

Infineon's acquisition of Wolfspeed just the beginning of collaborations in SiC power electronics

After International Rectifier & Infineon, Fairchild & ON Semiconductor, Wolfspeed & APEI, and now Infineon & Wolfspeed, market analyst firm Yole Développement wonders who will be next to merge.

The agreement in mid-July for Infineon Technologies AG of Munich, Germany to acquire the Wolfspeed Power & RF division of Cree Inc of Durham, NC, USA for \$850m has drawn a lot of attention in the compound semiconductor world. The deal also includes the related SiC wafer substrate business for power electronics and RF power electronics.

The power electronics industry landscape is evolving, and consolidation is increasing, noted Yole in its report 'Status of the Power Electronics Industry 2016' (issued in June). International Rectifier and Infineon Technologies, Fairchild Semiconductor and ON Semiconductor, Wolfspeed and APEI ... Now, Infineon and Wolfspeed.

Indeed, the Infineon's acquisition of Wolfspeed occurs amidst a power electronics industry where silicon carbide (SiC) technology benefits are well known and where business opportunities have been clearly identified by industrial companies. In its latest compound semiconductor technology & market analysis report 'Power SiC 2016: Materials, Devices, Modules, and Applications', Yole Développement forecasts that the market is rising at a compound annual growth rate (CAGR) of 19% from \$200m in 2015 to \$550m in 2021.

"Wolfspeed and Infineon Technologies are leaders in the SiC power devices industry. The combination of both players will clearly strengthen the leading position of Infineon Technologies in the SiC power business," notes technology & market analyst Dr Hong Lin. "This is a win-win acquisition." According to Lin, Infineon's market share should rise by more than 50% if the full acquisition is confirmed.

Lin gives the following analysis:

- Infineon and Wolfspeed are both established players in SiC diode manufacturing.
- Wolfspeed has developed a powerful SiC MOSFET solution, which is clearly more advanced than Infineon's,

i.e. within the commercialization phase: Wolfspeed's Gen 3 has already been commercially available for two years and has a good reputation. From its side, Infineon just released its MOSFET component in May. Within a SiC MOSFET market that is just taking off, Infineon's acquisition of Wolfspeed ensures its development in this market segment.

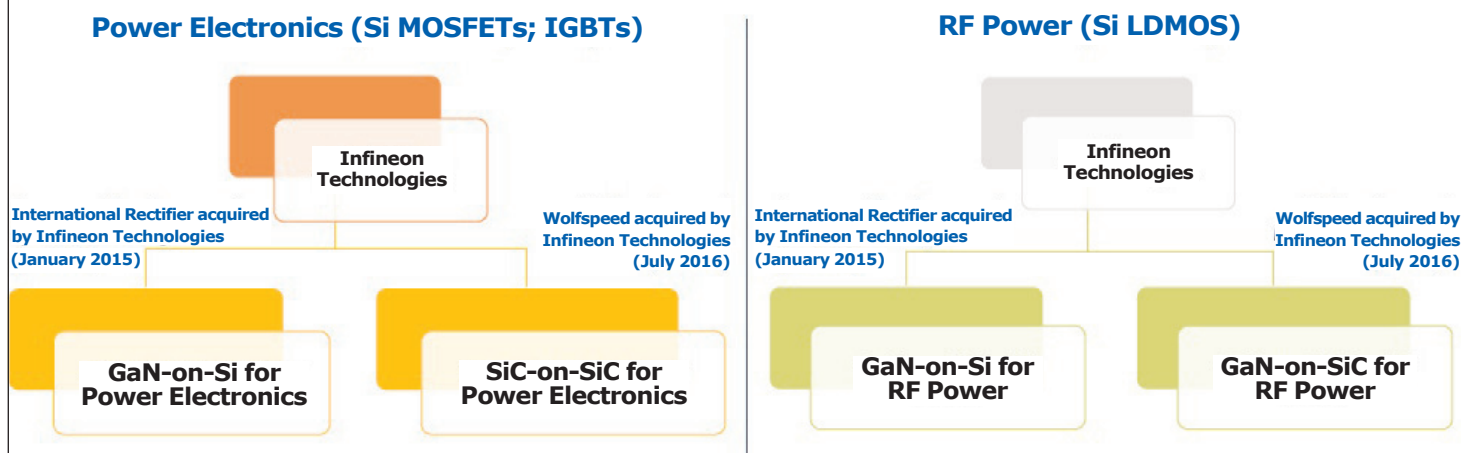
- In parallel, as number 1 in the incumbent silicon power business, Infineon has a well-established client portfolio. The firm has a strong understanding of the market's needs, its players, and the technical specifications related to power electronics applications.
- Infineon also has significant experience in power packaging for semiconductors, which is considered to be the main business bottleneck for SiC power electronics currently. Last year, to reinforce its packaging capability, Wolfspeed acquired Arkansas Power Electronics International Inc (APEI) of Fayetteville, AR, USA, a provider of SiC power modules and power electronics applications. Now, with the support of Infineon, Wolfspeed can further accelerate its product development and reaffirm the leadership of its technology approach.
- Finally, Infineon's investment and large-scale production capability could support Wolfspeed in ramping up production and expansion.

As well as Wolfspeed's SiC devices for power electronics applications, the acquisition also includes activities focused on GaN-on-SiC for RF applications. According to Yole's report 'GaN RF Devices Market: Applications, Players, Technology, and Substrates 2016-2022' (issued in June), the GaN RF devices market will double in the next five years, due to widespread adoption within various market segments. As a result, the acquisition of Wolfspeed gives Infineon direct access to the emerging GaN RF market.

With the two acquisitions over an 18-month period (from January 2015 to July 2016), Infineon has reaf-

Power Electronics & RF Power: Infineon Technologies' acquisitions & market positioning

(Sources: Power SiC 2016: Materials, Devices, Modules, and Applications report — Status of the Power Electronics 2016 report
— GaN RF Devices Market: Applications, Players, Technology, and Substrates 2016–2022 report)



firmed its market-leading position, says Yole, strengthening its activities in the emerging wide-bandgap (WBG) semiconductor technology sector.

The several recent mergers and acquisitions, such as Infineon Technologies and International Rectifier, ON Semiconductor and Fairchild Semiconductor, have launched a phase of consolidation in the power electronics industry, notes Yole. "We see this acquisition [of Wolfspeed] as the beginning of a series of impres-

sive collaborations within the SiC power business in the coming years," says Yole business unit manager Dr Pierric Gueguen. "This industry trend is likely to continue and to further increase in the future." ■

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