GaN MOCVD reactor installations to total 220 in 2015

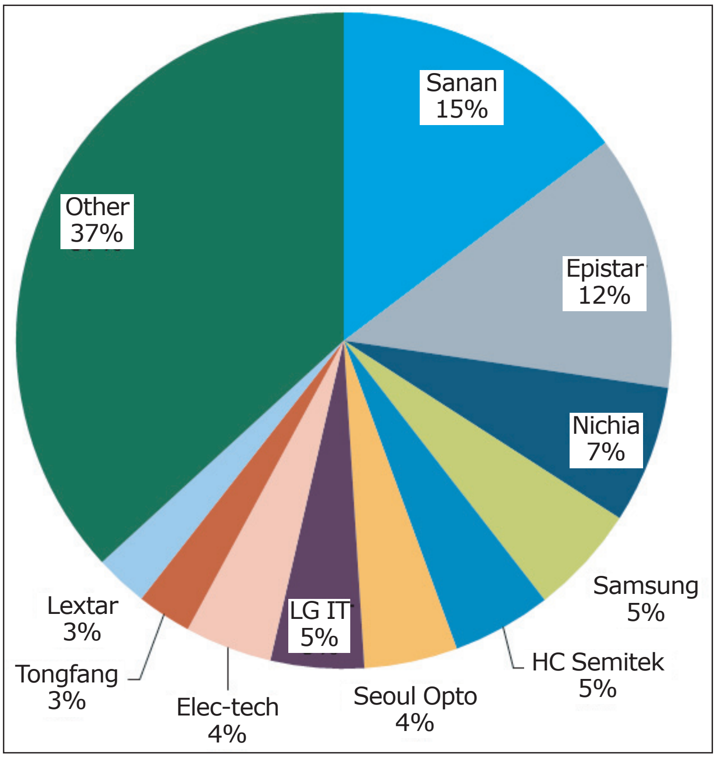
Three largest Chinese firms to take 27% of installations, reckons IHS.

Due to the major aggressive expansion plans of some Chinese LED firms, 220 gallium nitride metal-organic chemical vapour deposition (MOCVD) reactors will be installed in 2015, according to the latest data from the IHS LED Intelligence Service. This large number of MOCVD tool shipments will result in a 28% increase in the level of excess supply in the LED industry, forecasts market research firm IHS.

The new capacity expansion is slightly different from what happened several years ago, when large numbers of LED companies in China purchased government-subsidized tools, notes IHS.

The firm forecasts that this year only large and publicly traded companies will purchase MOCVD systems. The bar chart above shows the largest 20 MOCVD customers by the end of 2014: eight are Chinese companies and three of those — Sanan, HC Semitek and Aucksun — have announced expansion plans for 2015.

Most of the new reactors purchased in 2015 will be new-generation tools, which provide double the capacity per reactor. By the end of 2015, Sanan is projected to lead in 2-inch-equivalent wafer capacity share, although Epistar will still own the largest number of MOCVD tools. The three largest Chinese firms will achieve a combined market share of 27% in 2015, concludes IHS. ■



2"-equivalent GaN LED wafer capacity by end 2015.

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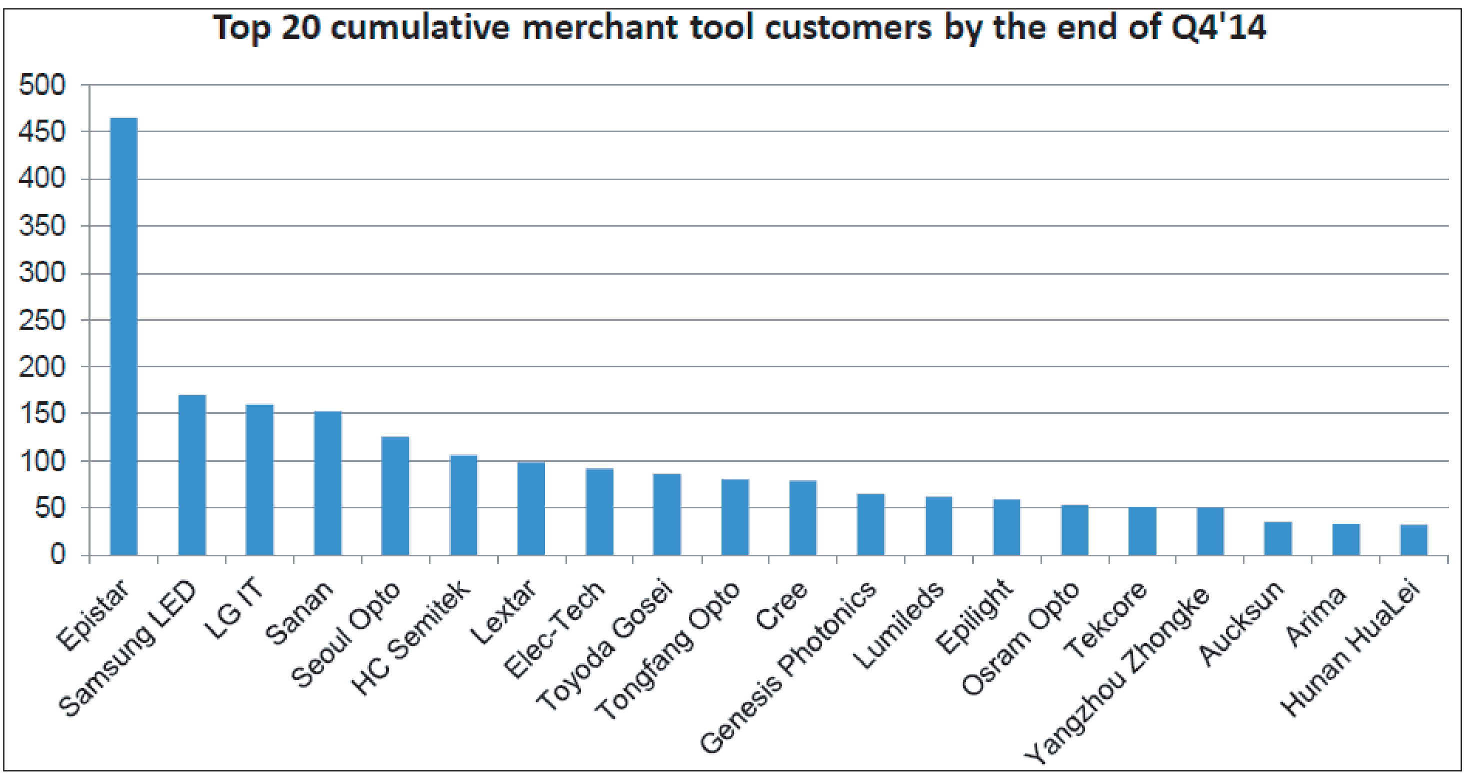

