Media Release

UTAC, Sarda and AT&S Collaborate in Delivering Small, Fast Voltage Regulators to Improve Data Center Energy Efficiency

Sarda's Heterogeneous Integrated Power Stage (HIPS) Employs UTAC's 3D SiP using the Embedded Component Packaging (ECP®) Technology from AT&S for Granular Power Delivery

June 15, 2016 – Raleigh, North Carolina and Singapore - Sarda Technologies (Sarda), a disruptive power management component supplier and UTAC Holdings Ltd (UTAC), one of the leading semiconductor assembly and test services providers in Asia, today announced that Sarda will implement its Heterogeneous Integrated Power Stage (HIPS) in UTAC's three-dimensional system-in-package ("3D SiP") based on ECP technology from AT&S to improve data center's energy efficiency.

Designed to address the rapidly escalating power consumption in data centers, Sarda's HIPS replaces silicon switches with gallium arsenide (GaAs) in voltage regulators that increase switching frequency by 10 times, improve transient response by 5 times and reduce size by 80%. With these fast, small voltage regulators, it enables granular power delivery to reduce data center power consumption by 30%.

The collaboration was announced at the International Symposium on 3D Power Electronics, Integration and Manufacturing Symposium (www.3D-PEIM.org) in Raleigh, North Carolina, USA.

"UTAC's 3D SiP enables Sarda to integrate GaAs switches, silicon driver and passive components in a compact, low-profile package that minimizes parasitics for efficient, high speed operation," said Bob Conner, CEO and co-founder of Sarda. *"UTAC's collaboration with AT&S also provides a full turnkey supply chain assembly and test flow with much needed alignment of roadmaps as well as design rules for 3D SiP solutions with embedded chip in substrate technology."*

"System manufacturers are moving from use of discrete components to highly integrated power management solutions to improve power density and energy efficiency. UTAC is very excited in working closely with Sarda and AT&S to demonstrate the benefits of using 3D SiP to reduce footprint and improve electrical and thermal performance," said Lee Smith, UTAC Vice President of Advanced Package Product Line.

"Our collaboration with UTAC maximizes the benefits of utilizing AT&S' ECP technology for the Sarda HIPS Solution", stated Michael Lang, CEO of Advanced Packaging at AT&S*. "The major ECP advantages compared to standard IC packaging and PCB assembly include a significant form factor reduction, higher reliability, improved thermal management and a fast and easy system integration with high efficiency."*

Reducing Data Center Cost-Per-Workload

Servers, routers and communications systems require new power management technology to keep up with the growth in data consumption and mobile connectivity. But power delivery and heat removal issues constrain system performance. Moreover, each system board uses dozens of voltage regulators which consume precious board space.

Designers can no longer rely solely on Moore's Law to deliver the needed gains in energy efficiency. Leading edge processors now operate at less than one volt, which prevents designers from reducing operating voltage enough to keep power consumption constant while increasing transistor density. Instead, developers are turning to "More-than-Moore Scaling," which heterogeneously integrates different materials and components to improve system performance-per-watt.

Small, fast voltage regulators enable granular power which reduces system power consumption through dynamic power management of each load. Miniaturizing the voltage regulators also frees up board space for more processors and memory to increase system performance. Increasing system performance-per-watt decreases the system cost-per-workload.

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About the International Symposium on 3D Power Electronics Integration and Manufacturing

The first International Symposium on 3D Power Electronics Integration and Manufacturing (www.3D-PEIM.org), held June 13-15, 2016, in Raleigh, North Carolina, brings together designers and manufacturers to address the future of integrated power electronics and advance the 3D power electronics systems designs of the future.

The 3D-PEIM symposium is underwritten by the Power Sources Manufacturers Association (PSMA) and is supported by the International Microelectronics Assembly and Packaging Society (IMAPS); the IEEE Components, Packaging and Manufacturing Technology Society (CPMT); North Carolina State University; the University of Maryland; and Virginia Tech.

About Sarda Technologies

Sarda Technologies provides disruptive power management components to reduce data center cost-per-workload by reducing power consumption through granular power delivery. The venture-backed company is located in Durham, NC. Please visit www.sardatech.com for more information or contact:

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About UTAC Holdings Ltd

UTAC Holdings Ltd (UTAC) is a leading independent provider of assembly and test services for a broad range of semiconductor chips and we offer a full range of semiconductor assembly and test services in the following key product categories: analog, mixed-signal and logic, and memory. Our customers are primarily fabless companies, integrated device manufacturers and wafer foundries. UTAC is headquartered in Singapore, with production facilities located in Singapore, Thailand,

Taiwan, China, Indonesia and Malaysia, in addition to its global sales network focused on five regions: United States, Japan, China and Taiwan, rest of Asia and Europe, with sales offices located in each of these regions.

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About AT & S Austria Technologie & Systemtechnik AG - First choice for advanced applications

AT&S is the European market leader and one of the globally leading manufacturers of high-value printed circuit boards. AT&S industrialises leading-edge technologies for its core business segments Mobile Devices, Automotive, Industrial, Medical and Advanced Packaging. In 2016, AT&S produces two new, leading-edge technologies at the new site in Chongqing (China) – IC substrates and substrate-like printed circuit boards for high-end applications. As an international growth enterprise, AT&S has a global presence, with production facilities in Austria (Leoben and Fehring) and plants in India (Nanjangud), China (Shanghai, Chongqing) and Korea (Ansan, near Seoul). The company employed an average of 8,759 people as in the financial year 2015/16.

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