SiC Market
2010-2020: 10 year market projection...

SiC market is now a real industry, not a niche anymore...

SiC INDUSTRY CONSOLIDATION AND RESHAPING HAS STARTED

SiC device makers now offer the 2 most expected devices in the power electronics industry: the diode and the transistor. 2011 is the year of the first SiC MOSFET introduction with simultaneous offers from Rohm and CREE.

These devices are used in real systems (air conditioners, motor drives, PV inverters...) and significant effort is being directed toward the packaging side to capture all the added-value of the SiC (High T°, high frequency...)

Thus, the open SiC device market has exceeded $50M in 2010 (excluding defense-related and R&D contracts) with an unexpectedly high penetration in the PV inverter segment where SiC Schottky diodes are now implemented in numerous systems, taking about 15% of the SiC device sales. PFC systems are still the top SiC device sales.

The pending question remains the same: will SiC be implemented in EV/HEV and when? Here several scenarios may be envisioned. In our optimistic scenario, the automotive-related business will start by 2014 with a fast ramp-up and will capture more than 60% of the SiC device business in 2020. On the other hand, in our pessimistic scenario SiC could be skipped by auto makers who may prefer GaN or incumbent Silicon technology.

The investment level in the SiC industry has never been so huge: Over $100M has been invested in M&A, R&D programs, private and public funding over 2010 and early 2011.

Very recently the SiC industry has also started to consolidate through M&A, large investments or license agreements. Over the last 18 months, the most significant were:
- Rohm – SiCrystal: acquisition
- Power Integration – SemiSouth: large investment
- Fairchild – TranSiC: acquisition
- Cree – Nippon Steel Corp.: license agreement
- SKC – Crysband: acquisition
- Infineon – SiCed: 100% acquisition

HIGH VOLTAGE: HUGE POTENTIAL BUT FEW PLAYERS...

We definitely assume that the safe area for SiC technology will be the high and very high-voltage applications (1.7kV to 10kV+) where GaN cannot easily go and where incumbent Silicon technologies are slowly reaching their limits. In the 10kV and more, SiC could be the dominant solution. However, and paradoxically, few players are targeting that high-voltage region, probably because the existing market is small (about $2B TAM), unclear time-to-market and limited number of applications.
Although 6” SiC wafer capacity is now ramping-up for LED production at CREE, the power industry is not yet able to access it in volume. We expect 2012 to be the starting point for a wide diffusion of this 150mm substrate that should act as an incentive for the remaining reluctant companies, arguing that SiC wafers are not compatible with their existing tool-kit.

**6” IS READY BUT NOT ACCESSIBLE IN VOLUME**

In most of our investigations, GaN is always mentioned as THE competing technology that can disrupt the expected natural and organic growth of the SiC business. Originally we though GaN devices could have created turbulence in the SiC area starting from 2010, by proposing 600V devices with a tip-point at 1.2kV. However it seems that the technology achievements have been delayed compared to the previous roadmap and only 200V GaN device are available in volume as of now. Thus, at the moment, the 600V blurry region where SiC and GaN are supposed to fight is safe for SiC as no device can compete yet.

**IS SiC SELF-PROTECTED AGAINST GaN MARKET PENETRATION?**

Of the 7 new entrants listed in the last 12 months, 4 were established in China and 3 among them were dedicated to material (raw wafer and/or epi). Epiworld, TianYue and TYSCT have invested extensively in top-class equipment to produce both SiC wafers and epiwafers. Kingway Technology will be active in the device area with a double entry: SiC and GaN from epi to device.

2 startups have ambitions of SiC device activity: Anvil Semiconductors in the UK and Ascatron, a spin-off from Swedish ACREO.

On the exit side, we have noticed the NeoSemiTech decision to cut its SiC activity as well as the 100% acquisition of SiCed by Infineon (formerly owned jointly with Siemens).

**LIFE AND DEATH: IS CHINA THE NEW ELDORADO FOR SiC BUSINESS ESTABLISHMENT?**

**COMPANIES CITED IN THE REPORT:**


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