

Gallium Nitride – Next Gen Power Semiconductor

Based on the materials of the consulting company Frost & Sullivan

Gallium Nitride (GaN) has gained traction in recent years owing to the shift observed in the global semiconductor scenario wherein the silicon dominated semiconductor industry is receding due to the design, power, and switching constraints posed by silicon. Hence, the time is ripe to invest in research, development, and commercialization of products based on GaN.

Properties of GaN:

- Unique properties of GaN such as high speed switching makes it attractive for high power electronics applications.
- GaN can be instrumental in reducing the overall circuit power consumption as the energy losses are minimal. The high breakdown voltage and low conduction resistance of GaN while operating at high voltages and high temperatures results in minimal energy losses.

GaN transistors such as FETs (field-effect transistors) and Schottky diodes are few of the semiconductor devices currently available in the market. These are being used in power electronic systems such as inverters, switch mode power supply systems, wireless charging circuits, and industrial drives.

Application Scenario of GaN:

- As the world is moving into adopting renewable energy such as solar and wind as there is growing concern across the globe over the harmful effects caused by greenhouse gases, power electronic devices such as inverters and critical circuits for wind turbines are being incorporated with GaN. This will increase power efficiency while bringing down the circuit size.
- GaNtronics will be pivotal in development of HEVs (hybrid EVs) and EVs as GaN circuits are smaller in comparison to silicon and can operate at high voltage and high temperature. This will provide flexibility to automotive OEMs (original equipment manufacturers) to design the automobiles without much stress on space constraints.

Key Companies working in GaN:

Efficient Power Conversion Corporation, Transphorm, GaN Systems, Infineon Technologies AG, NXP Semiconductors, Texas Instruments, LG, and Panasonic are some of the key companies across the globe working in the domain of GaN. Few promising start-ups such as VisiC, Exagan and EpiGaN are also entering the GaN semiconductor market with their unique product offerings.