SiC and GaN power semiconductor market to grow 17-fold to $2.5bn in 2023

Price and performance parity with silicon MOSFETs, IGBTs and rectifiers expected in 2020, forecasts IHS.

Energized by growing demand for power supplies, hybrid and electric vehicles, photovoltaic (PV) inverters and other established applications, the emerging global market for silicon carbide and gallium nitride power semiconductors will grow by a factor of 17 over the 10 years from 2013 (just $150m) to 2023 ($2.5bn), forecasts market research firm IHS Inc in the report 'The World Market for SiC & GaN Power Semiconductors — 2014 Edition'.

SiC and GaN power semiconductors have been trying to establish themselves in key applications for a few years now. However, about 15% of the eventual market could consist of new applications using these device technologies that are currently still two or three years away from production. In addition to the market for hybrid and electric vehicles themselves, it is now apparent that the electric vehicle charging infrastructure market — including battery charging stations for plug-in hybrid and battery-electric vehicles — is also a potentially interesting sector for SiC and GaN power devices.

There is no agreed global standard for hybrid-electric vehicle (HEV) charging infrastructure, so there are various competing standards describing the various levels or modes for AC and DC charging. All of the assorted AC levels can be considered to be for electro-mechanical systems, which require few, if any, power semiconductors. The IHS report therefore only considers DC or 'fast charging' systems, because these are AC–DC power supplies, converting power from the mains (typically three-phase) into very high currents of up to 125–400A at direct-current voltages up to 480–600V_{DC} (delivering a maximum power of 240kW).

Wireless power charges battery-powered appliances by transmitting power through the air instead of through power cables. Although proximity within a specified range is required, this technology is gaining in popularity in mobile phones, game controllers, laptop computers, tablets, electric vehicles, and other commodity products. The adoption of SiC and GaN power semiconductors will be negligible in inductive charging solutions, which are designed to comply with the Wireless Power Consortium (WPC) Qi or Power Matters Alliance (PMA) standards, because silicon metal-oxide-semiconductor field-effect transistors (MOSFETs) are adequate for the low frequencies involved. In contrast, the fast-switching capabilities of SiC and GaN power semiconductors are ideal for magnetic-resonance power-transfer applications, which perform well at the higher frequencies of the Alliance for Wireless Power (A4WP) standard.

As numerous consumer electronics applications use fairly low voltages, they will be more suitable for GaN devices. The only area of this application thought suitable for SiC power devices is wirelessly charging battery-powered electric vehicles, such as plug-in hybrid vehicles (PHEVs) etc.

Two more applications that could potentially use SiC power modules are wind turbines and traction. In both cases the biggest barriers to adoption are their high cost, unproven reliability, and a lack of availability of high-current-rated modules, in general, and of full SiC modules in particular. Both applications typically require 1700V modules, a voltage at which few SiC transistors have already been developed. Trials are underway, but commercial production is not expected to start until 2016 or 2017.

For high-voltage SiC technologies, there are many new medical applications and other potential industrial applications. For low-voltage GaN devices, the new applications include many emerging technologies that are expected to drive significant growth in the future, such as wireless envelope tracking, light detection and ranging (LIDAR), Class-B audio amplifiers, and medical devices.

IHS says that the key factor determining market growth will be how quickly SiC and GaN devices can achieve price parity with — and equivalent performance of — silicon MOSFETs, insulated-gate bipolar transistors (IGBTs) or rectifiers. Price and performance parity is forecast to occur in 2020, and the SiC and GaN power market is subsequently expected to experience tremendous growth through 2023. ■

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