Advanced Research Projects Agency • ENERGY

ADEPT PROJECT

TELEDYNE SCIENTIFIC & IMAGING

CHIP-SCALE POWER CONVERSION FOR LED LIGHTING

PROJECT TITLE:	Integrated Power Chip Converter for Solid-State Lighting		
ORGANIZATION:	Teledyne Scientific & Imaging, LLC	LOCATION:	Thousand Oaks, CA
PROGRAM:	ADEPT	ARPA-E AWARD:	$3,439,494
TECH TOPIC:	Other	PROJECT TERM:	10/1/10 – 9/30/12
WEBSITE:	www.teledyne-si.com		

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. Power stations also use power converters on a larger scale to modify electrical energy so it can be efficiently transmitted. 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

Teledyne is developing cost-effective power drivers for energy-efficient LED lights that fit on a compact chip. These power drivers are important because they transmit power throughout the LED device. Traditional LED driver components waste energy and don't last as long as the LED itself. They are also large and bulky, so they must be assembled onto a circuit board separately which increases the overall manufacturing cost of the LED light.

Teledyne is shrinking the size and improving the efficiency of its LED driver components by using thin layers of an iron magnetic alloy and new gallium nitride on silicon devices. Smaller, more efficient components will enable the drivers to be integrated on a single chip, reducing costs. The new semiconductors in Teledyne's drivers can also handle higher levels of power and last longer without sacrificing efficiency. Initial applications for Teledyne's LED power drivers include refrigerated grocery display cases and retail lighting.

IMPACT

If successful, Teledyne would help facilitate the widespread adoption of energy-efficient LED lighting.

- SECURITY: Widespread use of energy-efficient LED lighting would help lower U.S. energy consumption—helping the U.S. become more energy independent.
- ENVIRONMENT: Widespread use of energy-efficient lighting would help reduce electricity use and the harmful emissions created by coal-fired power plants.
- ECONOMY: This project could help significantly lower lighting costs for businesses, saving supermarket stores alone 70% in energy costs.
- JOBS: This project could help create U.S. manufacturing jobs.

CONTACTS

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