Ambiq Micro Achieves World-Leading Power Consumption Performance with TSMC 40ULP Technology

Austin, TX and Hsinchu, Taiwan – July 2, 2019 – Ambiq Micro and TSMC (TWSE:2330, NYSE: TSM) today announced that Ambiq's Apollo3 Blue wireless SoC, built on TSMC's 40 nanometer ultra-low power (40ULP) process, has achieved world-leading power consumption performance. Leveraging both Ambiq's Subthreshold Power Optimized Technology (SPOT™) platform and TSMC's 40ULP low operating power (low-Vdd) technology, the Apollo3 Blue with TurboSPOT™ sets a new standard in energy efficiency for battery-powered devices by increasing the computational capabilities of the ARM Cortex M4F core to 96MHz while lowering the active power consumption to less than six microamperes per megahertz (6uA/MHz). The Apollo3 Blue's outstanding performance has enabled Ambiq to reach new markets including battery-powered smart home devices and always-on, voice-enabled applications like remote controls and hearables.

The Apollo3 Blue brings several new features to Ambiq's SPOT-based Apollo product line including an integrated DMA engine, QSPI interface, and advanced stepper motor control for ultra-low power analog watch hand management. With unprecedented energy efficiency and microphone inputs, the Apollo3 Blue forms the core of Ambiq's Voice-on-SPOT™ reference platform making it the perfect device for customers that want to add always-on voice assistant integration and command recognition to battery-powered devices. To increase design flexibility and enable connections to the phone and cloud, the Apollo3 Blue provides a dedicated second core for the ultra-low power BLE5 connectivity platform providing superior RF throughput and leaving plenty of resources available for user applications.

TSMC's 40ULP technology conserves power with low-leakage transistors achieved by careful optimization of all leakage paths including the gates and junctions. To further enable IoT applications, TSMC also provides an eHVT ultra-low-leakage transistor and ultra-low leakage (ULL) SRAM bitcell. TSMC's 40ULP also provides a low-Vdd solution supported by multiple Vt option transistors, and a comprehensive design infrastructure including standard cell supporting operating voltage of 0.7V with robust timing sign-off methodology, design flow optimized for low operating voltage, and accurate wide-range SPICE model covering low-Vdd range. In addition, TSMC's manufacturing excellence enables customers to design with the confidence of minimal process variation, helping them break through the limits of energy consumption for battery-powered applications.

"Ambiq Micro is proud to continue our long-standing relationship with TSMC and build our next generation SPOT-enabled devices on TSMCs low-Vdd process technologies", said Aaron Grassian, Ambiq Micro Vice President of Marketing. "Ambiq Micro consistently sets dramatically new

levels of energy efficiency with each new product enabling customers to add true intelligence to mobile, battery-powered edge devices."

"It's exciting to witness what can be accomplished when Ambiq's design innovation meets TSMC's extensive process know-how," said Dr. Kevin Zhang, TSMC Vice President of Business Development. "TSMC continues to develop its comprehensive portfolio of low-Vdd offerings, from 55ULP and 40ULP to 22ULL, supported by the industry's most extensive design ecosystem, to help our customers create intelligent, connected devices that are always ready to interact with users in an easy, intuitive fashion."

Following up on the highly competitive 40ULP, TSMC has further extended its low-Vdd offerings for extremely low-power applications with 22nm ULL, which has improved RF and enhanced analog features as well as low-leakage eHVT device and ULL SRAM bitcell. It further supports low-Vdd design with operating voltage reduced to 0.6V, and on-chip MRAM and RRAM are also available to enable low-leakage embedded nonvolatile memory solutions for IoT applications.

About Ambiq Micro

Ambiq Micro was founded in 2010 on the simple yet powerful notion that extremely low power semiconductors are the key to the future of electronics. Through the use of its pioneering and patented Subthreshold Power Optimized Technology (SPOT™) platform, innovative companies around the world are developing differentiated solutions that reduce or eliminate the need for batteries, lower overall system power, and maximize industrial design flexibility.

About TSMC

TSMC pioneered the pure-play foundry business model when it was founded in 1987, and has been the world's largest dedicated semiconductor foundry ever since. The company supports a thriving ecosystem of global customers and partners with the industry's leading process technology and portfolio of design enablement solutions to unleash innovation for the global semiconductor industry.

TSMC serves its customers with annual capacity of about 12 million 12-inch equivalent wafers in 2019 from fabs in Taiwan, the United States, and China, and provides the broadest range of technologies from 0.5 micron plus all the way to foundry's most advanced processes, which is 7-nanometer today. TSMC is the first foundry to provide 7-nanometer production capabilities, and is headquartered in Hsinchu, Taiwan. For more information about TSMC please visit http://www.tsmc.com.

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