

Freescale creates first commercially viable GaAs MOSFET device

Freescale Semiconductor has developed the industry's first device that combines the high performance of gallium arsenide (GaAs) semiconductor compounds with the advantages of traditional metal oxide semiconductor field effect transistor (MOSFET) technology and its scaling laws.

Freescale's breakthrough enables the development of new classes of power amplifier and low-power, ultra-fast semiconductors that significantly shrink the size and boost the performance of end devices. The performance improvements could fundamentally change analog-to-digital conversion technology, potentially making such conversions virtually instantaneous.

"Freescale's GaAs MOSFET technology holds the promise of having a disruptive impact in the industry," said Asif Anwar, GaAs Services director for Strategy Analytics. "It offers potential leaps in device performance built upon a bedrock of mature manufacturing capabilities."

Silicon-based MOSFET technology forms the bedrock of CMOS, which is the most widely used microelectronic design process and is found in virtually every electronic product. Prior to Freescale's breakthrough, fundamental scientific limitations prevented the application of industry standard MOSFET processes, equipment, and interconnect methods in GaAs, which is a material that generates less noise and conducts electrons up to 20 times faster than traditional silicon.

The industry's previous inability to deploy silicon dioxide or other dielectric materials into GaAs device technologies had prohibited the incorporation of metal oxide gate structures that are critical to the creation of viable GaAs-based MOSFET devices. Freescale has identified GaAs-compatible materials and devices that provide scaling capabilities on par with traditional silicon materials. This eliminates oxide-semiconductor interface defect issues that had discouraged the creation of high performance MOSFET devices based on GaAs compounds in the past.

"This remarkable achievement overturns industry assumptions and has the potential to fundamentally change the way high performance semiconductors are designed, manufactured and deployed," said Sumit Sadana, senior vice president of Strategy and Business Development and acting chief technology officer for Freescale. "This breakthrough demonstrates Freescale's relentless commitment to technology innovation."

Freescale anticipates that early generations of GaAs-based MOSFET devices will be highly specialized and designed to complement traditional semiconductor technology. Freescale will accelerate deployment of the technology by collaborating with partners focused on creating infrastructure, wireless and optoelectronic products requiring extreme computing performance.

Source: Freescale Semiconductor

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