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Enerdyne Solutions Wins Grant for Cooler Wireless Devices

NORTH BEND, WA. July 1, 2004 – Enerdyne Solutions and faculty at Washington State University (WSU) begin work today on cooler chip designs funded in part by a \$40,000 Research Technology Development (RTD) grant from the Washington Technology Center (WTC). This 9-month collaborative project will produce innovative semiconductor chip designs so cellular phones and other wireless devices can operate cooler—with as much as two-to-three-times better thermal performance, enabling a doubling of chip output while reducing the size, weight and cost of the overall thermal solution. The project will focus on the evaluation and simulation of candidate designs for Gallium Arsenide (GaAs) Radio Frequency (RF) amplifier circuits with high power density and the development of design rules for subsequent device fabrication. The work will be done both at WSU’s School of Electrical Engineering and Computer Science in Pullman and at Enerdyne Solution’s research facility in North Bend.

Cellular telephony is now the single largest market for semiconductors, having surpassed the computer-related market. Demand for new handsets is currently above 40% per year, with 2004 unit shipments estimated at almost 600 million by CIBC World Markets. GaAs RF amplifiers are the critical enabling technology for wireless communications devices, and are used extensively in both handsets and infrastructure in the cellular, pager, radar and wireless internet industries. Additionally, as cellular usage continues to increase and usage becomes more data intensive, the RF infrastructure must provide higher performance.

“Compelling proposals, like Enerdyne’s, have a blend of great science and solid business strategy,” explained Laura Dorsey, WTC Technical Services Manager. “RTD applicants go through rigorous evaluation by academic and industry experts. Continued Dorsey, “The goal is to identify those projects that successfully combine technical merit with a strong business plan and economic impact in Washington”.

The project will utilize the expertise of WSU Associate Professor Dr. George LaRue in GaAs circuit design and of WSU Professor Dr. Mohamed Osman in device physics, simulation and high temperature electronics. Chris Macris, CTO of Enerdyne Solutions will provide expertise in the thermal analysis, design, and realization of high-performance cooling constructs. Together the team will investigate several GaAs Metal Semiconductor Field Effect Transistor (MESFET) RF Amplifier device structures based on the technological approach Enerdyne uses with its Polara™ heat spreaders for reducing the junction temperature at the device and circuit level. “There is an excellent fit between the challenges of this project and the research interests and expertise of the team,” notes Macris. “The WTC staff has been extraordinarily helpful in the

development of this proposal, and I'm very pleased that they have selected us for funding. We're all eager to get started."

In amplifying high-frequency RF signals much of the power consumption is lost to heat. This heat results in reliability problems and higher thermal solution costs and contributes to substantially larger and more expensive systems. The squandering of power through inefficient operation frustrates the desire for longer usable battery life, and further increases costs. A design that improves the thermal performance allows an increase in the power density without a costly increase in the cooling solution. "I look forward to working with Enerdyne Solutions on this research," says LaRue. "It has the potential to reduce the cost of many wireless applications such as cell phones."

Cooler operation of the key chips in wireless devices permits higher power densities, which allow smaller chips to handle the same amount of power, resulting in more chips per wafer, and hence, lower costs per chip. "People want cell phones that are powerful, portable, and operate a long time without needing to be recharged," observes Chris Leyerle, Enerdyne's President. "The cooler chips produced by this project will also enable manufacturers to create cost-effective wireless devices that are smaller, lighter and more richly-featured without compromising battery life."

Enerdyne Solutions develops, manufactures and commercializes technologies addressing the growing array of increasingly severe thermal problems facing the electronics industry today. Enerdyne and its principals have used their multi-disciplinary scientific expertise and experience to generate multiple patents and applications characterized by higher performance at reduced cost. The Company's products include Polara™, a semiconductor heat spreader technology ideal for hot spot mitigation; Indigo™, a thermal interface material system with twice the performance of its closest competitor; and PermaFrost™, an advanced thermoelectric chip for solid-state cooling, heating, and power generation.

The School of Electrical Engineering and Computer Science at Washington State University contributes both fundamental and applied research results to the information technology and engineering fields, educates students at all levels, and equips them for technical careers and other productive roles as citizens of the state and nation. More than 36 faculty members, 600 undergraduates and 100 graduate students enjoy state-of-the-art facilities for research and learning in such fields as wireless communications, embedded systems, digital design, power systems, microtechnology/device fabrication, optoelectronics, plasma research, and many others.

The Washington Technology Center (WTC) is a statewide technology-focused economic development agency. WTC's mission is to spark ideas, form connections between people and resources, and foster job growth to position Washington as a national technology leader. WTC's Research and Technology Development (RTD) program awards more than \$1 million annually for projects conducted jointly by Washington companies and researchers. The RTD program promotes academic-industry partnership, encourages collaborative idea generation, and help move concepts out of the laboratory and into the commercial market.

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