Power Integrations invests $30m in SemiSouth

Partnership to speed development of power devices for solar, wind & hybrid/electric auto industries

Power Integrations Inc of San Jose, CA, USA, which supplies high-voltage integrated circuits for compact, energy-efficient AC–DC and DC–DC power conversion in electronic products, has made a strategic investment in SemiSouth Laboratories Inc of Starkville, MS, USA.

Founded in 2000 as a spin-out from Mississippi State University, SemiSouth is a privately held firm that designs and manufactures high-voltage silicon carbide (SiC) semiconductor power devices and electronics for high-efficiency, harsh-environment power management and conversion in applications ranging from 3kW to 100kW (with products in development to serve applications up to 1MW). With a 10,000ft^2 cleanroom and more than 70 staff at its Starkville headquarters, products include 1200V and 1700V transistors as well as high-voltage diodes and power modules.

Power Integrations' EcoSmart energy-efficiency technology cuts standby energy consumption. Since 1998, the firm has sold nearly 4bn of its EcoSmart chips (used in electronic products including computers, appliances, mobile-phone chargers, consumer electronics and LED lights), saving an estimated $4.4bn of standby power and millions of tons of CO_2 emissions.

Power Integrations' commitment of $30m (which includes an equity investment in SemiSouth, a technology license and other financial commitments) should help to drive the continued expansion of SemiSouth's SiC fabrication facility. The firms will also collaborate to drive adoption of SemiSouth's SiC technology, aiming to speed the development of efficient power conversion devices for applications including solar and wind inverters as well as hybrid/electric vehicles.

The new relationship was announced at SemiSouth's Starkville base in the Thad Cochran Technology, Research and Economic Development Park at Mississippi State University in the presence of public officials including Mississippi Governor Haley Barbour, US Representative Gregg Harper, and Mississippi State University president Dr Mark Keenum.

"SemiSouth has made impressive breakthroughs in the development of silicon carbide technology, attaining exceptionally high levels of efficiency and establishing SiC as an enabler of clean technologies such as solar energy and hybrid/electric vehicles," says Power Integrations' president & CEO Balu Balakrishnan. "With a mutual focus on energy-efficient high-voltage semiconductor technology, Power Integrations and SemiSouth are natural strategic partners," he reckons. "We are particularly enthusiastic about investing in Mississippi's emerging high-tech sector, where strong support from government and the academic community has created an environment highly conducive to innovation and private-sector investment," Balakrishnan notes.

"Today's announcement is a testament to SemiSouth's success and to Mississippi's growing stature as a center for technology and innovation," asserts Barbour. "As a leader in automotive manufacturing, Mississippi understands the strategic importance of advanced power electronics, which are becoming a critical part of the supply chain as the industry migrates to hybrid/electric vehicles. Home-grown innovations like SemiSouth's SiC technology represent a tremendous economic opportunity for our state," he adds.

"In response to unprecedented global demand for our products in energy-sensitive markets such as solar inverters, server power supplies, wind inverters, and electric vehicle development, we needed to find the right investor willing to share our vision of expansion," says SemiSouth's president & CEO Kenney Roberts. "We welcome Power Integrations' investment in SemiSouth's future, to allow us to quickly expand and serve our customers on a much broader scale."

www.powerint.com
www.semisouth.com

Dow Corning producing micropipe-free 76mm 4H-SiC

Dow Corning Compound Semiconductor Solutions (DCCSS) of Midland, MI, USA says that it has developed technology to grow 76mm-diameter 4H-SiC (silicon carbide) crystals that are free of micropipe defects. Crystals made from the new zero-micropipe technology are now made routinely and supply the DCCSS 76mm 4H-SiC wafer and epitaxy manufacturing line.

Since micropipe defects are highly focused on killer defects in SiC devices, a supply of SiC substrates free of micropipes establishes the potential to manufacture SiC devices with higher yields than what has been possible with available SiC substrates in the past, says the firm.

"Dow Corning will continue to invest in the advancement of our SiC technology to support our customers' efforts in achieving their goals," says commercial manager Fred Buether. "We're using our technology experience to develop advanced application solutions for the power electronics market that result in innovative, energy-efficient products that are cost effective," he adds.

www.dowcorning.com/content/compsemi

GeneSiC wins $2.5m grant to develop multi-kV thyristors

The US Advanced Research Projects Agency – Energy (ARPA-E) has entered into a cooperative agreement with a team led by GeneSiC Semiconductor Inc of Dulles, VA, USA to develop ultra-high-voltage silicon carbide (SiC) thyristor-based devices, which are expected to be key enablers for integrating large-scale wind and solar power plants into the next-generation smart grid.

