Published on Digitimes.com December 20, 2012
Author: Sun Changhua
Translation by EPC
www.epc-co.com

Efficient Power Conversion Corporation – Enhancement-mode Gallium Nitride Transistors

There has been a lot written about gallium-nitride (GaN) semiconductor devices over the last few years. For example, scientists at the Rensselaer Polytechnic Institute in the United States claim to have developed the world's first GaN MOSFET. They tried to exploit the higher breakdown voltages and more efficient energy conversion capabilities of GaN to replace silicon MOSFETs. Their objective was to create more efficient electronic devices that can operate in extreme conditions. Indeed, gallium nitride has been recognized as a promising material for many novel applications including wireless power transmission, RF DC-DC "Envelope Tracking", and high-energy pulsed lasers.

Efficient Power Conversion Corporation (EPC) is the first company to produce enhancement-mode GaN field-effect-transistor (eGaN® FETs), a disruptive technology that can replace power MOSFETs. According to Yole Development's 2011 research report, the worldwide GaN market projection is for 250% year-on-year growth from 2011 to 2015. For the silicon carbide (SiC) market, this report projected 35% year-on-year growth during the same period.

Speaking at National Taiwan University at its first international forum on "New-Generation High-Power GaN Semiconductor Devices and Green Electric Energy Applications" in November 2012, Dr. Alex Lidow, co-founder and CEO of EPC, took the opportunity to explain the technological breakthrough represented by eGaN FETs with a hundred-plus participants who fully packed the hall at the University.

Lidow candidly shared that the above-mentioned Yole projection for market adoption is too optimistic. The financial worries of the euro zone, slower economic expansion in China, to name a few, could threaten to slow anticipated growth. Additional factors in play for GaN to prosper include the rate at which design engineering companies' jump into the market with products that demonstrate GaN's advantages.

Lidow said, "We learned from the technology conversion from bipolar transistor to power MOSFET in 1980s that there are four key activities that will drive the rate of adoption of GaN technology". They are: 1) Make GaN devices easy to use; 2) Develop applications that are beyond silicon's capabilities; 3) Make GaN more cost-effective and 4) Establish GaN's reliability.

Professor Chen who organized this first international forum with his teams said, “With the emergence of high power GaN semiconductor devices, the development of power electronics technology and its applications will come up with unprecedented breakthrough”.

Yet another critical support comes from industry players. Quite a few competitors are raising the interest level of customers in GaN technology and can reduce the customers’ perceived risk as an early adopter. Lidow calls them “cooperators” in propelling adoption of this new technology.

At the time of writing this article, Fujitsu Semiconductor Limited seems to echo what Lidow said and just announced in November 2012 its achievement of a high output power (2.5kW) server power supply with gallium-nitride power devices built on a silicon substrate. These devices were aimed to significantly contribute to the realization of a low-carbon society through improved power conversion

“Efficient Power Conversion - Enhancement-mode Gallium Nitride Transistor”, Digitimes.com, December 2012