RCM deployment into SoC designs via design automation tools currently under development at Cyclos."

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.

About Cyclos Semiconductor

Cyclos is the inventor and only commercial provider of resonant clock mesh technology for IC designs. The company is a spin-out

of the University of Michigan via their Technology Transfer Office. Based in Berkeley, CA and Ann Arbor, MI, Cyclos delivers resonant clock mesh semiconductor IP, design automation tools, and design consulting services for resonant clock mesh design solutions. For more information, visit http://www.cyclos-semi.com.