Breakfast with John Palmour of Wolfspeed

By Donald E. Burke, senior editor, Bodo's Power Systems

At ECCE 2015 in Montreal, I had the opportunity to interview Dr. John Palmour, Chief Technology Officer of Wolfspeed, the newly named Power and RF division of Cree, with a portfolio of SiC diodes, transistors and IGBT's, and microwave devices. Wolfspeed (Cree) products have been at the forefront of the Wide Bandgap materials revolution in the Power Transistor market. Wolfspeed is currently wholly owned by Cree, in anticipation of an IPO in 2016. John was one of the original "wolfpack" group of researchers that founded Cree in 1987.

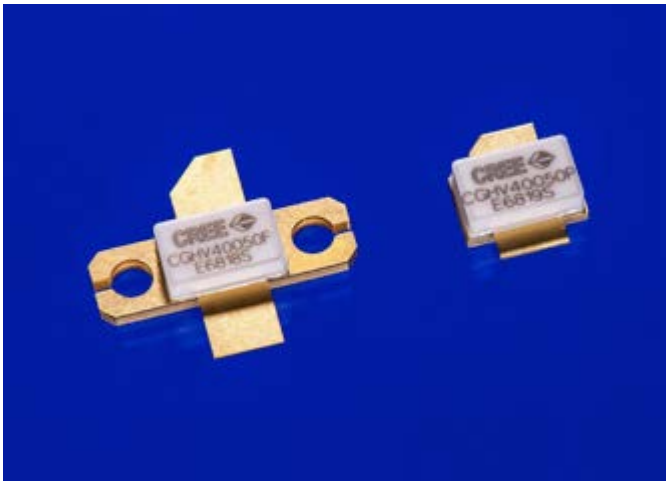
Don Burke: Now that Wolfspeed is operating as a separate business, what changes can we expect? And where did the name "Wolfspeed" come from?
John Palmour: Well, the product development program is quite well set, very challenging as it is, and we continue on much the same plan. This is a very dynamic business – so opportunities in the market and to our technology innovations will undoubtedly make for change.
I expect we will be even more agile in responding to these. I also expect that having independent access to capital will speed up investment, as it will now relate to the needs of Wolfspeed alone, rather than having to balance our needs versus those of Cree's LED business. I anticipate that this will quicken our pace – not that we have been slow to date.

We were very much part of the environment at North Carolina State University, and proud of the NCSU Wolfpack sports teams. So that nickname for our research group came pretty naturally. Wolfspeed is a good company name because it recognizes our roots and describing our products, which are all high speed semiconductors. The wolf is also an amazing animal - we don't think of it so much as a predator, but rather as a smart and agile animal that functions best in a group.

Don Burke: Did you six researchers fully understand the impact your work would have?
John Palmour: We always had an understanding that SiC could be a big game-changer, but truthfully we were really focused on our immediate work, so a societal change was only a background motivation. The possibilities of a blue LED were not fully understood in the beginning, so a revolution in lighting was not the immediate goal. We were focused on blue LEDs for full color displays and on SiC diodes and switches and their possibilities for electronics.

Don Burke: I see you have recently added 900 V products, lower than the acknowledged turf for SiC. What was the motivation for this, will you be going lower, and in general, what will be the voltage range for your products?
John Palmour: I'm not sure we cede any particular voltage as unfit for SiC – the product has a lot of advantages as a switch, so where these make sense, products will probably evolve. The 900 V line was a response to a particular application opportunity – well covered in our article in the September issue of Bodo's magazine. We continue to improve our 1200 V technology with our third generation C3M designs; we are actively developing products at voltages up to 15 kV where IGBT structures make sense; and doing advanced development up to 27 kV.

Don Burke: Will Wolfspeed introduce GaN power Transistors?
John Palmour: We do have a long history of producing GaN transistors, possibly more devices than anyone, but they are all directed to RF applications, and it represents a large segment of our current business. So we think we have a good understanding and capability in GaN technology.
But to answer your question – no, we have no current plans to enter the lower voltage applications with GaN. We believe that high voltage products in SiC bring a better value proposition to the market.



Don Burke: Wolfspeed now has a few Module products, as well as chips in many modules of other companies. What is your plan for Modules?
John Palmour: We do recognize that customers appreciate the packaged contribution that a multi-die module provides. And we salute the reliable performance and excellent engineering that many module manufacturers have introduced. We ourselves have added modules with conventional layouts to our product line as a way to get started in module manufacturing.
However, to take advantage of SiC performance, improved modules with far less parasitics; better access to gating; and capable of higher temperatures are required. These will undoubtedly result in different outline dimensions and connections than standard modules tailored for Silicon. We have active programs in development for new designs. We need to identify early-adopter customers that will design advanced products around new, non-standard, module designs.

Don Burke: Which kind'a brings us to the APEI subject. What's behind this?
John Palmour: APEI had a strong capability in device packaging. Many of these are specialty, high performance types. So we look to marry their capabilities with that of Wolfspeed and see what can be done. The acquisition is too early to have produced new products as yet, but we're working on it.

Don Burke: Wolfspeed has produced demonstrator Solar Inverter designs. Does this indicate an intention of Wolfspeed to begin equipment manufacture?
John Palmour: No, no plans, and particularly not for solar inverters as that industry has been so hard hit with changes in government support. The combination of Wolfspeed and APEI does have some very good system expertise however, and we hope that we can put that to work to assist our customers with designs and value propositions that complement their business.

Don Burke: Thanks for the discussion John; breakfast was tasty; and your views are interesting. Wolfpacks are known for their strong family support, and as a WBG industry leader, the Power Electronics community will look for guidance from Wolfspeed. Good luck with your new business!

www.wolfspeed.com

donaldb4@ieee.org