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SemiSouth Laboratories Announces Efficiency Improvement in Solar Inverter with SiC JFET

*Enhancement-mode JFET eliminates 50% of
energy losses in power semiconductors*

AUSTIN, Texas, April 10, 2008 - SemiSouth Laboratories, Inc. and the Center for Advanced Vehicle Systems (CAVS) at Mississippi State University announced today that SemiSouth's enhancement-mode silicon carbide (SiC) Junction Field Effect Transistor (JFET) significantly improved the efficiency of an off-the-shelf inverter commonly used in residential and commercial solar power energy systems. CAVS provided guidance and precision test equipment required to measure and validate the efficiency improvement.

CAVS validated that by replacing the existing silicon transistors with SemiSouth's enhancement-mode SiC JFETs - the inverter realized reduced losses in the power semiconductors by as much as 50%. Most significantly, CAVS used the JFETs as "drop-in" replacements for the silicon devices, making no design changes to the inverter before inserting the SemiSouth components. The grid connected, low-frequency isolated inverter, purchased from commercial inventory of a leading solar inverter provider, was designed with conventional silicon Insulated Gate Bipolar Transistors (IGBTs). Dr. Rand German, Director of CAVS and Professor of Mechanical Engineering at MSU, said of this collaboration "CAVS is putting a major emphasis on positioning itself for a lead in automotive power electronics R&D. This result validates our belief that developing and testing applications for silicon carbide power electronics through our partnership with

SemiSouth is leading to breakthroughs in energy efficiency."

Beyond the dramatic reduction in both conduction and switching losses, the use of SiC JFETs as "drop-in" replacements to achieve the efficiency gains is unprecedented. Robin Kelley, an applications engineer for SemiSouth, said, "All that was necessary to drop-in the enhancement-mode JFETs was the addition of a few passive components in the control circuit to take into consideration the change in threshold voltage between the original IGBTs and these JFETs. We started the inverter and it ran without any problems." With this simple change, immediate improvement with respect to performance and efficiency were realized. This serves to open the door for additional modification to fully take advantage of the SemiSouth device that will yield additional improvements not only in performance and efficiency, but also in overall system reliability.

Dr. Jeff Casady, SemiSouth's Chief Technical Officer, described the enhancement-mode SiC JFET as "cheaper to produce, smaller than any comparable silicon or silicon-carbide transistor, and free of reliability concerns with gate-oxides that have plagued more conventional approaches to develop an enhancement-mode field effect transistor using silicon carbide."

This new enhancement-mode JFET can be used as a direct replacement for silicon MOSFET's and IGBT's in virtually any off-the-shelf converter or inverter design.

Vess Johnson, SemiSouth's President and CEO, said, " The fact that the JFET's can be used as a drop-in replacement means that the barrier to entry has been greatly reduced and that designers working with these devices will be able to see immediate performance and efficiency improvements and will be able to drive new and better products to market much faster."



