

RF GaN market to grow at 22.9% CAGR over 2017–2023, boosted by 5G implementation

Threefold increase over next five years to be driven by telecoms and defense.

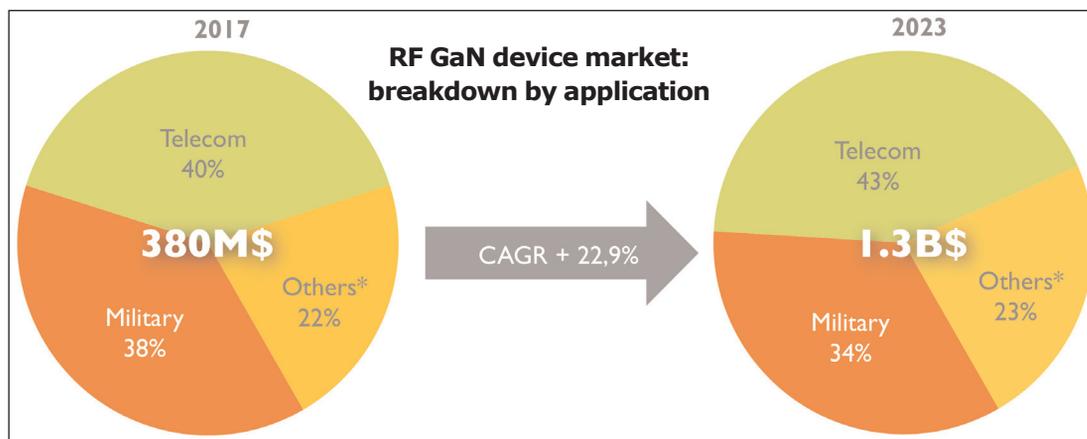
In the last couple of years, the radio-frequency gallium nitride (RF GaN) market has been reshaping the RF power industry landscape after seeing impressive growth to nearly \$380m by the end of 2017 (which was undoubtedly a good year), says Yole Développement in a new report 'RF GaN Market:

Applications, Players, Technology, and Substrates 2018–2023'. The penetration rate in various markets had a breakout period in the last two years, particularly in telecom and defense applications, which saw a compound annual growth rate (CAGR) of more than 20%.

But Yole expects that, led by the implementation of 5G networks, another a strong surge will occur around 2019–2020, so that the total RF GaN market will be 3.4 times larger by the end of 2023, posting a CAGR of 22.9% over 2017–2023.

The report covers GaN's presence and development in markets including wireless infrastructure, defense and aerospace, satellite communication, wired broadband - both in coaxial cables used in cable TV (CATV) and fiber-to-the-home — and other industrial, scientific & medical (ISM) radio band applications.

Recognized by industry players, RF GaN technology is becoming the current mainstream within the RF industry, which is mostly dominated by the integrated device manufacturers (IDMs) Sumitomo, Qorvo and Cree (which has reintegrated its Wolfspeed business after the latter's acquisition by Infineon was thwarted). However, the industry is at a critical stage, as the future should be different due to the penetration of foundries. In addition, Ampleon has announced an acquisition offer by Chinese LED maker Aurora Sapphire (a competitor of San'an Optoelectronics). With the GaN industry expected to grow in the coming years, existing market leaders will no doubt increase their revenue, but they will likely not increase their market share, predicts Yole.



Telecom and defense driving market

In the future, Yole sees telecom and defense markets as the mainstay of the industry.

Due to the increasing pace of development of 5G networks, the telecom market will bring a huge opportunity for GaN devices, beginning in 2018, reckons Yole. Compared with existing silicon LDMOS and gallium arsenide (GaAs) solutions, GaN devices can deliver the power/efficiency required for next-generation high-frequency telecom networks. Also, GaN's broadband capability is a key factor for enabling important new technologies, such as multi-band carrier aggregation.

GaN high-electron-mobility transistors (HEMTs) have been the candidate technology for future macro base-station power amplifiers. Yole estimates that most sub-6GHz macro network cell implementations will use GaN devices because LDMOS can no longer hold up at such high frequencies and GaAs is not optimum for high-power applications. However, because small cells do not need such high power, existing technology such as GaAs still has advantages. At the same time, market volumes will increase faster because higher frequencies reduce the coverage of each base station, hence more transistors will be implemented.

