Advanced Research Projects Agency • ENERGY

ADEPT PROJECT

CPES AT VIRGINIA TECH

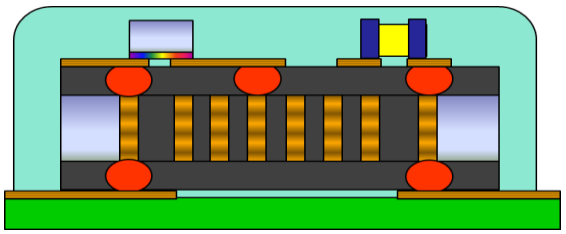
INTEGRATED POWER ADAPTER

PROJECT TITLE:	Isolated Converter with Integrated Passives and Low Material Stress		
ORGANIZATION:	Center for Power Electronics Systems (CPES) at Virginia Polytechnic Institute and State University (Virginia Tech)	LOCATION:	Blacksburg, VA
PROGRAM:	ADEPT	ARPA-E AWARD:	$1,000,000
TECH TOPIC:	Energy Storage: Portable	PROJECT TERM:	9/1/10 – 8/31/13
WEBSITE:	www.cpes.vt.edu		

CRITICAL NEED

All electric devices are built to operate with a certain type and amount of electrical energy, but this is often not the same type or amount of electrical energy that comes out of the outlet in your wall. Power converters modify electrical energy from the outlet to a useable current, voltage, and frequency for an electronic device. Today's power converters are inefficient because they are based on decades-old technologies and rely on expensive, bulky, and failure-prone components. Within the next 20 years, 80% of the electricity used in the U.S. will flow through these devices, so there is a critical need to improve their efficiency.

PROJECT INNOVATION + ADVANTAGES



CPES at Virginia Tech is developing an extremely efficient power converter that could be used in power adapters for small, lightweight laptops and other types of mobile electronic devices. Power adapters convert electrical energy into useable power for an electronic device, and they currently waste a lot of energy when they are plugged into an outlet to power up. CPES at Virginia Tech is integrating high-density capacitors, new magnetic materials, high-frequency integrated circuits, and a constant-flux transformer to create its efficient power converter. The high-density capacitors enable the power adapter to store more energy. The new magnetic materials also increase energy storage, and they can be precisely dispensed using a low-cost ink-jet printer which keeps costs down. The high-frequency integrated circuits can handle more power, and they can handle it more efficiently. And, the constant-flux transformer processes a consistent flow of electrical current, which makes the converter more efficient.

IMPACT

If successful, CPES at Virginia Tech would reduce the amount of energy consumed by notebooks and netbooks by 15%.

- SECURITY: Reduced energy consumption would help decrease demand for foreign sources of fuel.
- ENVIRONMENT: Efficient electronic components and devices conserve energy and reduce harmful emissions.
- ECONOMY: Stand-by energy drain from power adapters' accounts for about 10% of an average home's annual power usage—this amounts to about $4 billion in wasted spending across the U.S. every year.
- JOBS: Projects like this could help create U.S. manufacturing jobs.

CONTACTS

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