GaN RF MMIC Process Technologies Enable Lower Cost, Higher Performance

Cree introduces the new 40 Volt, 0.25um GaN-on-SiC HEMT process die product family to deliver revolutionary power and bandwidth capabilities through Ku Band. The innovative product family enables the replacement of Travel-Wave Tubes with solid-state amplifiers for improved efficiency and reliability. Cree will showcase its innovative performance capabilities at the 2012 IEEE International Microwave Symposium to be held June 17-22 in Montreal, Canada. “Cree’s 0.25um GaN HEMT die product family offers significant improvements in gain, efficiency and power density compared to GaAs transistors over the same frequency range,” said Tom Dekker, director RF sales and marketing, Cree. “The higher gain allows for more effective power combining schemes and enables solid-state power amplifiers to be produced with hundreds to multi-kilowatts at C-Band, X-Band and Ku Band.” Market applications include marine radar, medical imaging, industrial and satellite communication. Compared to GaAs transistors, solid-state amplifiers can improve reliability, reduce costs and boost efficiency while shrinking the size of not only the power amplifier but also the power supply. The higher efficiency of GaN HEMT power amplifiers can result in reduced transmitter power consumption. “Cree’s 0.25um GaN HEMT products demonstrate breakthrough performance in improved efficiency and bandwidth by enabling new classes of transistor operation not achievable with GaAs based transistors,” explained Ray Pengelly, RF business development manager, Cree. “Good examples are switch-mode HPAs which have been reported to offer greater than 80 percent power-added efficiency at microwave frequencies. GaN HEMT HPAs have been produced with instantaneous bandwidths from 6 to 18GHz at power levels exceeding 10W. These 0.25um GaN performance levels provide system engineers leapfrog advantages to re-invent their GaAs and tube transmitters.” The new GaN HEMT die products (CGHV1J006D, CGHV1J025D and CGHV1J070D) are rated at 6W, 25W and 70W of output power at 40V of drain voltage with an operating frequency range through Ku Band. This latest die family release is supported by Cree’s proprietary scalable large signal device models that are compatible with Agilent’s Advanced Design System and AWR’s Microwave Office simulator platforms, enabling RF design engineers to accurately simulate advanced RF amplifier circuits which can significantly reduce design cycle times – a most desirable requirement for the higher microwave frequencies. The 0.25um GaN-on-SiC HEMT process has been qualified to operate up to a drain voltage of 40 volts with industry-leading reliability. The mean time to failure exceeds more than one million hours at channel temperatures up to 225 degrees C. For additional information about Cree’s new 0.25um GaN-on-SiC HEMT die family, please visit www.cree.com [1].

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