

The Tinker's Toolbox - a talk with Alex Lidow of EPC on GaN Technology

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Hosted by ECN's Editorial Director, Alix Paultre, the Tinker's Toolbox is ECN's web-based interview show where we talk about the latest technology, components, and design issues for the electronic design engineering community.



In this episode we talk to Alex Lidow, founder of Efficient Power Conversion (EPC) and a leader in GaN transistor technology. The company has recently released a family of enhancement-mode power transistors, based on its proprietary gallium nitride on silicon (GaN-on-Si) technology, for power management device applications.

Privately held fabless firm EPC was founded in 2007 by CEO Alex Lidow and other staff from El Segundo-based International Rectifier Corp (IR). Father Eric Lidow founded IR in 1947, and Alex Lidow joined in 1977 before co-inventing the HEXFET power MOSFET and being made a director and CEO in 1995.

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Here is another link to the podcast: [EPC Interview](#) [1]

Links to eGaN support materials:

eGaN Products: <http://epc-co.com/epc/Products.aspx> [2]

Fundamentals of eGaN Technology:

<http://epc-co.com/epc/ToolsandDesignSupport/ProductTraining/eGaNtradeFETBasics.aspx> [3]

Application Notes for eGaN FETs:

<http://epc-co.com/epc/ToolsandDesignSupport/ProductTraining/ApplicationofeGaNtradeFETs.aspx> [4]

Training Videos for eGaN FETs:

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Here is a press release on the technology and the situation between International Rectifier and EPC:

Efficient Power Conversion Corp (EPC) of El Segundo, CA, USA has introduced a family of enhancement-mode power transistors, based on its proprietary gallium nitride on silicon (GaN-on-Si) technology, for power management device applications.

Spanning a range of 40–200V and 4–100 milliohms, the power transistors demonstrate performance advantages over incumbent silicon-based power MOSFETs (metal-oxide semiconductor field-effect transistors), EPC claims. The firm's technology produces devices that are smaller than similar-resistance silicon devices and have many times better switching performance. Applications that can benefit are DC–DC power supplies, point-of-load converters, Class-D audio amplifiers, notebook and netbook computers, LED drive circuits, telecom base-stations and cell phones.

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However, after he resigned in October 2007, IR sued Lidow in January 2009, alleging theft of intellectual property related to GaN power devices and that Lidow stalled IR from making its GaN technology public in 2007.

IR also announced it was making prototype devices using a proprietary GaN-based power device technology platform (GaNpowIR, launched in September 2008) based on 150mm GaN-on-Si epitaxy. Based on a native depletion-mode GaN HEMT structure (which can be fabricated using standard CMOS production tools), IR's first GaN products (the iP2010 and iP2011, launched late last month, on 23 February) are power stage devices designed for multiphase and point-of-load (POL) applications, including servers, routers, switches and general-purpose POL DC-DC converters.

EPC countered that it was not using IR's GaN technology, and that it had developed a different semiconductor product. In contrast, EPC's GaN technology is enhancement-mode (normally OFF). Developed specifically to replace power MOSFETs (which are made by firms such as Fairchild, Infineon, International

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Rectifier, Texas Instruments, and Vishay), EPC claims that it is the first firm to introduce E-mode GaN-on-Si transistors as power MOSFET replacements for power management applications. The devices are produced in a standard silicon CMOS foundry on 150mm silicon wafers (EPC has received funding from foundry partner Epil of Taiwan). The use of such low-cost infrastructure has allowed EPC to price the initial products aggressively as it aims to accelerate the conversion from silicon power MOSFETs.

With products priced between \$0.80 and \$5.00 in 1000-unit quantities (comparable to high-end MOSFETs), the new technology is ready for commercial use. EPC has posted on its web site results from what it claims is the most extensive reliability testing ever performed on GaN power devices. It has also posted application notes, SPICE models, demo boards and development kits.

“EPC’s GaN-on-silicon power transistors represent the first major breakthrough in power conversion technology since the development of the commercial power MOSFET,” claims Lidow. “We have developed a very cost-effective and reliable technology that is also very easy for anyone with power MOSFET experience to use in a way that will significantly boost their power management system performance.”

EPC has also announced that electronic component distributor Digi-Key Corp will be the exclusive global distributor for its E-mode GaN power transistors. “EPC’s GaN-based power management products bring intriguing next-generation breakthrough benefits to existing MOSFET and bipolar solutions,” comments Dave Doherty, Digi-Key’s VP of semiconductor product. “Digi-Key has the fastest global logistics and the most efficient supply chain of any distributor with which I have worked over the last 30 years,” says Lidow. “This will translate into fast and easy service to all our global customers who want to get access to our enhancement mode GaN transistors to replace their less-efficient power MOSFETs.”

EPC is now shipping sample quantities to select strategic customers, and will start delivering product to general customers this quarter.

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