

TRANSPHORM

EFFICIENT SWITCHES FOR SOLAR POWER CONVERSION

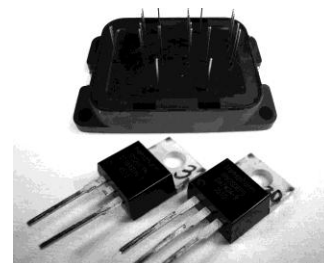
PROJECT TITLE:	Four Quadrant GaN Switch Enabled Three Phase Grid-Tied Microinverters		
ORGANIZATION:	Transphorm, Inc.	LOCATION:	Goleta, CA
PROGRAM:	Solar ADEPT	ARPA-E AWARD:	\$3,644,559
TECH TOPIC:	Power Conversion	PROJECT TERM:	2/13/12 – 2/12/15
WEBSITE:	www.transphormusa.com		

CRITICAL NEED

Photovoltaic (PV) solar systems convert the sun's energy into electricity, but only a small percentage of the sunlight that reaches a PV system is converted into useful electricity. This is due in part to the inefficiency of inverters for converting direct current (DC) output of solar cells to alternating current (AC) power needed for the grid when the intensity of the sunlight is low. Failure-prone electrical components used in most PV systems today also reduce system reliability. Improving the performance of switches and components used in inverters would lower the overall cost of PV systems —helping to make renewable solar energy cost-competitive with conventional, nonrenewable forms of electricity generation.

PROJECT INNOVATION + ADVANTAGES

Transphorm is developing power switches for new types of inverters that improve the efficiency and reliability of converting energy from solar panels into useable electricity for the grid. Transistors act as fast switches and control the electrical energy that flows in an electrical circuit. Turning a transistor off opens the circuit and stops the flow of electrical current; turning it on closes the circuit and allows electrical current to flow. In this way a transistor can be used to convert DC from a solar panel into AC for use in a home. Transphorm's transistors will enable a single semiconductor device to switch electrical currents at high-voltage in both directions—making the inverter more compact and reliable. Transphorm is using Gallium Nitride (GaN) as a semiconductor material in its transistors instead of silicon, which is used in most conventional transistors, because GaN transistors have lower losses at higher voltages and switching frequencies.



IMPACT

If successful, Transphorm would develop solar inverters that would be over 98% efficient at converting solar energy into useable electricity, thereby improving performance and reducing operating cost of the entire PV system.

- **SECURITY:** Lowering the cost of PV systems would help increase the use of solar energy, which in turn would decrease our dependence on fossil fuels and improve U.S. energy security.
- **ENVIRONMENT:** Solar energy systems create zero harmful emissions while providing energy to homes and businesses, so their widespread use would significantly improve air quality.
- **ECONOMY:** This project could help position the U.S. as a leader in the power electronics industry since the technology can be used for other applications.
- **JOBS:** Widespread use of these PV systems could create jobs for system installers, technicians and salespeople.

CONTACTS

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