Located near Washington DC, GeneSiC develops SiC-based devices for high-voltage, high-frequency SiC devices for power grid, pulsed power and directed energy weapons as well as high-temperature SiC power devices for aircraft actuators and oil exploration. Development projects include high-temperature rectifiers, SuperJunction Transistors (SJT) and a variety of thyristor-based devices. GeneSiC has had prime/sub-contracts from US Government agencies including the Department of Energy, Navy, Army, DARPA, and Department of Homeland Security.

"This highly competitive award to GeneSiC will allow us to extend our technical leadership position in multi-kV SiC technology, as well as our commitment to grid-scale alternative energy solutions with solid-state solutions," believes president Dr Ranbir Singh. "Multi-kV SiC thyristors we're developing are the key enabling technology towards the realization of Flexible AC Transmission Systems (FACTS) elements and High Voltage DC (HVDC) architectures envisaged towards an integrated, efficient, smart grid," he adds. "GeneSiC's SiC-based thyristors offer 10 times higher voltage, 100 times faster switching frequencies and higher-temperature operation in FACTS and HVDC power processing solutions as compared to conventional silicon-based thyristors."

In April, GeneSiC responded to the Agile Delivery of Electrical Power Technology (ADEPT) solicitation from ARPA-E that sought to invest in materials for fundamental advances in high-voltage switches that has the potential to leapfrog existing power converter performance while offering reductions in cost. The firm's proposal 'Silicon Carbide Anode Switched Thyristor for medium voltage power conversion' was selected to provide a lightweight, solid-state, medium-voltage energy conversion for high-power applications such as solid-state electrical substations and wind turbine generators. Deploying these advanced power semiconductor technologies could provide a reduction in electricity consumption of as much as 25–30% through increased efficiencies in delivery of electrical power, says GeneSiC.

Ultra-high-voltage (>10kV) SiC device technology will play a revolutionary role in the next-generation utility grid, believes GeneSiC. Thyristor-based SiC devices offer the highest on-state performance for >5kV devices, and are widely applicable to medium-voltage power conversion circuits such as fault-current limiters, AC–DC converters, static VAR compensators and series compensators, adds the firm. SiC-based thyristors also offer the best chance of early adoption due to their similarities to conventional power grid elements. Other promising applications and advantages for the devices include:

- power-management and power-conditioning systems for medium-voltage DC conversion sought under Future Naval Capability (FNC) of US Navy, electro-magnetic launch systems, high-energy weapon systems and medical imaging (the 10–100x higher operating frequency capability allows unprecedented improvements in size, weight, volume and, ultimately, cost of such systems, says GeneSiC); and
- a variety of energy storage, high-temperature and high-energy physics applications (energy storage and power grid applications are receiving increasing attention as the world focuses on more efficient and cost-effective energy-management solutions).

www.genesicsemi.com

High-linearity power amplfiers for 4.4–5.1GHz band

IXYS Corp subsidiary MicroWave Technology Inc (MwT) of Fremont, CA, USA, which makes GaAs-based devices, MMICs and amplifier modules for microwave and wireless communications, has launched a family of three GaAs- and GaN-based high-linearity microwave/RF power amplifiers.

The WPS-445133-02 has 2W output at 1dB gain compression point and 26dBm linear output power (burst power) at 2.5% EVM under the 64 QAM 802.11 digital signal modulation scheme. The multi-stage power amplifier has 33dB of gain.

The WPS-444924-02 produces 4W output power at 1dB gain compression point and 29dBm linear output power at 2% EVM with 10dB gain.

As a GaN-based high-power amplifier that requires 28V on the drain bias, the MGA-444940-02 achieves 10W output at 2dB gain compression point and 33dBm linear power at 2.5% EVM with 12dB gain. The power-added efficiency at 2W linear power level is as high as 20%.

The power amplifiers suit emerging applications in the 4.4–5.1GHz frequency band, including telemetry, dedicated high-data-rate wireless network, point-to-point wireless communications, and military wireless communications.

All three are fully matched for both input and output terminals for easy cascade and are packaged in RoHS-compliant MwT-02 surface-mount package. Mean time before failure is over 100 years at 85ºC ambient.

www.mwtinc.com