

FAB\$ and LABS

Gearing Up For 5G



In March, Cree bought Infineon's RF power business, combining it with the RF segment of Wolfspeed. The acquisition adds LDMOS technology and products to Wolfspeed's GaN on SiC portfolio and strengthens Cree's position in the wireless infrastructure market—well-timed for the coming deployment of sub-6 GHz 5G. The deal included a world-class assembly and test facility in Morgan Hill, Calif., on the southern edge of Silicon Valley, which has been producing RF power devices for cellular infrastructure, defense and aerospace applications since the early 1990s.

The Morgan Hill capability began under Ericsson Components, when a small team of engineers was formed to design and set up a manufacturing capability for silicon bipolar devices, the technology of choice at that time. The market quickly moved from bipolar to LDMOS, which provided superior performance in power amplifiers for cellular infrastructure. In 2000, reflecting the growth of the product line, Ericsson began constructing a 54,000 square foot building in the same business park.

The manufacturing techniques and equipment in the Morgan Hill facility have changed dramatically over the last 20 years. In the early 90s, manufacturing was predominately manual. Today, fully automated and linked manufacturing lines produce tens of thousands of products per day, with no manual handling of the individual components. For void-free die attach, Wolfspeed uses multi-wafer equipment with an ultra-fast, proprietary die attach process. Assemblies are inspected by automated optical inspection, as they move in carriers down conveyor belts between the assembly machines. Automating manufacturing process-

es has enabled Wolfspeed to reduce cost and compete with off-shore manufacturers, as well as improving quality and product consistency, making Wolfspeed a top choice among customers. Product testing is also highly automated to minimize test time while assuring product performance.

LDMOS dominated the power amplifier market until the commercialization of GaN on SiC, which provides higher power density and higher efficiency. GaN has largely supplanted LDMOS for defense applications and is establishing a beachhead in wireless infrastructure, where efficiency and bandwidth are key performance requirements.

As amplifier architectures for cellular infrastructure have changed over the years, so has the device topology. Today, most devices are used in Doherty configurations, and many of these devices are produced as a "Doherty in a package," with both the main and peak transistors assembled in one package. Production RF testing is performed in the Doherty configuration, which ensures high board assembly yield for the customer.

The manufacturing capability in Morgan Hill is equally adept with LDMOS and GaN power transistors. The components produced in the facility cover a wide range of frequencies and power levels: from 300 MHz to greater than 5 GHz, and from a few watts to over 1.4 kW pulsed output power for the latest GaN on SiC transistors. Wolfspeed's Morgan Hill facility is the largest U.S. manufacturer of RF power transistors, prepared to support the significant demand for power transistors from the coming ramp of 5G—both LDMOS and GaN.

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