GaN Devices for Power Electronics Patent Investigation

Description:

The potential energy efficiency savings from the adoption of GaN power semiconductor devices has led to significant research and development that is now beginning to be realized in commercially available devices. Today, there are only a few players selling Power GaN products (Infineon/IR, EPC, GaN Systems, Transphorm) and the market is still small, estimated at $10M in 2015 in Yole Développement's July 2015 'GaN and SiC devices for power electronics applications' report. But the ramp-up will be quite impressive, starting in 2016, at an estimated 93% CAGR through 2016-2020, with an estimated 2020 device market size of more than $300M in the baseline ‘nominal’ scenario.

The GaN power industry is consolidating in preparation for this significant growth, and GaN technology is spreading across the value chain. This can been seen in recent mergers and acquisitions (Infineon/IR, Transphorm/Fujitsu’s GaN Power Conversion business), license agreements (Infineon/Panasonic, Transphorm/Furukawa) and the will of several firms to move onto the mass production stage (Transphorm/Fujitsu). As GaN power devices are now poised for rapid market adoption, a strong intellectual property (IP) position is essential for companies to grow their GaN business. In today's Power GaN market, it is crucial to understand the global patent landscape through in-depth analyses. This enables you to anticipate changes, harvest business opportunities, mitigate risks and make strategic decisions to strengthen your market position and maximize return on your IP portfolio.

More than 1,960 patented inventions related to GaN power electronics have been published worldwide up to April 2015. The first patents were published in the mid-1990s by silicon power companies (Furukawa Electric, International Rectifier, Infineon). But the take-off of patenting activity was really observed ten years later with a first wave of patent publications over the 2005-2009 period, mainly due to American companies (International Rectifier, Power Integrations) and Japanese companies (Panasonic, Rohm, Furukawa Electric, Sumitomo Electric, Toshiba, Toyota). A second wave of patent publications started in 2010, mainly originating from Mitsubishi Electric, Fujitsu, Transphorm, Avogy and Infineon, while the first commercial products, collaborations, mergers and acquisitions emerged. Quite recently LED pure-players like Seoul Semiconductor have entered the Power GaN IP arena.

The time evolution of patent filings has reached a peak, and we expect a slowing down of new patent applications. Meanwhile, granted patents worldwide should increase after successful prosecution of the numerous pending patent applications. We believe the second peak of patent filings combined with the significant ratio of patents in force and the large number of patent applications still in the pipeline worldwide is an indication of the technology maturity heralding a future ramp-up of the GaN power market.

Key Features Of The Report:

1. IP trends including time evolution and countries of filing
2. Power GaN market data and forecasts
3. Ranking of main patent applicants
4. Joint developments and IP collaboration network of main patent applicants
5. Key patents and granted patents near expiration
6. Relative strength of main companies' IP portfolios
7. Matrix showing patent applicants and patented technologies
8. Segmentation of patents:
   - by technology levels, including epiwafers, devices, modules and packaging,
   - by technical challenges, including current collapse, E-mode and cascode,
   - and by type of substrate including SiC, silicon, sapphire and bulk GaN.
Objective Of The Report:

Review the context for Power GaN technology and market trends.
- Review Power GaN's technical challenges and as known solutions.
- Understand the IP landscape for GaN power electronics.
- Comprehend key trends in IP and technology development.
- List the major players and the relative strength of their patent portfolio.
- Name new players.
- Identify IP collaboration networks between key players (industrial and academic).
- Position key players within the value chain and understand their strategic decisions.
- Identify current legal status of patented technologies.
- Identify key patents by assignees and technology.
- Identify blocking and valuable patents.
- Overview of past and current litigations and licensing agreements.
- Avoid patent infringement.
- Appreciate the link between the patent landscape and market evolutions.

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