The defense market has been the major driving force for GaN development in the past decades. Originating in the US Department of Defense, GaN devices have been implemented in new-generation aerial and ground radars. GaN's high-power capability improves detection range and resolution, and designers are becoming increasingly familiar with the new technology.

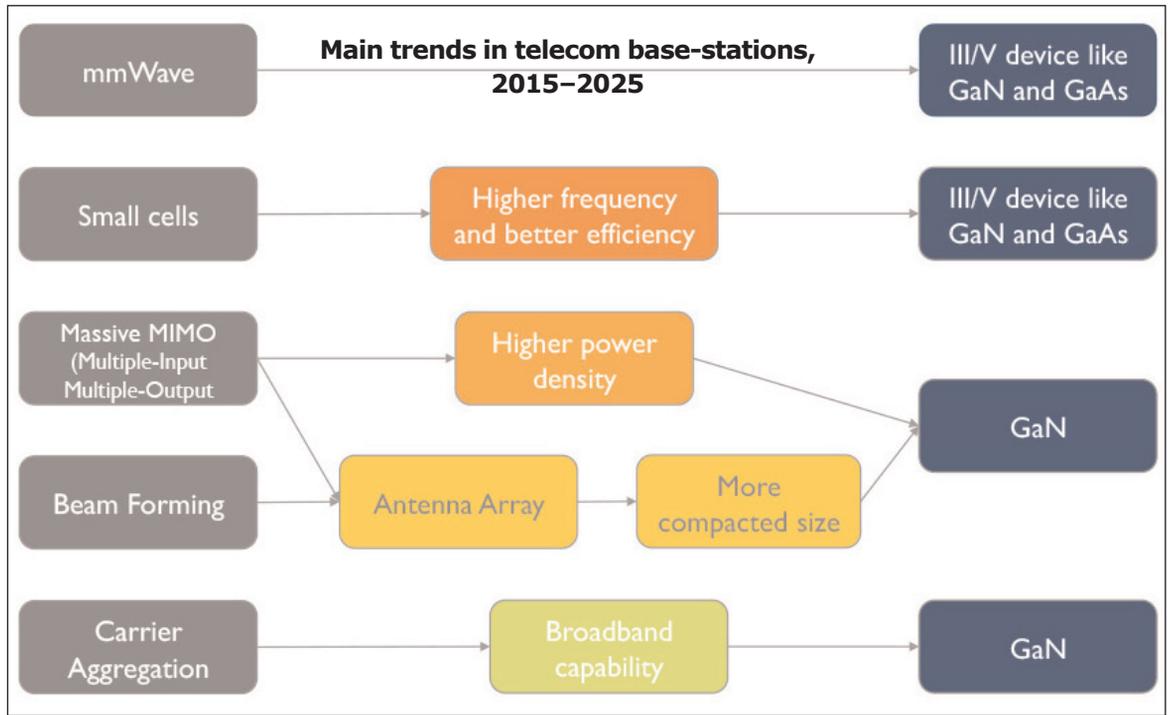
Nevertheless, this military-related technology is very sensitive. Also, as GaN devices are becoming popular in defense applications, development in the non-military segment could be affected. This is especially true in terms of mergers and acquisitions. Governments could block deals if businesses target military applications, as in the thwarted acquisitions of Aixtron by China-based FGC Investment Fund and of

Wolfspeed by Germany's Infineon Technologies.

"GaN RF has been recognized by the industry and has become mainstream," notes Zhen Zong, technology & market analyst at Yole. "Indeed, leading players are increasing revenue very rapidly and this trend will remain for the next several years," he adds.

The price of GaN transistors is still relatively high today. According to Yole's analysts, in the near future more and more players should penetrate the market, ensuring that volumes increase and prices decrease. In parallel, Yole highlights significant issues related to packaging. An effort in packaging could also strongly reduce prices to an attractive level.

More players are now choosing plastic packages: the industry is showing some movement on new types of packaging material and new die attach methods. Companies such as MACOM and Sumitomo have begun using silver sintering as the die attach material,



which aids thermal control and improves device quality. Also, it has been established that the next step will be to use pure copper as the flange material for packages.

Driven by significant R&D investments, new technologies in the package material and die attach will be used more frequently in higher-frequency and higher-power applications, reckons Yole. "Indeed, we believe it will help reduce the price and ameliorate the performance," says Zhen Zong.

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